

Institute of Biology and Earth Sciences

winter semester:

Module I MODERN LABORATORY TECHNIQUES IN EARTH AND ENVIRONMENTAL SCIENCES

Human biomonitoring as a tool for chemical exposure assessment	30 ECTS
Basic bioinformatics tools	
Atomic absorption spectroscopy – how to quantify metals in environmental samples	
Microscopy in environmental studies	
Protein extraction and separation	

Module II ECOTOURISM I

Travel photography	30 ECTS
National parks in the world: nature and management	
Outdoor navigation	
Tourism and culture in Latin America	
Ecotourism and sustainability	

summer semester:

Module I ANTHROPOCENE

GIS in disaster prevention	30 ECTS
Human impacts on landscape	
Past and contemporary climate change	
Living in a polluted environment	
GIS in Hydrology	

Module II ECOTOURISM II

Weather and climate in tourism and travel	30 ECTS
Iconic landscapes as tourist destinations	
Tatra Mts & Zakopane	
Bees, apitourism and apitherapy	
Wildlife rehabilitation principles	

Course card

Course title	Basic bioinformatics tools		
Semester (winter/summer)	Winter/Summer	ECTS	6
Lecturer(s)	Dr hab. Gabriela Gołębiowska-Paluch, prof. UKEN		
Department	Institute of Biology and Earth Sciences, Chair of Genetics, UKEN		

Course objectives (learning outcomes)

The aim of the course is to familiarize the student with basic bioinformatics tools for the analysis, synthesis and interpretation of data obtained from the biological experiments, both at the theoretical and practical level. An additional goal is to acquire the ability to use appropriate databases, bioinformatics tools and software, as well as methods of data preparation for the needs of thesis and scientific publication.

Prerequisites

Knowledge	Principles of biology
Skills	English medium level
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 activities including bioinformatics tools for the analysis, synthesis, graphical presentation and interpretation of data obtained from biological research, both at the theoretical and practical level. 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:

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

Assessment criteria	The student graduate from the course based on active attendance at the laboratory classes. Quality of the report and essay from the laboratory activities will be assessed.
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Comments	Course taught in English.
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Course content (topic list)

1. Preparation of data for creating a biological profile.
2. Creating chromosome and protein maps.
3. Work in image analysis software.
4. Databases and on-line tools.

Compulsory reading

Jozefowicz, A. M., Döll, S., & Mock, H. P. (2020). Proteomic Approaches to Identify Proteins Responsive to Cold Stress. In *Plant Cold Acclimation* (pp. 161-170). Humana, New York, NY.
 Perlan Technologies Polska Sp. z o. o. – webinars and tutorials.
 Bio-Rad – webinars and tutorials.

Recommended reading

Gołębiowska-Pikania* G., Kopeć* P., Surówka E., Krzewska M., Dubas E., Nowicka A., Rapacz M., Wójcik-Jagła M., Malaga S., Żur I. **2017**. Changes in protein abundance and activity involved in freezing tolerance acquisition in winter barley (*Hordeum vulgare* L.). *Journal of Proteomics*, 169: 58-72, DOI: 10.1016/j.jprot.2017.08.019, ISSN: 1874-3919, Wydawca: Elsevier.

Gołębiowska-Pikania* G., Kopeć P., Surówka E., Janowiak F., Krzewska M., Dubas E., Nowicka A., Kasprzyk J., Ostrowska A., Malaga S., Hura T., Żur I. **2017**. Changes in protein abundance and activity induced by drought during generative development of winter barley (*Hordeum vulgare* L.). *Journal of Proteomics*, 169:73-86. 10.1016/j.jprot.2017.07.016, ISSN: 1874-3919, Wydawca: Elsevier.
 Krzewska, M., **Gołębiowska-Pikania G.**, Dubas, E., Gawin, M., & Żur, I. **2017**. Identification of proteins related to microspore embryogenesis responsiveness in anther cultures of winter triticale (*x Triticosecale* Wittm.). *Euphytica*, 213(8), 192. Open Access, 10.1007/s10681-017-1978-1, issn: 0014-2336, Wydawca: Springer.

Golebiowska GJ, Bonar E, Emami K, Wędzony M. **2019**. Cold-modulated small proteins abundance in winter triticale (*x Triticosecale*, Wittm.) seedlings tolerant to the pink snow mould (*Microdochium nivale*, Samuels and Hallett) infection. *Acta biochimica Polonica*, 66(3), 343-350.

