**O p i s p r o c e s u p r o w a d z ą c e g o d o u z y s k a n i a e f e k t ó w u c z e n i a s i ę**

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| **Wydział realizujący kształcenie:** | | | | **Biologii i Ochrony Środowiska** | | | | |
| **Kierunek, na którym są prowadzone studia:**  *(nazwa kierunku musi być adekwatna do zawartości programu kształcenia a zwłaszcza do zakładanych efektów uczenia się)* | | | | **Global change biology** | | | | |
| **Poziom studiów:**  *(studia pierwszego, drugiego stopnia, jednolite studia magisterskie)* | | | | **studia drugiego stopnia** | | | | |
| **Poziom Polskiej Ramy Kwalifikacji:**  *(poziom 6, poziom 7)* | | | | **poziom 7** | | | | |
| **Profil studiów:**  *(ogólnoakademicki, praktyczny)* | | | | **ogólnoakademicki** | | | | |
| **Przyporządkowanie kierunku do dyscypliny naukowej, do której odnoszą się efekty uczenia się:** | | | | **nauki biologiczne** | | | | |
| **Forma studiów:**  *(studia stacjonarne, studia niestacjonarne)* | | | | **stacjonarne** | | | | |
| **Liczba semestrów:** | | | | **4** | | | | |
| **Liczba punktów ECTS konieczna do ukończenia studiów na danym poziomie:** | | | | **120** | | | | |
| **Łączna liczba godzin dydaktycznych:** | | | | **1100 + godziny zajęć ogólnouczelnianych** | | | | |
| **Tytuł zawodowy nadawany absolwentom:** | | | | **magister** | | | | |
| **Wskazanie związku programu kształcenia z misją i strategią UMK:** | | | | Program kierunku global change biology wpisuje się w główny cel strategiczny UMK, jakim jest ugruntowanie wysokiej pozycji uczelni wśród najlepszych instytucji naukowych i dydaktycznych. Tworzony kierunek wpisuje się również w dwa cele operacyjne obszaru kształcenie wspomnianego celu strategicznego: a) zwiększenie liczby studentów z zagranicy i tym samym odpowiednie zwiększenie liczby kursów/kierunków prowadzonych w językach obcych; b) zwiększenie oferty studiów prowadzonych w językach obcych. Program został skonstruowany tak, aby zapewnić najwyższą jakość kształcenia. Jego celem jest nie tylko przekazywanie najnowszej wiedzy, ale również rozwój umiejętności i kompetencji społecznych przyszłych absolwentów. | | | | |
| **Wymagania wstępne (oczekiwane kompetencje kandydata) – zwłaszcza w przypadku studiów drugiego stopnia:** | | | | Dyplom licencjata kierunku studiów z dyscypliny nauki biologiczne lub nauki o Ziemi i środowisku lub z dziedziny nauk rolniczych. | | | | |
| **Przedmioty/grupy zajęć wraz z zakładanymi efektami uczenia się \*** | | | | | | | | |
| **Grupy przedmiotów** | | **Przedmiot** | **Zakładane efekty**  **uczenia się** | | **Formy i metody kształcenia**  **zapewniające osiągnięcie efektów kształcenia** | | **Sposoby weryfikacji i oceny efektów**  **uczenia się osiągniętych przez studenta** | |
| **Ecology and Evolution** | | Evolutionary ecology | W1: Graduate has advanced knowledge in evolutionaly ecology K\_W01  W2: Graduate explains the relationships between organisms and changing environment K\_W06  U1: Gradulte uses the knowledge in ecology and evolution while analyzing the consequences of global change K\_U02  U2: Graduate correctly formulates hypotheses concerning evolutionary consequences of global change K\_U07  K1: The graduate understands the need for lifelong learning and improving professional competences and skills K\_K01 | | Lecture and discussion | | Assessment methods:  - test  Assessment criteria:  fail- 0-59 %)  satisfactory- 60-70%)  satisfactory plus- 71-80%  good – 81-87%  good plus- 88-94%  very good- >94%) | |
| Environmental genomics | Student  W1: explains biological concepts and complex of natural phenomena and processes K\_W02  W2: has knowledge in the field of molecular biology in the environment K\_W10  Student  U1: is able to use source information in Polish and English, performs analysis, synthesis, summarizes and makes a critical assessment, which allows correct inference K\_U09  U2: is able to use a foreign language to communicate at a basic level in accordance with the requirements of B2 ESOKJ K\_U12  U3: has the ability to present results in English, as well as write a report in English K\_U14  Student  K1: understands the need to improve the knowledge with the use of scientific and popular journals K\_K01  K2: rationally and critically approaches information obtained from scientific literature, the Internet, and other sources of mass media, as well as common beliefs relating to the topic K\_K03 | | Expository teaching methods:  discussion, presentation, video / computer, pointer, banners image | | Assessment methods:  Laboratory – presentation in groups, 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good W1, W2, U1, U2, U3, K1, K2 | |
