UNIWERSYTET PEDAGOGICZNY
IM. KOMISJI EDUKACJI NARODOWEJ W KRAKOWIE

Erasmus+

winter semester:

Module I MODERN LABORATORY TECHNIQUES IN EARTH AND ENVIRONMENTAL SCIENCES

LABORATORY ANALYSIS OF FINE SEDIMENTS	20 ECTS
GEOGRAPHICAL INFORMATION SYSTEMS (QGIS)	
ATOMIC ABSORPTION SPECTROSCOPY – HOW TO QUANTIFY METALS IN ENVIRONMENTAL SAMPLES	
MICROSCOPY IN ENVIRONMENTAL STUDIES	

Module II PHYSICAL GEOGRAPHY

GIS IN HYDROLOGY	20 ECTS
OUTDOOR NAVIGATION	
TATRA MTS & ZAKOPANE	
GEOMORPHOLOGICAL LANDSCAPES	

summer semester:

Module I ANTHROPOCENE

LIVING IN A POLLUTED ENIVIRONMENT	20 ECTS
GIS IN NATURAL DISASTER PREVENTION	
HUMAN IMPACTS ON LANDSCAPE	
PAST AND CURRENT CLIMATE CHANGE	

Module II SOCIO-ECONOMIC GEOGRAPHY 1

ECONOMIC GEOGRAPHY	20 ECTS
GEOGRAPHY OF AGRICULTURE	
HUMAN GEOGRAPHY	
GLOBALISATION AND CITIES	

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Course card

Course title	**Laboratory methods of fine sediment analysis**

Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	Dorota Chmielowska-Michalak, PhD		
Department	Department of Physical Geography		

Course objectives (learning outcomes)

After completing the course, student can characterize the laboratory analysis for measurement of particle size and particle shape of fine grained sediments (from 0.5 microns to several millimeters). They are able to carry out analysis of their size and shape using specialist equipment and can interpret the results.

Prerequisites

Knowledge	The person who taking these course should understand and explain the relationships between the elements of the geographical environment based on the content of geology, geomorphology and hydrology. The person who taking these course should understand and describe basic statistical ratio.
Skills	The person who undertaking these course should be able to: - recognize and classify the basic types of rocks, - characterize the weathering covers made as a result of physical and chemical weathering processes from various types of rocks in various climatic conditions, - characterize the most important physical and chemical properties of the main soil types, - recognize the basic forms and describe the basic types of relief on the basis of cartographic materials.
Courses completed	

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours				15			

Teaching methods:

Course is conducted as a laboratory exercises and during the course students carry out individual or group projects. The analysis of fine graidned material is partially carring out using Morphologi G3SE (produced by Malvern). Discussion of analysis results based on literature.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
					x	x		x					

Assessment criteria	

Comments	

Course content (topic list)

1. Research of textural features of the Quaternary sediments (selected methods) 2. Grain size analysis as a tool for classifying sedimentary environments 3. Laboratory analysis for measurement of particle size and particle shape of fine grained sediments

Compulsory reading

1. Blott, S. J., Pye, K. 2001. GRADISTAT: a grain size distribution and statistics package for the analysis of unconsolidated sediments. Earth surface processes and Landforms, 26(11), 1237-1248. 2. Blott, S., Pye, K., 2008. Particle shape: a review and new methods of characterization and classification. Sedimentology 55, 31-63. 3. Folk RL, Ward WC. 1957. Brazos River bar: a study in the significance of grain size parameters. Journal of Sedimentary Petrology 27: 3-26. 4. Cailleux, A., 1942. Les actiones eoliennes periglaciaires en Europe. Mémoires de la Société géologique de France. Paléontologie 41, 1–176 (in French). 5. Polakowski, C., Sochan, A., Bieganowski, A., Ryżak, M., Földényi, R., Tóth, J., 2014. The influence of the sand particle shape on particle size distribution measured by laser diffraction method. International Agrophysics 28, 195-200. 6. Mycielska-Dowgiałło, E., 1993. Estimates of Late Glacial and Holocene aeolian activity in Belgium, Poland and Sweden. Boreas 22, 165-170. 7. Campaña, I., Benito-Calvo, A., Pérez-González, A., de Castro, J. B., Carbonell, E., 2016. Assessing automated image analysis of sand grain shape to identify sedimentary facies, Gran Dolina archaeological site (Burgos, Spain). Sed. Geol. 346, 72-83. doi: 10.1016/j.sedgeo.2016.09.010 8. Varga, G., Kovács, J., Szalai, Z., Cserháti, C., Újvári, G., 2018. Granulometric characterization of paleosols in loess series by automated static image analysis. Sed. Geol. 370, 1-14. doi:10.1016/j.sedgeo.2018.04.001

9. Chmielowska, D., Woronko, B., Dorocki, S.. 2021. Applicability of automatic image analysis in quartz-grain shape discrimination for sedimentary setting reconstruction. Catena, 207, 105602.