Gołębiowska, G., Stawoska, I., & Wesełucha-Birczyńska, A. **2022**. Cold-modulated leaf compounds in winter triticale DH lines tolerant to freezing and *Microdochium nivale* infection: LC-MS and Raman study. *Functional Plant Biology*, 49(8), 725-741.

Golebiowska-Paluch, G., Dyda, M., & Wajdzik, K. **2023.** QTL Regions and Candidate Genes Associated with Selected Morphological Traits of Winter Triticale (\times *Triticosecale*) Seedlings. *Journal of Plant Growth Regulation*, 43(5), 1350-1367.

Emami, K., Mesbahi, E., Al-Mrabeh, A., Gatehouse, A. M., Shu, Q. Y., & **Golebiowska-Paluch, G. 2023.** 2-DE-based and shotgun proteomics approach in the analysis of the seed proteome of a low phytic acid rice (*Oryza sativa*, ssp. *japonica*) mutant. *Journal of Cereal Science*, 114, 103801.

Stawoska, I., Wesełucha-Birczyńska, A., & **Golebiowska-Paluch, G. 2024.** Temperature-caused changes in Raman pattern and protein profiles of winter triticale (\times *Triticosecale*, Wittm.) field-grown seedlings. *Molecules*, 29(9), 1933.

Golebiowska-Paluch, G., Stawoska, I., Jelonek-Kozioł, M., Wesełucha-Birczyńska, A., & Kornaś, A. **2024.** Soil Salinity Differentiates Winter Triticale Genotypes in Physiological and Biochemical Characteristics of Seedlings and Consequently Their Yield. *International Journal of Molecular Sciences*, 25(23), 12971.

Course card

Course title	Atomic absorption spectroscopy – how to quantify metals in environmental samples		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Assoc. Prof. 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).

Assessment methods:

Other	Written exam	Oral exam	Written assignment (essay)	Students presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
			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
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Comments	Course taught in English.
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Course content (topic list)

<ol style="list-style-type: none"> 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

<p>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 (<i>Cygnus olor</i>) wintering in Puck Bay (northern Poland). <i>Chemosphere</i> 164, 436–442.”</p> <p>Binkowski Ł.J., Sawicka-Kapusta K. 2015. Lead poisoning and its in vivo biomarkers in Mallard and Coot from hunting activity areas. <i>Chemosphere</i> 127, 101–108</p> <p>Publications by the course coordinator including a detailed description of instrumental method used</p>

Recommended reading

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

Course card

Course title	Human biomonitoring as a tool for chemical exposure assessment		
Semester (winter/summer)	Winter	ECTS	6
Lecturer(s)	dr Martyna Błaszczyk-Altman		
Department	Institute of Biology and Earth Sciences, Chair of Genetics, UKEN		

Course objectives (learning outcomes)

Regardless of the place of residence, we are constantly exposed to xenobiotic substances, which are released into the environment because of natural processes and anthropogenic activities. The task of human biomonitoring is to continuously monitor the concentration of these substances and/or their metabolites in bodily fluids and human tissues (including skin derivatives). The main aim of the course is to present the differences between human and environmental biomonitoring. Why is human biomonitoring (HBM) so important nowadays? What are the main sources of human exposure to chemical substances? In which matrices can these chemicals be detected? How should HBM research be properly conducted? During the course, students will find answers to these and other questions and gain hands-on experience in working with human-derived material.

Prerequisites

Knowledge	
Skills	Principles of chemistry and biology.
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			7	8				

Teaching methods:

Tutoring discussions accompanied with multimedia presentations and laboratory practice.

Assessment methods:

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

Assessment criteria	The student graduates from the course based on attendance in the classes and participation in discussions.
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Comments	The course is taught in English.
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Course content (topic list)

- Biomonitoring (environmental and human).
- Sources of human exposure to chemical substances (with particular emphasis on heavy metals).
- Matrices used in human biomonitoring (pros and cons; blood as a universal matrix in HBM research).
- Stages of typical HBM research (which errors may disrupt the entire study).
- Scales and automated pipette calibration (laboratory practice).
- General introduction to atomic absorption spectrometry and voltammetry (laboratory practice).
- Developing good laboratory practices.