| Dynamic plant biogeography | W1 – describes and explains mechanisms of plant geography – K\_W04  W2 – describes the impact of plant geography on the environment, economy and human health – K\_W06, K\_W07  W3 – knows the recent literature on plant geography – K\_W17  U1 – designs, conducts and interprets simple experiments under the teacher’s supervision – K\_U08, K\_U10  U2 – reads scientific literature in the field of plant geography – K\_U11  U3 – presents the results of conducted experiments and literature surveys – K\_U14  K1 – is critical with regard to the results of own work and data on plant geography from scientific and popular sources – K\_K03, K\_K06  K2 – is capable of team work during conducting experiments and preparing reports – K\_K11 | | Standard lecture, demonstration, preparing and conducting experiments, work with literature data | | Lecture: Written exam – a test consisting of open and closed questions. Criteria for the final grade: 50-60% points - 3, 61-70% - 3+, 71-80% - 4, 81-90% - 4+, >90% - 5  Laboratory:  Written tests during laboratory classes  Test of skills in identification of plant species  Evaluation of a report prepared on the basis of the conducted experiment  Evaluation of a short presentation in the field of plant geography (mechanisms, important species, recent findings) on the basis of scientific literature provided by teachers  Activity during the classes  Final grade in laboratory classes will be an average of grades received in the above-mentioned categories | |
| Dynamic animal biogeography | W1 – knows the principles of zoogeography – K\_W05  W2 – knows the importance of distribution of animals for the function of ecosystems, human economy and health – K\_W06  W3 – knows the recent facts from the literature on biogeography – K\_W16  U1 – knows how to conduct simple experiments - K\_U08  U2 – knows how to conduct literature surveys – K\_U09, K\_U11  U3 – knows how to interpret facts on the distribution of animals from literature and own observations – K\_U09  K1 – is capable of team work during conducting experiments and preparing reports K\_K11  K2 – is capable to present the results of own work and from scientific and public sources to larger audience – K\_K02  K3 – is capable to estimate negative impact of alien species and suggest the proper methods of counteraction – K\_K04 | | Information lecture, problem lecture  Team projects in laboratory classes based on field and literature data | | Lecture  Written exam – a form consisting of descriptive and problematic questions covering the whole scope of knowledge delivered on lectures and obtained during self-study.  Criteria for the final grade (points related to % of correct answers): 51-60% - 3 points, 61-70% - 3+ points, 71-80% - 4 points, 81-90% - 4+ points, >90% - 5 points  Laboratory classes  Written test – descriptive and multiple-choice test checking the knowledge obtained during laboratory classes.  Presentation of results of team-project activity  Multimedial presentation of one of topics based on recent literature  Overall activity during classes.  The final grade will be based on all listed activities | |
| Dynamic marine and freshwater biogeography | W1: Student explains the interactions between organisms and their environment (K\_W07)  U1: Student has necessary computer skills to search for information, communicate, organize and analyze data, prepare reports and present obtained results and conclusions (K\_U04)  K1: Student understands the need to continually improve knowledge using scientific and popular science journals (K\_K01) | | Expository teaching methods:  • Informative lecture (conventional)  Searching teaching methods:  • Laboratory  • Project  • Report | | Lecture: written test/exam  Laboratory: attendance at classes, multimedia presentation  Assessment criteria: the student must get 50 - 60% points for a satisfactory grade, a satisfactory plus - 61-70% points, a good grade - 71-80% points, a good plus - 81-90% points, a very good - over 90% points. | |
| Molecular biogeography | W1 - describes and explains factors affecting organisms spatial distribution - K\_W02, K\_W06  W2 – knows molecular markers and describes molecular methods used in biogeography - K\_W10  W3 – knows the recent literature on molecular biogeography – K\_W16  U1 – designs, conducts and interprets simple experiments under the teacher’s supervision – K\_U08, K\_U10  U2 – applies various bioinformatic methods in the data analysis for molecular biogeography purposes – K\_U01, K\_U04  U3 – reads scientific literature in the field of molecular biogeography – K\_U11  U4 – presents the results of conducted experiments and literature surveys – K\_U14  K1 – is critical with regard to the results of own work and data on molecular biogeography from scientific and popular sources – K\_K03, K\_K06  K2 – is capable of team work during conducting experiments and preparing reports – K\_K11 | | Standard lecture, demonstration, preparing and conducting experiments, work with literature data | | Lecture: Written exam – a test consisting of open and closed questions. Criteria for the final grade: (55-65% - 3, >65-75% - 3+, >75-85% - 4, >85-95% - 4+, >95% - 5)  W\_02, W\_06, W\_011  Laboratory:  Written tests during laboratory classes  Evaluation of a report prepared on the basis of the conducted experiment  Final grade in laboratory classes will be an average of grades received in the above-mentioned categories | |