Recommended reading

1. Morphologi G3 Serise, August 2008. User Manual. Mano 410. Malvern Instruments Ltd (Issue 1.1)

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Course card

Course title	**Geographical Information Systems (QGIS)**		
Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	Rafał Kroczak PhD		
Department	Department of Physical Geography		

Course objectives (learning outcomes)

After completing the course the student will know the most common types of spatial data and their extensions, as well as the methods of their acquisition. The student will be able to create digital maps, analyze them and prepare them for publication. The student will also know how to perform basic GIS analyzes.

Prerequisites

Knowledge	Basic knowledge of cartography.
Skills	Basic computer skills, knowledge of Microsoft or/and Libre Office package.
Courses completed	-

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours				15			

Teaching methods:

The course is conducted with QGIS software. It is recommended to use personal laptops.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
							successful completion of all						

Assessment criteria	Pass: on the basis of successful completion of all exercises ordered by the teacher during the laboratory sessions (all partial exercises must be completed). Each student may be absent from a maximum of 2 sessions for whatever reason.

Comments	Each lecturer sets the method and date of delivering the exercise for final exam

Course content (topic list)

1. Introduction to QGIS. Functionalities and extensions.
2. Layers and their properties. Attribute table.
3. Geoprocessing and analysis tools
4. Working with the digital elevation model
5. Filtering and spatial queries
6. Spatial relations
7. Raster data and algebra maps
8. Final editing of maps (linear scale, legend, cartographic grid, descriptions, map orientation).

Compulsory reading

Bryndal, T., Kroczak, R. (2019). Reconstruction and characterization of the surface drainage system functioning during extreme rainfall: the analysis with use of the ALS-LIDAR data—the case study in two small flysch catchments (Outer Carpathian, Poland). Environmental Earth Sciences, 78(6), 1-16.
Fidelus-Orzechowska J., Wrońska-Wałach D., Cebulski J., Żelazny M. (2018). Effect of the construction of ski runs on changes in relief in a mountain catchment (Inner Carpathians, Southern Poland). Science of the Total Environment 630, 1298-1308.
Fidelus J., Kroczak R., Jucha W., Stasiak P. (2015). Interactive maps as an innovative tourist service – a comparison of cartographic websites of Polish National Parks. [w:] Managing the quality of tourism services, Lublin.

Recommended reading

Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). Geographic information science and systems. John Wiley & Sons.

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Course card

Course title	**Atomic absorption spectroscopy – how to quantify metals in environmental samples**

Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	dr hab. prof. UP Łukasz Binkowski		
Department	Institute of Biology and Earth Sciences,		

Course objectives (learning outcomes)

The course considers modern laboratory techniques and methods for measuring metal concentrations (mercury, cadmium, lead, and others) in environmental samples. The main emphasis is put in the course on the following:

- preparation of samples for metal analyses
- flame and electrothermal atomic absorption spectroscopy
- cold vapor atomic absorption spectroscopy
- quality control system in instrumental laboratories

Students learn how the techniques work and can try themselves as analysts.

Prerequisites

Knowledge	principles of chemistry, physics and mathematics
Skills	communicative English
Courses completed	-

Course organization											
Form of classes	W (Lecture)	Group type									
		A (large group)		K (small group)		L (Lab)		S (Seminar)		P (Project)		E (Exam)	
Contact hours						15					

Teaching methods:

Laboratory classes with samples preparation and analysis with different atomic absorption spectroscopy techniques. Preparation of report from laboratory classes including method description and results obtained with the instrument. Individual work of students outside of the classroom (reading scientific articles, consultation with the course lecturer and working on the individual report from laboratory classes).

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Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
					X	X		X		X			

Assessment criteria	The student graduate from the course based on active attendance at the laboratory classes. The quality of the report from the laboratory activities will be assessed.

Comments	Course taught in English.

Course content (topic list)

1. Introduction to sampling methods of environmental samples.
2. Preparation of the samples collected for further analyses.
3. Method of instrument calibration.
4. Flame and electrothermal atomic absorption spectrometry.
5. Cold-vapour atomic absorption spectrometry.
6. Results recalculations.
7. A quality control system in instrumental laboratories.

Compulsory reading

1. Publication of the course coordinator including a detailed descrpition of instrumental method used „Binkowski Ł.J., Meissner W., Trzeciak M., Izevbekhai K., Barker J. 2016. Lead isotope ratio measurements as indicators for the source of lead poisoning in Mute swans (Cygnus olor) wintering in Puck Bay (northern Poland). Chemosphere 164, 436–442."
2. Publication of the course coordinator including a detailed descrpition of instrumental method used „Binkowski Ł.J., Sawicka-Kapusta K. 2015. Lead poisoning and its in vivo biomarkers in Mallard and Coot from hunting activity areas. Chemosphere 127, 101–108".

Recommended reading

Skoog D., Holler F., Crouch S. 2007: Principles of Instrumental Analysis. Thomson Brooks/Cole.

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Course card

Course title	**Microscopy in environmental studies**

Semester (winter/summer)	winter	ECTS	5

Lecturer(s)	Dr hab. Gabriela Gołębiowska-Paluch, prof. UP	

Department	Institute of Biology and Earth Sciences, Chair of Genetics	

Course objectives (learning outcomes)

The course presents general principles of microscopy and how it is used to study environmental samples. It contains presentation of the structure and principle of operation as well as the possibility of practical use of the light microscope, fluorescence microscope, Nomarski contrast, dark field and polarized light microscope. During the course students will exercise various methods of preparation, staining and imaging possibilities as well as they will observe environmental objects like microbial, plant and animal samples from water, soil and other environmental samples. In addition, it will be possible to observe crystalline and paracrystalline substances in polarized light.