Compulsory reading

Esteban M., Castaño A. (2009). Non-invasive matrices in human biomonitoring: a review. *Environment International* 35: 438-449.
 National Research Council. (2006). Human biomonitoring for environmental chemicals. The National Academies Press. Washington DC, USA.
 Joas R., Casteleyn L., Biot P., Kolossa-Gehring M., Castano A. et al. (2012). Harmonized human biomonitoring in Europe: activities towards an EU HBM framework. *International Journal of Hygiene and Environmental Health* 215: 172-175.

Recommended reading

Walker C.H., Sibly R.M., Hopkins S.P., Peakall D.B. (2012). Principles of ecotoxicology. 4th Edition. CRC Press. Boca Raton, USA

Course card

Course title	Microscopy in environmental studies		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Assoc. Prof. Gabriela Gołębiowska-Paluch		
Department	Institute of Biology and Earth Sciences, Chair of Genetics, UKEN		

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:

Other	Written exam	Oral exam	Written assignment (essay)	Students presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
			X		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 and essay will be assessed.
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Comments	Course taught in English.
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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.

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 triticales (\times *Triticosecale*) to the fungal pathogen *Microdochium nivale*. *Plant Pathology*, 62(4), 867-878.

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

Course card

Course title	Protein extraction and separation		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Assoc. Prof. Gabriela Gołębiowska-Paluch		
Department	Institute of Biology and Earth Sciences, Chair of Genetics, UKEN		

Course objectives (learning outcomes)

Knowledge on basic proteomics methods. Experience in laboratory work, experiment design, protein isolation and purification, spectrophotometry, gel electrophoresis, protein visualisation and electropherogram analysis. Western Blot preparation and immunostaining.

Prerequisites

Knowledge	Principles of biology
Skills	English medium level
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 activities including lab rules, protein isolation and purification, spectrophotometry, gel electrophoresis, protein visualisation and electropherogram analysis. Western Blot preparation and immunostaining. 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:

Other	Written exam	Oral exam	Written assignment (essay)	Students presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
			X		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 and essay will be assessed.
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Comments	Course taught in English.
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Course content (topic list)

Methods of protein isolation and purification. Spectrophotometry.
Gel electrophoresis – types, principles and application.
Electropherogram – protein visualisation and analysis.
Western Blot – types, principles and application.

Compulsory reading

Jozefowicz, A. M., Döll, S., & Mock, H. P. (2020). Proteomic Approaches to Identify Proteins Responsive to Cold Stress. In *Plant Cold Acclimation* (pp. 161-170). Humana, New York, NY.

Perlan Technologies Polska Sp. z o. o. – webinars and tutorials.

Bio-Rad – webinars and tutorials.

Recommended reading

Gołębiowska-Pikania* G., Kopec* P., Surówka E., Krzewska M., Dubas E., Nowicka A., Rapacz M., Wójcik-Jagła M., Malaga S., Żur I. 2017. Changes in protein abundance and activity involved in freezing tolerance acquisition in winter barley (*Hordeum vulgare* L.). *Journal of Proteomics*, 169: 58-72, DOI: 10.1016/j.jpro.2017.08.019, ISSN: 1874-3919, Wydawca: Elsevier.

Gołębiowska-Pikania* G., Kopec P., Surówka E., Janowiak F., Krzewska M., Dubas E., Nowicka A., Kasprzyk J., Ostrowska A., Malaga S., Hura T., Żur I. 2017. Changes in protein abundance and activity induced by drought during generative development of winter barley (*Hordeum vulgare* L.). *Journal of Proteomics*, 169:73-86. 10.1016/j.jpro.2017.07.016, ISSN: 1874-3919, Wydawca: Elsevier.

Krzewska, M., **Golebiowska-Pikania G.**, Dubas, E., Gawin, M., & Żur, I. **2017**. Identification of proteins related to microspore embryogenesis responsiveness in anther cultures of winter triticale (\times *Triticosecale* Wittm.). *Euphytica*, 213(8), 192. Open Access, 10.1007/s10681-017-1978-1, issn: 0014-2336, Wydawca: Springer.

Golebiowska GJ*, Bonar E, Emami K, Wędzony M. **2019**. Cold-modulated small proteins abundance in winter triticale (\times *Triticosecale*, Wittm.) seedlings tolerant to the pink snow mould (*Microdochium nivale*, Samuels and Hallett) infection. *Acta biochimica Polonica*, 66(3), 343-350.