| The global dynamics of parasites and diseases | W1: defines the phenomenon of parasitism and explains parasitological terms - K\_W01  W2: explains the interactions between parasites and environment - K\_W07  U1: Correctly evaluates parasitic threats to human health and life - K\_U05  U2: Has oral presentation skills in English - K\_U14  K1: is responsible for work safety in a parasitological laboratory - K\_K09  K2: shows criticism in relation to the results of his work - K\_K07 | | 1. lecture with multimedia presentation  2. laboratory work | | Lecture – W01, W02, U01 - a test consisting of open and closed questions. Criteria for the final grade: 50-60% points - 3, 61-70% - 3+, 71-80% - 4, 81-90% - 4+, >90% - 5  Laboratory classes –U02 - project in groups and test consisting of open and closed questions. Criteria for the final grade: 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good. | |
| **Bioconser-vation** | | Hydrobiology and water management | W1: Wyjaśnia pojęcia biologiczne oraz złożone zjawiska i procesy przyrodnicze, a także związki i zależności pomiędzy strukturą i funkcją - K\_W02  W2: Objaśnia wzajemne oddziaływania środowiska i organizmów w nim żyjących - K\_W07  U1: Dokonuje pomiarów, interpretuje obserwacje, i na ich podstawie opracowuje i opisuje wyniki oraz wyciąga poprawne wnioski. -K\_U08  U2: Projektuje i przeprowadza obserwacje i pomiary w terenie i/lub laboratorium w obecności opiekuna - K\_U10  U3: Posługuje się językiem obcym umożliwiającym komunikowanie się na podstawowym poziomie w zakresie nauk biologicznych zgodnie z wymaganiami B2+ESOKJ - K\_U12  K1: Rozumie potrzebę powiększania kompetencji zawodowych z zakresu nauk przyrodniczych oraz potrafi inspirować i organizować proces uczenia się innych osób - K\_K02  K2: Racjonalnie i krytycznie podchodzi do informacji uzyskanej z literatury naukowej, internetu, i innych źródeł masowego przekazu, a także obiegowych przekonań odnoszących się do nauk biologicznych. - K\_K03  K3: Jest odpowiedzialny za powierzony sprzęt, pracę własną i innych. - K\_K10  K4: Jest zdolny do pracy zespołowej. - K\_K11 | | Wykład - prezentacja multimedialna,  Laboratorium - interaktywna forma kształtowania wiedzy i umiejętności, polegająca na rozwiązywaniu problemów i zadań przedstawionych przez prowadzącego, oparta na treściach wykładu. | | W02, W07 – kolokwium  U8, U10, U12 – kolokwium  K02, K03, K10, K11 – aktywność  Wykład: zaliczenie na ocenę w formie testu z pytaniami otwartymi i zamkniętymi. Kryteria oceny: na ocenę dostateczną student musi zdobyć 50 - 60% pkt, na ocenę dostateczny plus - 61-70% pkt, na ocenę dobry - 71-80% pkt, na ocenę dobry plus - 81-90% pkt, na ocenę bardzo dobry - powyżej 90% pkt.  Zajęcia laboratoryjne: w zakresie wiedzy i umiejętności: kolokwium końcowe z materiału ćwiczeniowego.  Kryteria oceny: na ocenę dostateczną student musi zdobyć 50 - 60% pkt, na ocenę dostateczny plus - 61-70% pkt, na ocenę dobry - 71-80% pkt, na ocenę dobry plus - 81-90% pkt, na ocenę bardzo dobry - powyżej 90% pkt.  W zakresie kompetencji społecznych: oceniana jest aktywność studenta na zajęciach i jego udział w dyskusji i rozwiązywaniu problemów oraz praca zespołowa. Ocena w skali 2-5.  Ocena ostateczna z laboratorium: ocena z kolokwium końcowego (70%) + średnia z ocen z aktywności na zajęciach (30%) | |
| Urbanization and the future of natural resources | W1: explains biological concepts and complex of natural phenomena and processes under global urbanisation K\_W02  W2: demonstrates knowledge of current issues in the field of global change and natural resources K\_W15  U1: is able to use source information in Polish and English, performs analysis, synthesis, summarizes and makes a critical assessment, which allows correct inference K\_U09  U2: is able to use a foreign language to communicate at a basic level in accordance with the requirements of B2 ESOKJ K\_U12  U3: has the ability to present results in English, as well as write a report in English K\_U14  K1: understands the need to improve the knowledge with the use of scientific and popular journals K\_K01  K2: rationally and critically approaches information obtained from scientific literature, the Internet, and other sources of mass media, as well as common beliefs relating to the topic K\_K03 | | Expository teaching methods:  informative lecture, discussion, presentation, video / computer, pointer, banners image | | Assessment methods:  Lecture – final test, 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good W1, W2, U1, U2, U3, K1, K2  Laboratory – project in groups, 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good W1, W2, U1, U2, U3, K1, K2 | |