Prerequisites

Knowledge	Principles of biology
Skills	English medium stage
Courses completed	-

Course organization											
Form of classes	W (Lecture)	Group type									
		A (large group)		K (small group)		L (Lab)		S (Seminar)		P (Project)		E (Exam)	
Contact hours						15					

Teaching methods:

Laboratory classes with samples preparation and analysis under the microscope. Preparation of report from laboratory classes including method description and images taken under the microscope during classes by using digital camera. Individual work of students outside of the classroom (reading scientific articles, consultation with the course lecturer and working on the individual report from laboratory classes).

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
					X	X		X		X			

Assessment criteria	The student graduate from the course based on active attendance at the laboratory classes. Quality of the report from the laboratory activities will be assessed.

Comments	Course taught in English.

Course content (topic list)

1. Construction and principles of operation of light and fluorescence microscope. Types of lighting and filters. Operation of the NIKON H600L microscope, change of filters, camera settings, observation of differences, use of the NIKON Nis-elements program and documentation of the obtained images. 2. Observation in Nomarski contrast, polarized light and dark field microscopy of biological and non-biological samples. 3. Autofluorescence - what and why gives fluorescence and how to use it. Preparation of material for autofluorescence observation. Observation of autofluorescence in various biological material. 4. Non-specific and specific fluorescent dyes: principle of operation and result. 5. Cell viability tests in reaction to environmental factors.

Compulsory reading

https://www.nikoninstruments.com/en_EU/Learn-Explore/Techniques/Fluorescence https://www.microscopyu.com/techniques/fluorescence/introduction-to-fluorescence-microscopy The indicated web-pages give clear description of the subjects presented during the course, together with schemes and illustrations. Much more is available for those who want to deepen their understanding of fluorescence.

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Recommended reading

Lembicz, M., Miszalski, Z., Kornaś, A., & Turnau, K. (2021). Cooling effect of fungal stromata in the Dactylis-Epichloë-Botanophila symbiosis. Communicative & integrative biology, 14(1), 151-157.

Dubas, E., Custers, J., Kieft, H., Wędzony, M., & van Lammeren, A. A. (2014). Characterization of polarity development through 2-and 3-D imaging during the initial phase of microspore embryogenesis in Brassica napus L. Protoplasma, 251(1), 103-113.

Szechyńska-Hebda, M., Hebda, M., Mierzwiński, D., Kuczyńska, P., Mirek, M., Wędzony, M., ... & Karpiński, S. (2013). Effect of cold-induced changes in physical and chemical leaf properties on the resistance of winter triticale (× Triticosecale) to the fungal pathogen Microdochium nivale. Plant Pathology, 62(4), 867-878.

Dubas, E., Golebiowska, G., Zur, I., & Wedzony, M. (2011). Microdochium nivale (Fr., Samuels & Hallett): cytological analysis of the infection process in triticale (× Triticosecale Wittm.). Acta physiologiae plantarum, 33(2), 529-537.

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Course card

Course title	**Living in a polluted environment**		
Semester	summer	ECTS*	4
Lecturer(s)	Dr hab. prof. UP Łukasz Binkowski		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

Heavy metals, pesticides, smog, PAHs and dioxins – every day we hear about the different elements and chemicals that threaten the biosphere, including man. What is the real risk? How to defend against them? Are these threats real or just catchy slogans? And why all of this combines ecology? The course is going to answer these questions. Participants will discuss the major threats to the environment, the mechanisms of circulation and detoxification as well as the impact of toxic substances on populations and ecosystems. They will also participate in the scientific project in the field of ecotoxicology.

Prerequisites

Knowledge	-
Skills	English: speaking, reading and writing
Courses completed	-

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours	10			5			

Teaching methods:

Lab classes and tutoring discussions accompanied with multimedia presentations, scientific movies, publications and e-learning platform activities.
Individual work of students outside of the classroom (scientific research – individual project, reading popular-scientific and scientific articles).

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Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
	x				x	x		x					

Assessment criteria	Points from the test done on the e-learning platform, quality of the project.

Comments	Course taught in English.

Course content (topic list)

1. What is the ecotoxicology (short description of ecology and toxicology)?
2. The tragic story of the development of ecotoxicology.
3. Why everyone should be interested in ecotoxicology?
4. The main mechanisms studied by ecotoxicology.
5. Fundamentals of environmental monitoring.
6. The impact of pollutants on organisms and detoxification mechanisms.
7. Overview of key toxic substances (heavy metals, pesticides, pharmaceuticals, smog, etc.).
8. Interactions between toxic substances and environmental factors.
9. The impact of pollution on populations and aquatic and terrestrial ecosystems.
10. The latest trends in ecotoxicology and the applied ecotoxicology.

Compulsory reading

1. Walker C.H., Hopkin S.P., Sibly R.M., Peakall D.B. (2001). Principles of ecotoxicology. Taylor & Francis, New York.
2. Newman M.C. (2010). Fundamentals of ecotoxicology. CRC Press, Boca Raton.