Golebiowska, G.*, Stawoska, I., & Wesełucha-Birczyńska, A. **2022**. Cold-modulated leaf compounds in winter triticale DH lines tolerant to freezing and *Microdochium nivale* infection: LC-MS and Raman study. *Functional Plant Biology*, 49(8), 725-741.

Golebiowska-Paluch, G.*, Dyda, M., & Wajdzik, K. **2023**. QTL Regions and Candidate Genes Associated with Selected Morphological Traits of Winter Triticale (\times *Triticosecale*) Seedlings. *Journal of Plant Growth Regulation*, 43(5), 1350-1367.

Emami, K., Mesbahi, E., Al-Mrabeh, A., Gatehouse, A. M., Shu, Q. Y., & **Golebiowska-Paluch, G.*** **2023**. 2-DE-based and shotgun proteomics approach in the analysis of the seed proteome of a low phytic acid rice (*Oryza sativa*, ssp. *japonica*) mutant. *Journal of Cereal Science*, 114, 103801.

Stawoska, I., Wesełucha-Birczyńska, A., & **Golebiowska-Paluch, G.*** **2024**. Temperature-caused changes in Raman pattern and protein profiles of winter triticale (\times *Triticosecale*, Wittm.) field-grown seedlings. *Molecules*, 29(9), 1933.

Golebiowska-Paluch, G.*, Stawoska, I., Jelonek-Kozioł, M., Wesełucha-Birczyńska, A., & Kornaś, A. **2024**. Soil Salinity Differentiates Winter Triticale Genotypes in Physiological and Biochemical Characteristics of Seedlings and Consequently Their Yield. *International Journal of Molecular Sciences*, 25(23), 12971.

Course card

Course title	Ecotourism and sustainability		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Assoc. Prof. Joanna Zawiejska		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

The course focuses on the relationship between ecotourism development and environmental quality. Current trends in ecotourism and nature tourism are discussed, their potential advantages and impacts, and their significance for sustainable development, biodiversity conservation and natural areas in the context of ongoing global environmental change. After completing the course, the student is able to indicate and characterise the positive and potentially negative practices in ecotourism and their effects, describe the relations and between climate change and tourism.

Prerequisites

Knowledge	The student has sufficient understanding of environmental processes and current global environmental change
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:

Mini-lectures, individual and group work, group discussion based on presentations of assignments. Field based research assignment.

Assessment methods:

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

Assessment criteria	Final test (50%) and presentation of assignments (40%), 10% discussion
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Comments	-
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Course content (topic list)

Tourism and goals of sustainable development. Nature-based tourism vs. responsible and sustainable tourism.
New trends in ecotourism.
The impacts of mass and ecotourism on the environment.
Proactive tourism: can tourism improve quality of the environment?
Climate change and green tourism.
The role of science and education in shaping environmental awareness, conservation and socio-economic development. Transboundary ecotourism initiatives.
The role of certification. Greenwashing and eco-pirates.
Food and enotourism: linking environment and local culture.

Compulsory reading

Balmford A, Beresford J, Green J, Naidoo R, Walpole M, et al. (2009) A Global Perspective on Trends in Nature-Based Tourism. *PLoS Biol* 7(6):
Bardolet-Puigdollers M, Fusté-Forné F. (2023) A Sustainable Future for Food Tourism: Promoting the Territory through Cooking Classes" *Gastronomy* 1: 32-43. <https://doi.org/10.3390/gastronomy1010004>
Macdonald C, Turffs D., McEntee K, Elliot J, Wester J, (2023) The relationship between tourism and the environment in Florida, USA: A media content analysis, *Annals of Tourism Research Empirical Insights*, 4,1 <https://doi.org/10.1016/j.annale.2023.100092>

Recommended reading

A selection of thematic papers and websites.

Course card

Course title	National parks in the world: nature and management		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Joanna Fidelus-Orzechowska, PhD		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

Upon completion of the course, the student has knowledge of the variation in natural conditions, tourist infrastructure as well as management and conservation strategies in national parks (NP) in the world. The participant understands the specificity of selected NP and the need and challenges for their sustainable development.