| Environmental impacts of genetically modified organisms | W1: Student uses the specific terminology and defines: transgenic organisms, GMM, GMO, LMO, promoter, exon, intron, terminator, mutant, cloning, genetic engineering - K\_W02 K\_W10, K\_W11  W2: Student lists the stages of creating transgenic plants and plant selection genes - K\_W02, K\_W10, K\_W11  W3: Student combines the structure of a genetic construct introduced into plants with its functionality - K\_W02, K\_W04  W4: Student has knowledge in the field of selection and targeted modification of plants in order to obtain new features useful for humans and the environment K\_W10, K\_W11,  W5: Student indicates the benefits and risks of using biotechnology in relation to man and the environment K\_W06, K\_W07,  W6: Student independently assesses the threats to health and human life currently discussed in specialist literature regarding GMM or GMO - K\_W06, K\_W07, K\_W17,  U1: Student uses specialist terminology and biological nomenclature and specialized terms in genetics, biochemistry, biotechnology K\_U02  U2: Student plans, illustrates and modifies the structure of the introduced construct to the GM plant - K\_U02  U3: The student correctly evaluates threats to human health and life about GMM and GMO - K\_U05  K1: Student follows the rules of ethics - K\_K05  K2: Student rationally and critically approaches information obtained from scientific literature, the Internet, and other sources of mass communication regarding GMM or GMO - K\_K02, K\_K03  K3: The student is eager to popularize biological knowledge about GMM and GMO K\_K07 | | Lecture: informative lecture with multimedia presentations | | Lecture:  Test written exam consisting of single-choice questions offering 4 eventualities. Each correct answer - 1 points. At least 20 questions in the test. Passing the exam after reaching at least 50% of the points available. Very good mark for more than 90% of the points. Other grades proportionally in the 50-90% range.  Written exam - W01, W02, W03, W04, W05, U01, U02, U03 | |
| Applied ecosystem services | W1: Students can analyze natural resource and environmental management problems by using appropriate methods from natural science disciplines (K\_W02)  W2: Students demonstrate knowledge of ecological principles, and interdisciplinary aspects of natural resource and environmental management issues (K\_W02, K\_W03)  W3: Students are able to characterize the organization and functioning of ecological systems and the relationship between the organism and the environment (K\_W05)  W5: objaśnia rolę i znaczenie środowiska przyrodniczego dla funkcjonowania człowieka; (K\_W13)  W6: Students describes changes and environmental hazards caused by human activity on the surface of the earth, in soils and waters; (K\_W07)  W7: Students lists and describes the basic methods, technologies, tools that allow to use the natural potential to improve the quality of human life, as well as allow for the restoration of lost natural values; (K\_W08)  U1: Students communicate effectively, both orally and in writing, to diverse audiences including professionals, resource managers, local communities and policy makers; (K\_U14, K\_U15)  U2: Students can conduct original, independent scientific research of professional quality in their specialization area; (K\_U17)  U3: Students can function as professionals in their specialization area by demonstrating responsible and ethical conduct, effective collaboration, informed decision making, and life-long learning; K\_U13, K\_U17)  U4: Students uses a computer to search for information, create databases, analyze data, prepare reports and present results; (K\_U04)  U4: Students recognize the health and environmental hazards and put the correct hypotheses about their causes; (K\_U05, K\_U07)  U5: Students interpret observations and measurements and draw correct conclusions on their basis; (K\_U09)  U7: Students use source information in Polish and English, carry out analyzes, syntheses, summaries, critical assessments and correct conclusions; (K\_U09)  K1: Students