Recommended reading

1. Carlson R. (1962). Silent Spring. Penguin Classic, London.
2. Colborn T., Dumanoski D., Myers J.P. (1996). Our stolen future. Plume Book, New York.
3. Murray B. (1962). Our synthetic environment. Knopf, New York.
4. Smith R., Lourie B. (2011). Slow death by rubber duck: the secret sanger of everyday things. Counterpoint, Berkeley.

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Course card

Course title	**GIS in natural disaster prevention**		
Semester (winter/summer)	summer	ECTS	5
Lecturer(s)	Ph.D. Paweł Kroh		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

Course presents use of Geographical Information Systems in prevention from landslides and floods. During classes students will learn how to use raster and vector data to evaluate areas that could be in danger in case of flood; how to use digital elevation models for landslide mapping. Use of GIS in mountain rescue and avalanche prediction will also be presented.

Prerequisites

Knowledge	
Skills	Basic GIS skills
Courses completed	

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours				15			

Teaching methods:

At the beginning of the course short lecture will be presented. Then, after short introduction to each topic students will proceed with laboratory tasks realized in GIS programs.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
					x					x			

Assessment criteria	Proper execution of given tasks, essay.

Comments	

Course content (topic list)

1. Flood prevention project:
a) Presentation of national Polish data: flood risks maps and cartographic databases (BDOT10k)
b) Downloading data and their conversion to proper formats
c) Georeferencing flood hazard maps
d) Vectorization areas with flood hazard
e) Selection of objects (residential buildings, hospitals, schools etc.) which would be in danger
2. Landslides prevention project:
a) Presentation of digital elevation models (DEM) based on LIDAR
b) DEM conversion
c) Landslides mapping and vectorization
d) Selection of buildings which are localized on landslides areas

Compulsory reading

Salata, T., & Prus, B. (2017). Geodata Modelling Applied to the Planning and Land Use of Rural Areas in Conjunction with the Polish Spatial Information Infrastructure. Land Ownership and Land Use Development: he Integration of Past, Present, and Future in Spatial Planning and Land Management Policies, 195.
Jaboyedoff, M., Oppikofer, T., Abellán, A., Derron, M. H., Loye, A., Metzger, R., & Pedrazzini, A. (2012). Use of LIDAR in landslide investigations: a review. Natural hazards, 61(1), 5-28.

Recommended reading

Kroh, P., Struś, P., Wrońska-Wałach, D., & Gorczyca, E. (2019). Map of landslides on the commune scale based on spatial data from airborne laser scanning. Carpathian Journal of Earth and Environmental Sciences, 14(1).

Kroh, P. (2020). Identification of landing sites for rescue helicopters in mountains with use of Geographic Information Systems. Journal of Mountain Science, 17(2), 261-270.

Kroh, P. (2017). Analysis of land use in landslide affected areas along the Łososina Dolna Commune, the Outer Carpathians, Poland. Geomatics, Natural Hazards and Risk, 8(2), 863-875.

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Course card

Course title	**Human impacts on landscape**		
Semester (winter/summer)	summer	ECTS	5
Lecturer(s)	dr hab. Joanna Zawiejska, prof. UP		
Department	Department of Physical Geography		

Course objectives (learning outcomes)

The course explores human agency in transforming various geomorphological landscapes as well as the causes and effects of the modification of the operation of geomorphic processes. Interactions between natural and anthropogenic conditions for development of landforms are discussed based on case studies from different environments.

Prerequisites

Knowledge	Basic geomorphology, geology, climate, hydrology.
Skills	-
Courses completed	-

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours			15				

Teaching methods:

Following introductory lectures students prepare preseentations and discuss assigned topics.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
						x		x	x			x	

Assessment criteria	Presentations (30%) and final test (70%)

Comments	

Course content (topic list)

1. Human agency in geomorphology over time. Natural and anthropogenic drivers of change in geomorphic processes and creation of landforms.
2. Indirect human impact on the operation of geomorphic processes in different climates
3. Man-made landforms and their development.
4. Complexity of impacts and consequences: cases studies.

Compulsory reading

Goudie A., 2018, The Human Impact on the Natural Environment, Wiley- Blackwell
Gregory K.J., 2006, The human role in changing river channels, Geomorphology 79(3):172-191

Recommended reading

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Course title	**Past and current climate change**		
semester	summer	ECTS*	5
Lecturer(s)	Dr Barlomiej Pietras		
Department	Department of Ecology and Geoinformation		

Course objectives (learning outcomes)

This course focuses on past and ongoing climate change, its drivers and consequences.

Prerequisites

Knowledge	Basic knowledge about climate.
Skills	The ability to obtain basic information about climate
Courses completed	

Course organization						
Form of classes	W (Lecture)	Group type				
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours				15			

Teaching methods:

Lectures, participatory discussion, individual projects

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
						X		X		X			

Assessment criteria	Students prepare and present a project, final test.