Prerequisites

Knowledge	General knowledge of the natural environment.
Skills	Ability to work with cartographic data, geoportals. Data acquisition from geoportals
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 (K)						

Teaching methods:

Analysis of websites, geoportals of individual national parks: natural conditions, use and management methods. Discussion of the functioning of selected national parks - limitations, challenges, management approaches.

Assessment methods:

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

Assessment criteria	Attendance in class, active participation in discussions, project work.
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Comments	As part of the course, depending on the size of the group, a visit to one of the national parks in southern Poland is possible.
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Course content (topic list)

1. What is a national park? Types of protected areas: regional comparison.
2. Environmental diversity of selected national parks in the world
3. Accessibility and park management strategies and policies around the world.
4. Infrastructure in the national parks.
5. Management of tourist traffic in popular national parks.
6. Challenges of conservation efforts in areas of high natural value.
7. Role of national parks in environmental education.

Compulsory reading

Staiff, R., Bushell, R., & Kennedy, P. (2002). Interpretation in national parks: Some critical questions. *Journal of sustainable tourism*, 10(2), 97-113.

Davis, C. R., & Hansen, A. J. (2011). Trajectories in land use change around US National Parks and challenges and opportunities for management. *Ecological Applications*, 21(8), 3299-3316.

Delekta, A., Fidelus-Orzechowska, J., & Chrobak, A. (2020). Expert's Perceptions towards Management of Tourist Traffic in Protected Areas Based on the Tatra Mountains. *Journal of Environmental Management & Tourism*, 11(2 (42)), 443-459.

Fidelus-Orzechowska, J., Gorczyca, E., Bukowski, M., & Krzemień, K. (2021). Degradation of a protected mountain area by tourist traffic: case study of the Tatra National Park, Poland. *Journal of Mountain Science*, 18(10), 2503-2519.

Recommended reading

Manning, R. E. (2002). How much is too much? Carrying capacity of national parks and protected areas. In *Monitoring and management of visitor flows in recreational and protected areas. Proceedings of the Conference held at Bodenkultur University Vienna, Austria* (pp. 306-313).

Nepal, S. K. (2002). Mountain ecotourism and sustainable development. *Mountain research and development*, 22(2), 104-109.

Course card

Course title	Outdoor navigation		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Paweł Kroh, Ph.D.		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

After the course student will be able (i) to carry out outdoor positioning and navigation with use of map, compass and local topography; (ii) make topographical sketches, (iii) use an outdoor GPS (mark positions, navigating to waypoints and use of tracks); (iv) prepare tracks in PC and download to receiver.

Prerequisites

Knowledge	n/a	
Skills	n/a	
Courses completed	n/a	

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:

Introductory training and 2-day field classes with practical tasks.

Assessment methods:

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

Assessment criteria	Execution of given tasks, essay
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Comments	
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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 making basic sketches and maps of locations 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

Course card

Course title	Tourism and culture in Latin America		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Anna Winiarczyk-Raźniak, PhD		
Department	Department of Socio-economic Geography		

Course objectives (learning outcomes)

Student associates the presence of attractions and tourist values of Latin American countries with issues related to the social and natural diversity of the region and its history. The student identifies the most important tourist attractions in each country and the preparation of tourism products corresponding to their specificity. The student understands the causes of the region's cultural diversity of Latin America and the need to preserve its heritage.

Prerequisites

Knowledge	-
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				7	8				

Teaching methods:

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

Assessment methods:

Other	Written exam	Oral exam	Written assignment (essay)	Student's presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
				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.
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Comments	-
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Course content (topic list)

1. What is the region of Latin America?
2. Environmental conditions of the development of tourism in Latin America
3. Social, economic and cultural conditions of the development of tourism in Latin America and its regional differentiation
4. Characteristic of tourist attractions in selected Latin American Countries.
5. Mexico as an example of the diversity of the tourist offer.
6. Andean countries and their specific tourist conditions and possibilities.

Compulsory reading

Wilson T.D., 2008, The Impacts of Tourism in Latin America, Latin American Perspectives, 35; 3
 Cabezas A., 2008, Tropical Blues: Tourism and Social Exclusion in the Dominican Republic, Latin American Perspectives, 35; 3
 Wilson T.D., 2008, Economic and Social Impacts of Tourism in Mexico, Latin American Perspectives, 35; 3

Recommended reading

Course card

Course title	Travel Photography		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Tomasz Padło, PhD		
Department	Department of Art Research		

Course objectives (learning outcomes)

The aim of the course is to familiarize students with the basics of photographic composition and the use of photography in travel and in the promotion of tourist destinations.