can function as professionals in their specialization area by demonstrating responsible and ethical conduct, effective collaboration, informed decision making, and life-long learning; (K\_K01, K\_K02)  K2: Students can constructively critique real or possible programs, policies, and institutions that impact ES, based on those possible impacts and the concepts of efficiency, equity, and sustainability; (K\_K01; K\_K03)  K3: Students can advocate and support their views on the pros and cons of economic valuation of ecosystem services and other routes to affecting decision-making based on ecosystem services research and stakeholder input; (K\_K01; K\_K03, K\_K07)  K4: Students are willing to work in a team as a member; (K\_K11) | | Laboratory: group work - students carry out projects in groups of 2-3 persons and presentation, discussion and case study analysis, two essays  Lecture: informative lecture, discussion | | Assessment methods:  - written project with oral presentation  - written examination  - test  - activity  Assessment criteria for lecture:  - activity,  - the presence of the lecture  - written exam  Assessment criteria for tutorial:  - activity,  - the presence of the tutorial  - positive test passed  - positive written project passed  - well received presentation of the project  - two essays  Assessment a percentage for test:  fail - below 55%  satisfactory - 56-64 %  satisfactory plus - 65-74 %  good – 75-84 %  good plus - 85-94 %  very good - 95-100 % | |
| The future of land use | W1: Students can analyze natural resource and environmental management problems by using appropriate methods from natural science disciplines (K\_W02)  W2: Students demonstrate knowledge of land use planning objectives and interdisciplinary aspects of natural resource and environmental management issues (K\_W02, K\_W03)  W3: Students are able to characterize the organization and functioning of ecological systems and the relationship between the organism and the environment (K\_W05)  W7: Students lists and describes the basic methods, technologies, tools that allow to use the natural potential to improve the quality of human life (K\_W08)  U1: Students communicate effectively, both orally and in writing, to diverse audiences including professionals, resource managers, local communities and policy makers; (K\_U14, K\_U15)  U2: Students can conduct original, independent scientific research of professional quality in their specialization area; (K\_U17)  U3: Students can function as professionals in their specialization area by demonstrating responsible and ethical conduct, effective collaboration, informed decision making, and life-long learning; K\_U13, K\_U17)  U4: Students uses a computer to search for information, create databases, analyze data, prepare reports and present results; (K\_U04)  U5: Students interpret observations and measurements and draw correct conclusions on their basis; (K\_U09)  U6: Students use source information in Polish and English, carry out analyzes, syntheses, summaries, critical assessments and correct conclusions; (K\_U09)  K1: : In the concept of the spatial development plan students can refer the examples of foreign solutions described in the scientific literature of Elsevier journals and reports on the implementation of the projects available on the web (K\_K01, K\_K02, K\_K03)  K2: Students can constructively critique and discuss real or possible programs, policies and the concept of the project, arguing for and against; (K\_K01; K\_K03)  K3: Students can advocate and support their views on the pros and cons of economic valuation of ecosystem services and other routes to affecting decision-making based on ecosystem services research and stakeholder input; (K\_K01; K\_K03, K\_K07)  K4: Students are aware of the work in a group, taking a leadership role and responsibility for the implementation new tasks; (K\_K11) | | Laboratory: group work - students carry out projects in groups of 2-3 persons and presentation, discussion and case study analysis, two essays  Lecture: informative lecture, discussion | | Assessment methods:  - written project with oral presentation  - written examination  - test  - activity  Assessment criteria for lecture:  - activity,  - the presence of the lecture  - written exam  Assessment criteria for tutorial:  - activity,  - the presence of the tutorial  - positive test passed  - positive written project passed  - well received presentation of the project  - two essays  Assessment a percentage for test:  fail - below 55%  satisfactory - 56-64 %  satisfactory plus - 65-74 %  good – 75-84 %  good plus - 85-94 %  very good - 95-100 % | |