Comments	

Course content (topic list)

1. Ongoing climate change
2. Proxy data
3. Regional aspects of climate change
4. Regional climate models

Compulsory reading

1. Burroughs W.J., 2001: Climate Change. Cambridge University Press.
2. Desonie D., 2008: Climate: causes and effects of climate change. Chelsea House, USA.
3. IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp, doi:10.1017/CBO9781107415324.
4. Jonathan Cowie, 2007. Climate Change: Biological and Human Aspects, Cambridge University Press, Cambridge, UK. ISBN 978-0-521-87399-4. XVI + 487 pp
5. McGuffie K., Henderson-Sellers A., 2005: A Climate Modelling Primer, 3rd Edition. University of Technology, Sydney, Australia.

Recommended reading

1. IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.
2. Wang J., Oppenheimer M. The Latest Myths and Facts on Global Warming - 2005 - pp. 2-7

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Course card

Course title **GIS in hydrology - flood hazard assessment**

Semester (winter/summer) summer ECTS 4

Lecturer(s) Tomasz Bryndal, PhD

Department Physical Geography

Course objectives (learning outcomes)

Floods are the most destructive natural disaster in the World and small mountain catchment (usually smaller than 50 km2 in area) are considered as more prone to flood occurrence – especially flash flood. Identification of flood hazard zone is a key element supporting flood mitigation.
After completing the course, student can perform hydrological calculation of a river discharge and hydraulic calculation of a water flow in the river channel and valley floor in small mountain catchment using hydrological and hydraulic modelling approach. The student is able to create flood hazard zone in a catchment.

Prerequisites

Knowledge
The person who taking these course should understand and explain the relationships between the elements of the geographical environment related to water circulation in a catchment scale and should have basic knowledge about hydraulic processes influencing water flow in a river channel.

Skills Basic computer skills,

Courses completed Hydrology

Course organization

Form of classes	W (Lecture)	Group type			
	A (large group)	K (small group)		L (Lab)	S (Seminar)
	P (Project)	E (Exam)			
Contact hours		15			

Teaching methods:

Course conducted in the form of laboratory tasks with tutor's introductory presentations & comments. The course is conducted with QGIS and HEC-RAS, HEC-HMS software. Use of the personal laptops is recommended.

Assessment methods:

E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks
Individual project	Group project	Discussion participation		Student's presentation
Written assignment (essay)	Oral exam	Written exam	Other	
	x			

Assessment criteria Pass: on the basis of successful completion of all exercises ordered by the teacher during the laboratory sessions (all partial exercises must be completed).

Comments -
Course content (topic list)

1/ Flood risk and flood hazard assessment as contemporary conception in flood risk management
2/ Rainfall-runoff hydrological models as a tools supporting the flood magnitude assessment.
3/ Hydraulic modelling as a tool for flood hazard assessment
4/ Project – delineation of flood hazard ma in catchment

Compulsory reading

Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). Geographic information science and systems. John Wiley & Sons.
HEC- RAS - https://www.hec.usace.army.mil/software/hec-ras/documentation.aspx
HEC-HMS- https://www.hec.usace.army.mil/software/hec-hms/documentation.aspx

Recommended reading

Bryndal T., Franczak P., Kroczak R., Cabaj W., Kołodziej A. 2017, The impact of extreme rainfall and flash floods on the flood risk management process and geomorphological changes in small Carpathian catchments: a case study of the Kasiniczanka river (Outer Carpathians, Poland), Natural Hazard, 88, 95-120, DOI: 10.1007/s11069-017-2858-7
Bryndal T., 2014 Hydrological parameters of rainstorm-inducted flash floods in the Polish, Slovakian and Romanian parts of the Carpathians. Przegląd Geograficzny, 86,1, 5-21. https://rcin.org.pl/Content/42812/PDF/WA51_60463_r2014-t86-z1_Przeg-Geogr-Bryndal.pdf
Bucała-Hrabia, A., Kijowska-Strugała, M., Bryndal, T., Cebulski J., Kiszka K., Kroczak R., 2020, An integrated approach for investigating geomorphic changes due to flash flooding in two small stream channels (Western Polish Carpathians), Journal of Hydrology: Regional Studies, Volume 31, 100731, https://doi.org/10.1016/j.ejrh.2020.100731

UNIWERSYTET PEDAGOGICZNY
IM. KOMISJI EDUKACJI NARODOWEJ W KRAKOWIE

Erasmus+

Course card

Course title	**Outdoor navigation**		
Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	Ph.D. Paweł Kroh		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

After the course student will be able to realize outdoor positioning and navigation with use of map, compass and local topography; will know how to make topographical sketches. Usage of outdoor GPS receiver will be trained (marking positions, navigating to waypoints and use of tracks); preparation of tracks in PC and downloading to receiver also will be presented.

Prerequisites

Knowledge	none	
Skills	none	
Courses completed	none	

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours				15			

Teaching methods:

Introduction lecture and 2-day field classes with practical tasks

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
				x						x			

Assessment criteria	Execution of given tasks, essay

Comments	

Course content (topic list)

1. Map types and possibilities of their use outdoor.
2. Basic compass theory and use of compass together with maps
3. Azimuth determining and its use for self-positioning on map and in field
4. Methods of doing basic sketches and maps of places and walk trails
5. GPS receiver functions
6. Navigation with GPS receiver – marking positions, saving tracks
7. Use of PC for planning and downloading waypoints and tracks to digital maps.