Prerequisites

Knowledge	-
Skills	Basics of using a camera
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:

Discussion, photography workshop in Krakow, preparation of tourist brochure.

Assessment methods:

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

Assessment criteria	Students are obliged to actively participate in classes and complete the final project
Comments	-

Course content (topic list)

<ol style="list-style-type: none"> 1. Rules of composition in photography 2. Basics of using the camera 3. The importance of photography in tourism 4. What is and what makes a good travel photograph? 5. Creating a tourist folder based on photos

Compulsory reading

<p>Sontag, S. 1978, On Photography, Penguin Books, London</p> <p>Rakić, T., Chambers, D. (Eds.). 2011, An introduction to visual research methods in tourism (Vol. 9). Routledge.</p>

Recommended reading

Course card

Course title	GIS in natural disaster prevention		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Ph.D. Paweł Kroh		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

Course presents the use of Geographical Information Systems in prevention of landslides and floods. During classes students will learn (i) how to use raster and vector data to identify flood hazard areas; (ii) 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 a brief introduction and instructions to each topic students will proceed with laboratory tasks realized in GIS software.

Assessment methods:

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

Assessment criteria	Proper execution of given tasks, essay.
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Comments	
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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 required formats
 - c) Georeferencing flood hazard maps
 - d) Vectorization areas with flood hazard
 - e) Selection of objects (residential buildings, hospitals, schools etc.) that are at risk
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: the 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-Walach, 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 Carp

Course card

Course title	GIS in hydrology - flood hazard assessment		
Semester (winter/summer)	Summer	ECTS	6
Lecturer(s)	Dr hab. Tomasz Bryndal, prof. UKEN		
Department	Institute of Biology and Earth Sciences, Chair of Physical Geography, UKEN		

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	Prospective students should understand and explain the relationships between the elements of the geographical environment related to water circulation at a catchment scale and 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:

Other	Written exam	Oral exam	Written assignment (essay)	Students presentation	Discussion participation	Group project	Individual project	Laboratory tasks	Field classes	Classes in schools	Didactic games	E – learning
							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)..
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Comments	Course taught in English.
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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/hecras/documentation.aspx>

HEC-HMS- <https://www.hec.usace.army.mil/software/hechms/documentation.aspx>

Recommended reading

Bryndal T., Franczak P., Krocak 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-induced 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

Bucala-Hrabia, A., Kijowska-Strugała, M., Bryndal, T., Cebulski J., Kiszka K., Krocak 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>

Course card

Course title	Human impacts on landscape		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Assoc. Prof. Joanna Zawiejska		
Department	Institute of Biology and Earth Sciences		

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 presentations and discuss assigned topics.

Assessment methods:

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

Assessment criteria	Presentations (30%) and final test (70%)
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Comments	
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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.
5. Landscape change in the context of ongoing and projected climate change.

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

Course card

Course title	Living in a polluted environment		
Semester	summer	ECTS*	6
Lecturer(s)	Assoc. Prof. 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).

Assessment methods:

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

Assessment criteria	Points from the test done on the e-learning platform, quality of the project.
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Comments	Course taught in English.
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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.

Course card

Course title	Past and current climate change		
semester	summer	ECTS	6
Lecturer(s)	Bartłomiej Pietras, PhD		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

This course focuses on past and ongoing climate change, its drivers and consequences. Natural and anthropogenic signals in observed climate change. The students also explore discuss the fact-based and fallacious information on climate change and its effects present in the media and popular belief.

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:

Introductory seminars, participatory discussion, individual projects

Assessment methods:

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

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

Course content (topic list)

1. Past and ongoing climate change
2. Proxy data
3. Regional aspects of climate change
4. Regional climate models
5. Myths and facts on global warming.

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

Course card

Course title	Weather and climate in tourism and travel		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Bartłomiej Pietras, PhD		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

The aim of the course is to expand knowledge about weather and climate conditions in different parts of the world. The student acquires the ability to effectively look for and practically use meteorological knowledge, and interpret available weather information in planning travel and tourist events.