| The last of the wild: European protected areas | W1 – knows the distribution of important habitats across Europe – K\_W02  W2 – knows the principles of creation national parks and nature reserves – K\_W15  W3 – knows the reasons for the threat of nature – K\_W03  W4 – knows the principles of nature conservation – K\_W05  U1 – knows how to define the value of habitat – K\_U10  U2 – knows how to fill out the Natura 2000 standard data forms – K\_U08  U3 – knows how to use and interpret various literature and data base sources – K\_U11  K1 – is capable of team work during gathering data and preparing reports – K\_K04  K2 – is capable to estimate negative impact of human activity on the environment and suggest the proper methods of counteraction – K\_K05  K3 – is capable to present the ideas of nature conservation for a wider audience – K\_K07 | | Information lecture, problem lecture  Team projects in laboratory classes based on field and literature data | | Lecture  Written exam – a form consisting of descriptive and problematic questions covering the whole scope of knowledge delivered on lectures and obtained during self-study.  Criteria for the final grade (points related to % of correct answers): 51-60% - 3 points, 61-70% - 3+ points, 71-80% - 4 points, 81-90% - 4+ points, >90% - 5 points  Laboratory classes  Written test – descriptive and multiple-choice test checking the knowledge obtained during laboratory classes.  Presentation of results of team-project activity  Multimedial presentation of one of topics based on recent literature  Overall activity during classes  The final grade will be based on all listed activities (from 3 to 5) | |
| Ecological impacts of invasive species | W1 – describes and explains mechanisms of biological invasions – K\_W04  W2 – describes the impact of biological invasions on the environment, economy and human health – K\_W06, K\_W07  W3 – knows the recent literature on biological invasions – K\_W16  U1 – designs, conducts and interprets simple experiments under the teacher’s supervision – K\_U08, K\_U10  U2 – reads scientific literature in the field of biological invasions – K\_U11  U3 – presents the results of conducted experiments and literature surveys – K\_U14  K1 – is critical with regard to the results of own work and data on biological invasions from scientific and popular sources – K\_K03, K\_K06  K2 – is capable of team work during conducting experiments and preparing reports – K\_K11 | | Standard lecture, demonstration, preparing and conducting experiments, work with literature data | | Lecture: Written exam – a test consisting of open and closed questions. Criteria for the final grade: 50-60% points - 3, 61-70% - 3+, 71-80% - 4, 81-90% - 4+, >90% - 5  Laboratory:  Written tests during laboratory classes  Test of skills in identification of alien organisms  Evaluation of a report prepared on the basis of the conducted experiment  Evaluation of a short presentation in the field of biological invasions (mechanisms, important species, recent findings) on the basis of scientific literature provided by teachers  Activity during the classes  Final grade in laboratory classes will be an average of grades received in the above-mentioned categories | |
| Case studies in global change | W1 – describes and explains environmental effects of global changes – K\_W04, K\_W06  W3 – knows the recent literature on biological invasions – K\_W16  U2 – reads scientific literature concerning global changes in the environment – K\_U11  U3 – presents the results of conducted literature surveys – K\_U14  K1 – is critical with regard to the results of own work and data on global change in the environment from scientific and popular sources – K\_K03, K\_K06 | | Discussion, literature surveys, student presentations | | Evaluation of a presentation on the selected topic  Activity during the classes (participation in discussion after presentations)  Final grade in laboratory classes will be an average of grades received in the above-mentioned categories | |
|  | | Data compilation, organization, and analysis in biology | W1: defines a task or problem in the field of his specialty and selects appropriate statistical methods to solve them K\_W08  U1: applies advanced knowledge in the field of statistics to the biological data K\_U01  U2: is able to use a foreign language to communicate at a basic level in accordance with the requirements of B2 ESOKJ K\_U12  U3: has the ability to present results in English, as well as write a report in English K\_U14  K1: demonstrates the ability to use statistical and multivariate methods to develop and present results and analyzes K\_K08  K2: can work in a team, both by directing and co-ordinating the team's activities and by performing assigned tasks K\_K11 | | Expository teaching methods:  discussion, presentation, video / computer, pointer, banners image | | Laboratory – project in groups 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good W1, W2, U1, U2, K1 | |