Compulsory reading

'How to read a map', wikihow, http://wikihow.com/Read-a-Map

Recommended reading

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Course card

Course title	**The Tatra Mountains and Zakopane**		
Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	Ph.D. Paweł Kroh		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

Course presents environmental, cultural and historical factors which influence nowadays state of the highest mountains in Poland. After the course student will know most important elements of the Tatra's environment, history of Tatra National Park and development of idea of nature conservation in region. History of Zakopane and local culture also will be shown.

Prerequisites

Knowledge	None
Skills	None
Courses completed	None

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours			x				

Teaching methods:

Introduction lecture and field classes in Tatra Mountains.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
				x						x			

Assessment criteria	Active presence during classes, short essay about given topic.

Comments	

Course content (topic list)

- The Tatra Mountains natural history
- Environmental factors of nature state
- Environmental functioning in montane, sub-alpine and alpine belt,
- Nature protections, its history and nowadays problems
- History of region in wider context
- Most recognizable elements of local folklore

Compulsory reading

Balon, J. (2005). Spatial order in the natural environment of the Polish Tatra Mts. Prace Geograficzne IGiGP UJ, 115, 19-29.
Taczanowska, K., Brandenburg, C., Muhar, A., Hat-Pawlikowska, K., Ziobrowski, S., Chlipała, B., ... & Witkowski, Z. (2014, August). Who is hiking in the Tatra National Park, Poland? A socio-demographic portrait of visitors. In The 7th International Conference on Monitoring and Management of Visitors in Recreational and Protected Areas (MMV). Tallinn, Estonia (pp. 27-29).

Recommended reading

Kotarba, A., Kaszowski, L., & Krzemień, K. (1987). High-mountain denudational system of the Polish Tatra Mountains= Wysokogórski system denudacyjny Tatr Polskich. Geographical Studies. Special Issue.
Cooley, T. J. (1999). Folk Festival as Modern Ritual in the Polish Tatra Mountains. The World of Music, 31-55.
Rączkowska, Z (2006). Recent geomorphic hazards in the Tatra Mountains. Studia Geomorphologica Carpatho-Balcanica, 40, 45-60.

Zwoliński, Z., & Stachowiak, J. (2012). Geodiversity map of the Tatra National Park for geotourism. Quaestiones geographicae, 31(1), 99-107.
Balon, J., & Jodłowski, M. (2012). Landscape organization in the non-glaciated high-mountain ranges in Europe.
Buchwał, A, & Fidelus, J. (2008). The development of erosive and denudational landforms on footpaths sections in the Babia Góra Massif and the Western Tatras. Geomorphologia Slovaca et Bohemica, 2, 14-24.

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Course card

Course title	**Geomorphological landscapes**		
Semester (winter/summer)	winter	ECTS	5
Lecturer(s)	Dr hab. Joanna Zawiejska		
Department	Department of Physical Geography		

Course objectives (learning outcomes)

Understanding of the reasons for the diversity of landscapes in the world. Ability to indicate and discuss the major drivers of contemporary landform development with examples from different regions. Understanding of the origin and properties of landforms in chosen regions of the world. Understanding of impacts and hazards posed by potential and ongoing geomorphic processes to human population.

Prerequisites

Knowledge	Knowledge of geology and geomorphology at undergraduate level. Processes and interactions leading to the development of landscapes.
Skills	Understanding the relationships between different elements of the environment, origin of the basic types of landscapes.
Courses completed	Geology, Geomorphology, Climatology (recommended)

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours					15		

Teaching methods:

The course will consists of 5 thematic blocks, each block will have a theoretical background followed by student-prepared presentations based on literature and discussion of the main theme of the lesson.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
						x		x	x	x			

Assessment criteria	literature research and presentation of assigned topics (30%) class-based discussion (20%) submission of a written assigment on the assigned topic (50%)

Comments	

Course content (topic list)

Effects of the interaction of fluvial processes and geological structure (e.g.Niagra Falls, Iguazu Falls, Victoria Falls).
Sandstone, granite and karst landscapes of the world.
Diversity of active volcanic landforms.
Iconic landscapes of the world (e,g. Grand Canyon, Karst of Ha Long Bay, the Dolomites…).
Mountains and natural hazards.

Compulsory reading

Migoń P. (Ed.) 2010, Geomorphological Landscapes of the World, Springer.

Recommended reading

Goudie A.S. (ed.) 2003, Encyclopedia of Geomorphology, Taylor & Francis Ltd
A selection of up-to-date scientific papers.

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Course card

Course title	**Economic Geography**		
Semester (winter/summer)	summer	ECTS	5
Lecturer(s)	dr Wioletta Kilar		
Department	Department of Socio-Economic Geography Institute of Law, Economics and Administration		

Course objectives (learning outcomes)

After this course the student will know the basic concepts and theories of economic geography, especially those related to industry and services, the basic classifications of industrial and service activities, forms of industry concentration and location factors for industrial activities. He will learn how to measure changes in economic geography, present results and will be able to analyze changes and spatial regularity between elements of the socioeconomic space, trying to explain the reasons for diversity and change.