Prerequisites

Knowledge	To participate in the course, the student should know basic terms in the field of meteorology and climatology
Skills	The ability to link cause and effect, analyze and synthesize and select thematic information from scientific publications and media sources.
Courses completed	not applicable

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:

Conversation classes, analysis and discussion. The course is conducted in English with the use of literature, websites and other sources.

Assessment methods:

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

Assessment criteria	Preparation and presentation of the issue (60%). Participation in the discussion (30%) Preparation for classes (10%)
Comments	The course is passed by the student who participated in the classes and completed the projects.

Course content (topic list)

1. Basic sources of meteorological and climatic knowledge used in tourism and travel.
2. From jetlag to mountain sickness: bioclimatology and adaptation of human body to different weather conditions.
3. Extreme weather: hazards and risks for tourists and tourist infrastructure.
4. Tourism and climate change.

Compulsory reading

Auliciems A., 1998, Human Bioclimatology: An Introduction, Advances in Bioclimatology, 5, 1-6

Scott D., Gossling S., Hall M., 2012, International tourism and climate change, WIREs Climate Change, Vol 3, 213-295.

Scott D., Lemieux C., 2010, Weather and Climate Information in Tourism, Procedia Environmental Sciences 1, 146-183;

Recommended reading

<https://library.wmo.int/records/item/28148-the-assessment-of-human-bioclimate>

Course card

Course title	Bees, apitourism and apitherapy		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Anna Chrobak-Žuffová, PhD		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

After completing the course, the student has knowledge about honey bees - their characteristics, lifestyle and importance for the natural environment. The student can recognize authentic bee products and benefits (their purpose in the natural supplementation of the human body). The student is aware of the significance of protection of honey bees for their continued existence on Earth by planting honey plants and supporting local beekeepers. The student recognizes the specifics of apitourism and analyses its potential for sustainable tourism.

Prerequisites

Knowledge	General knowledge of natural environment on the world
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 (L)				

Teaching methods:

Analysis of source materials regarding honey bee specifications. A field visit to educational apiary. Analysis of bee products combined with their tasting. Discussion on various ways to help honey bees survive.

Assessment methods:

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

Assessment criteria	Attendance in class, active participation in discussions, preparation of group work as directed by the instructor.
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Comments	Field classes will take place in close contact with bees. A tasting of bee products is also planned. People allergic to bee venom or other bee products are obliged to report it to the lecturer before starting the course. The class is taught by a professional beekeeper and educator.
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Course content (topic list)

1. Bee as species
2. Significance of bees to the environment, bee diseases and other threats to bees.
3. Visit to educational apiary
4. Specifics of authentic and fraudulent bee products. Benefits and nutrition values of bee products.
5. Apitourism and apitherapy and its potential for development of sustainable tourism.
6. Apitourism in Lesser Poland region – local examples.

Compulsory reading

Genersch, E. (2010). Honey bee pathology: current threats to honey bees and beekeeping. *Applied microbiology and biotechnology*, 87, 87-97.

Majewski, J. (2017). Beekeeping support in the European Union countries. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 17(4), 193-198.

Topal, E., Adamchuk, L., Negri, I., Kösoğlu, M., Papa, G., Dârjan, M. S., ... & Mărgăoan, R. (2021). Traces of honeybees, api-tourism and beekeeping: From past to present. *Sustainability*, 13(21), 11659.

Recommended reading

Brodtschneider, R., & Crailsheim, K. (2010). Nutrition and health in honey bees. *Apidologie*, 41(3), 278-294.

Weis, W. A., Ripari, N., Conte, F. L., da Silva Honorio, M., Sartori, A. A., Matucci, R. H., & Sforcin, J. M. (2022). An overview about apitherapy and its clinical applications. *Phytomedicine plus*, 2(2), 100239.

Course card

Course title	Iconic landscapes as tourist destinations		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Assoc. Prof. Joanna Zawiejska		
Department	Department of Physical Geography		

Course objectives (learning outcomes)

Understanding of the reasons for the diversity of landscapes in the world. Understanding of the origin and characteristics of the most visited and iconic landscapes of the world. Understanding of impacts and hazards posed by potential and ongoing processes (e.g. avalanches, rockfalls) to tourism development and the effects of (over)tourism on these landscapes. Significance of landscapes to local native cultures.

Prerequisites

Knowledge	Basic knowledge about environment.
Skills	Understanding the basic interrelationships between elements of the environment, origin of the basic types of landscapes.
Courses completed	Physical Geography or Tourism Regions (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:

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

Assessment criteria	<p>literature research and presentation of assigned topics (30%)</p> <p>class-based discussion (20%)</p> <p>submission of a written assignment on the assigned topic (50%)</p>
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Comments	
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Course content (topic list)

Iconic and most visited landscapes of the world: what makes a landscape a popular tourist destination?
Interaction of rivers and geology (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...).

Natural hazards and tourism.
Native cultures and landscapes.
The curse of popularity: challenges and management of overtourism at iconic landscape destinations

Compulsory reading

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

Recommended reading

A selection of up-to-date scientific papers. Internet research.

Course card

Course title	The Tatra Mountains and Zakopane		
Semester (winter/summer)	summer	ECTS	6
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 shaped the region 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 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			x					

Teaching methods:

Introduction lecture and field classes in Tatra Mountains and Zakopane.

Assessment methods:

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

Assessment criteria	Active presence during classes, short essay about assigned topic.
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Comments	Students with severe health conditions are advised to consult with the course teacher before the field trips. The course is taught by a certified mountain guide and rescuer. Adequate clothing and footwear are recommended for the visit in the Tatra National Park.
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Course content (topic list)

<p>Natural history of the Tatra Mountains. Environment of the Tatra Mountains. Environmental functioning in montane, sub-alpine and alpine belt. History of the Tatra region and the emergence of Zakopane as a major tourist resort. Nature protection, its history and current problems. Most recognizable elements of local folklore.</p>

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.

Course card

Course title	Wildlife rehabilitation principles		
Semester (winter/summer)	summer	ECTS	6
Lecturer(s)	Katarzyna Kucharska, PhD		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

The aim of the course is to familiarize students with aspects of wildlife rehabilitation methods according to various species. Students will learn about the anatomy, biology and behavior of different animals which is crucial to provide top-quality care and welfare for wildlife patients. Students will gain knowledge of ethical principles and legal regulations concerning aspects of wildlife rehabilitation, knowledge in laboratory skills and research methods for the post-release monitoring of the species.

Prerequisites

Knowledge	Basic biology
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	5		10	10		4		1	

Teaching methods:

Field classes, laboratory classes preceded by introductory lectures. Visits in the Wildlife Rehabilitation Center.

Assessment methods:

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

Assessment criteria	Active participation in classes, field classes and laboratory classes. Written exam and skills exam.
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Comments	
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Course content (topic list)

<ol style="list-style-type: none"> 1. Biology and anatomy of wild animals 2. Wild animal behavior 3. Marine animals 4. The Wildlife Patient: Initial Assessment, monitoring and triage 5. The Wildlife Patient: husbandry of the rehabilitated animal, stages of rehabilitation, release 6. Post-release monitoring of the wildlife patient and research 7. Community education about wildlife issues 8. Ethics and Legislation 9. Management of non-releasable animals

Compulsory reading

<ol style="list-style-type: none"> 1. Stocker L., 2005, „Practical Wildlife Care”, Blackwell Publ 2. Klupiec C., Korbel R., Liebich H. G., Koenig H.E., 2016, „Avian Anatomy: Textbook and colour atlas”

Recommended reading

1. Meredith A.L., Keeble E. J., 2011, “Wildlife Medicine and Rehabilitation”, Manson Publishing

Course card

Course title	Outdoor navigation		
Semester (winter/summer)	winter	ECTS	6
Lecturer(s)	Paweł Kroh, Ph.D.		
Department	Institute of Biology and Earth Sciences		

Course objectives (learning outcomes)

After the course student will be able (i) to carry out outdoor positioning and navigation with use of map, compass and local topography; (ii) make topographical sketches, (iii) use an outdoor GPS (mark positions, navigating to waypoints and use of tracks); (iv) prepare tracks in PC and download to receiver.

Prerequisites

Knowledge	n/a	
Skills	n/a	
Courses completed	n/a	

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:

Introductory training and 2-day field classes with practical tasks.

Assessment methods:

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

Assessment criteria	Execution of given tasks, essay
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Comments	
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Course content (topic list)

<ol style="list-style-type: none"> 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 making basic sketches and maps of locations 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