Prerequisites

Knowledge	Basic definitions in the field of economic geography.
Skills	Basic skills of analysis and presentation (graphical, cartographic) of economic geographic data.
Courses completed	

Course organization								
Form of classes	W (Lecture)	Group type						
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)	
Contact hours					x			

Teaching methods:

Introductory lectures, individual studies of literature on the subject, interpretation of statistical data, class-based discussion, individual projects.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
						x		x		x			

Assessment criteria	Credits obtained a student who took part in the discussions and passed an essay. Preparation for class (the literature required for class read in advance) Discussion in class – lectures Partial slingshot regarding the factors of the location of the selected company Student's work-essey on SWOT analysis of the economy of the country/or region you come from (the region/country of my origin) SWOT- strengths, weaknesses, opportunities and threats analysis
Comments	

Course content (topic list)

- Changes in the world economy - the place of economic geography.
- Evolutionary Economic Geography
- Location factors for industrial activities.
- High technology industry.
- Determinants of the location and differentiation of innovative industries in Poland.

Compulsory reading

Clark G. L., Gertler M. S., Feldman M. P., 2000, The Oxford Handbook of Economic Geography, Oxford University Press,
chapter: R. Boschma and K. Frenken Evolutionary Economic Geography.
chapter: M. P. Feldman and M. Storper Economic Growth and Economic Development: Geographical Dimensions, Definition, and Disparities

Here, there and everywhere. Special Report – Outsourcing and Offshoring, The Economist, January, 19th 2013, ss. 14

Wood A., Roberts S., 2011, Economic geography. Places, networks and flows. Routledge

International Standard Industrial Classification of All Economic
(https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf)

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Erasmus+

Course card

Course title	**Geography of Agriculture**		
Semester (winter/summer)	summer	ECTS	5
Lecturer(s)	dr Tomasz Padło		
Department	Department of Artistic Research		

Course objectives (learning outcomes)

After completing the course the student has knowledge about methods and main directions of research applied in the geography of agriculture, the main types of agriculture occurring in the regions of the world. He knows new trends in the development of global agriculture, understands the impact of processes of globalization for the agricultural economy and socio-economic development of rural areas in developing countries. The student understands the impact of agriculture on the environment. In addition, he understands the evolution of EU agricultural policy.

Prerequisites

Knowledge	Basic knowledge of Socio-Economic Geography
Skills	Not required
Courses completed	Not required

Course organization											
Form of classes	W (Lecture)	Group type									
		A (large group)		K (small group)		L (Lab)		S (Seminar)		P (Project)		E (Exam)	
Contact hours						15					

Teaching methods:

Course is conducted in the mixed form of lectures, individual and group works. Important part of the course is discussion based on brainstorm method.

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
		x				x	x	x		X			

Assessment criteria	Final assessment based on individual and group work by student, making individual project and active participation in the course.

Comments	-

Course content (topic list)

- Globalization of economic processes and their impact on agriculture
- Influence of culture on the nature of agriculture
- Interventionism and protectionism in agriculture, objectives and achievements of the Common Agricultural Policy;
- Analysis of the main types of agriculture in the world;
- The impact of agriculture on environmental changes
- Polish agriculture against the world agriculture;
- Analysis of the main types of agriculture in the world;

Compulsory reading

Bański J., 2007, Geografia rolnictwa Polski, Polskie Wydawnictwo Ekonomiczne, Warszawa;
Diamond J., 2005, Collapse: How Societies Choose to Fail or Succeed, Viking Press;
Grigg D., 1995, An Introduction to Agricultural Geography, Routledge;
FAOSTAT data base

Recommended reading

Kuby M., Harner J., Gober P., 2002, Human Geography in Action, John Wiley & Sons, New York;

Turnock D., 1998, Privatization in Rural Eastern Europe. The Process of Restitution and Restructuring, Studies of Communism in Transition, Edward Elgar, Cheltenham;

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Course card

Course title	**Human Geography**

semester	summer	ECTS*	5

Lecturer(s)	Dr hab. Sławomir Kurek, prof. UP	

Department	Department of Socio-economic Geography	

Course objectives (learning outcomes)

The aim of this course is to provide knowledge based on teaching effects on the main socio-demographic processes (fertility, mortality and migration) and structures (age and sex composition, socio-economic structures). The course enable the students to use methods and spatial analysis of population processes. In addition to this, the course aims at paying attention to world social problems (such as population ageing, population decline, overpopulation)from the spatial point of view and their consequences.

Prerequisites

Knowledge	Has knowledge about selected population concepts and spatial patterns of population changes on international level Depicts basic population processes and their relationship to economic issues
Skills	Explains spatial patterns of population change (fertility and migration) and population composition (aging, education, employment structure) Identifies population problems in various world regions and presents the possibilities of their solution Is able to discuss on issues associated with population phenomena from national and supranational perspectives
Courses completed	

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Course organization											
Form of classes	W (Lecture)	Group type									
		A (large group)		K (small group)		L (Lab)		S (Seminar)		P (Project)		E (Exam)	
Contact hours				15							

Teaching methods:

The description of theoretical issues, interpretation of statistical data, multimedial presentation, case studies, problem method, graphic methods of data illustration (maps, diagrams).

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	presentation	Student's assignment (essay)	Oral exam	Written exam	Other
						x		x		x			

Assessment criteria	Credited after written essay and completed individual projects

Comments	

Course content (topic list)

1. The definition of demography and its role in socio-economic life
2. Methods of demographic analysis
3. The sources and types of demographic data (Population censuses, registration of events, demographic estimation and analysis)
4. Population size and distribution
5.Population growth
6. Population composition (age and sex structure)
7. Population ageing and its consequences
8.Natural increase

9. Fertility and its determinants
10. Mortality
11. Theories in demography (First and Second Demographic Transition)
12. Migration and its determinants
13. Socio-economic population structures
14. Demographic projections
15. Analysis of population processes in the world and its consequences

Compulsory reading

Literature:

Basic:

1. Demography: The Study of Human Population, Third Edition, David Yaukey, Douglas L. Anderton, Jennifer Hickes Lundquist, 2006.

Complementary:

1. POPULATION GEOGRAPHY, Gary L Peters; Robert P Larkin, 2008, Kendall Hunt publishing company.
2. World Population Data Sheet, www.prb.org

Recommended reading

Complementary literature:

1. Population Challenges and Development Goals, Department of Economic and Social Affairs, Population Division, ST/ESA/SER.A/248, United Nations, New York, 2005.
2. Alene Gelbard, Carl Haub, and Mary M. Kent, World Population Beyond Six Billion, Population Bulletin vol. 54 no. 1, Population Reference Bureau, 1999, www.prb.org.
3. World Population Highlights: Key Findings From Prb's 2009 World Population Data Sheet, Population Bulletin vol. 64, no. 3, www.prb.org
4. Global Demographic Divide, Population Bulletin vol. 60 no. 4, 2005, Population Reference Bureau, www.prb.org.
5. European Commission, 2004, Low Fertility and Population Ageing, RAND EUROPE. (www.rand.org/pubs/monographs/MG206).
European Commision, 2005, Low fertility and policy responses in the European Union. RAND EUROPE http://www.rand.org/pubs/research_briefs/2005/RAND_RB9126.pdf).

6. Frejka, T., Sobotka, T., 2008: Fertility in Europe: Diverse, delayed and below replacement. In: Demographic Research, Special Collection 7: Childbearing Trends and Policies in Europe, 19, 3: 15–46 www.demographic-research.org).

7. van de Kaa, D.J. 2003: The idea of a second demographic transition in industrialized countries, The Japanese Journal of Population, No. 1, Vol. 1 http://www.ipss.go.jp/webj-ad/WebJournal.files/population/2003_4/Kaa.pdf).

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Course card

Course title	**Globalization and cities**		
Semester (winter/summer)	summer	ECTS	5
Lecturer(s)	Dr Piotr Raźniak		
Department	Department of Socio-economic Geography		

Course objectives (learning outcomes)

Basic definitions of cities, globalization, metropolitan areas. Globalization of cities. Advantages and disadvantages of globalization. Which city is most globalized, strongest business center, most powerful in the modern world? Global changes in world cities hierarchy and their linkages. Development of command and control function of cities in modern world. Suburbanisation procesess as the reason of metropolitan areas development.

Prerequisites

Knowledge	Knows difference between city and metropolitan area. Knows how suburbanisation processes creates metropolitan areas, knows what causes determining strongest cities in the world and globalization processes. Positive and negative aspects of globalization.
Skills	Student is able to identify differences between city and metropolitan area. Student is able to identify positive and negative aspects of suburbanization, positive and negative aspects of globalization. Identify factors determining power of metro areas in the world
Courses completed	Present an individual project

Course organization							
Form of classes	W (Lecture)	Group type					
		A (large group)	K (small group)	L (Lab)	S (Seminar)	P (Project)	E (Exam)
Contact hours					15	15	

Teaching methods:

Classes are in the form of lectures and exercises, the student must perform and present an individual project

Assessment methods:

	E – learning	Didactic games	Classes in schools	Field classes	Laboratory tasks	Individual project	Group project	Discussion participation	Student's presentation	Written assignment (essay)	Oral exam	Written exam	Other
						X		X	X	X			

Assessment criteria	Completion of the course obtained student, who has made correctly individual project and received a positive assessment of project presentation

Comments	

Course content (topic list)

1. Suburbanisation processes as the factor of metropolita areas creation
2. Globalisation as the factor of development of metropolitan areas
3. World city/global city – which metro area is most globalized and powerful in the world
4. Large corporations as main actors of command and control function of cities
5. Suburbanisation - positive or negative process for the core and outskirts
6. Globalisation – positive or negative process in the modern world – impact on the life of averave citizens

Compulsory reading

Csomós, G. (2013), The Command and Control Centers of the United States (2006/2012): An Analysis of Industry Sectors Influencing the Position of Cities, Geoforum, *50, (2013), 241-251. Free access: http://www.lboro.ac.uk/gawc/rb/rb430.html*
Beaverstock, J.V., Smith, R.G., Taylor, P.J. (1999), A Roster of World Cities, Cities, *16 (6), 445-458. Free access: http://www.lboro.ac.uk/gawc/rb/rb5.html*

Recommended reading