|  | | Scientific publishing | W1: charakteryzuje metodologię badań uprawianej dyscypliny oraz szczegółowe techniki badawcze uprawianej specjalizacji - K\_W03  U1: wykorzystuje wiedzę z różnych dziedzin nauki planując badania naukowe z zakresu biologii - K\_U01,  U2: pisze artykuły naukowe w języku angielskim - K\_U05,  K1: postępuje zgodnie z kodeksem zasad etycznych pracy naukowej i dobrych obyczajów - K\_K06,  K2: respektuje zasady publicznej własności wyników badań naukowych z uwzględnieniem zasad ochrony własności intelektualnej - K\_K07 | | Course:   * writing own poster and scientific paper | | The final marks come from successful course are as follows; up to 3.39 – sufficient, 3.40-3.74 – sufficient plus, 3.75-4.19 – good,> 4.50 – very good.  Final test – W1  Scientific paper – U1, U2  Activity (competences only) – K1, K2. | |
|  | | Basics in climatic modelling | W1: Has basic knowledge of the nature of climate changes in the Earth’s history, with particular focus on the last thousand years – K\_W02  W2: Knows the potential factors (both natural and anthropogenic) determining present and future climate and climate changes – K\_W02  W3: Is able to assess the direction and rate of climate variations on various time and spatial scales – K\_W02, K\_W06, K\_W07  W4: Has the essential knowledge to assess the probable consequences of climate changes on the natural environment and the economy – K\_W02, K\_W06, K\_W07  U1: Is able to use and expand their knowledge in order to apply it to analysis of environmental processes – K\_U04, K\_U05, K\_U07, K\_U08  U2: Is able to practically define the interdependencies between climate changes and the natural environment – K\_U04 – K\_U09,  U3: Is able to seek out, comprehend, analyse and exploit required information from the basic sources related to climate changes and its causes – K\_U09, K\_U11, K\_U15  U4: Uses knowledge acquired relating to climate change and its causes in analyses of its influence on the natural environment and man – K\_U09, K\_U11, K\_U15  K1: Understands the need to maintain up-to-date knowledge on climate change and its causes – K\_K01, K\_K02, K\_K03  K2: Is able independently or as part of a team to reliably and fairly assess the consequences of climate changes on the natural environment and man, and provide rational solutions – K\_K02, K\_K03, K\_K04, K\_K05  K3: Is able to appropriately define priorities in the realisation of tasks set by self or others – K\_K01, K\_K04, K\_K05, K\_K08, K\_K11 | | Lecture and problem-based lesson with multimedia presentations  Laboratory exercises: experiments, climatological analyses based on collections of meteorological data, maps and atlases. | | 1. Written examination in the form of test.  Mark range:  Percent of  correct answers: Mark  0-50% fail (2,0)  51-60% pass (3,0)  61-70% pass plus (3,5)  71-80% good (4,0)  81-90% good plus (4,5)  91-100% very good (5,0)  2. Laboratory classes: marks from classes in the form of reports, marks given based on activity of students during classes; final mark is calculated as mean from all marks in the following way: 2,51-3,39 – pass, 3,40-3,74 – pass plus, 3,75-4,19 – good, 4,20-4,50 – good plus, above 4,50 – very good | |
|  | | Advanced techniques in environmental data analysis | W1: defines a task or problem in the field of his specialty and selects appropriate statistical methods to solve them K\_W08  U1: applies advanced knowledge in the field of statistics to the biological data K\_U01  U2: is able to use a foreign language to communicate at a basic level in accordance with the requirements of B2 ESOKJ K\_U12  U3: has the ability to present results in English, as well as write a report in English K\_U14  K1: demonstrates the ability to use statistical and multivariate methods to develop and present results and analyzes K\_K08  K2: can work in a team, both by directing and co-ordinating the team's activities and by performing assigned tasks K\_K11 | | Expository teaching methods:  conventional lecture, discussion, presentation, video / computer, pointer, banners image | | Laboratory – project in groups 61-68% satisfactory, 69-76% satisfactory plus, 77-84 % good, 85- 92% good plus, 93-100% very good W1, W2, U1, U2, K1 | |
|  | | Applied geostatistical analysis | W1: Demonstrates an increased knowledge in the field of numeric maps analysis and geospatial data statistics as well as knowledge of specialized IT tools that enable describing and forecasting the course of natural phenomena – K\_W08  U1: Applies an advanced knowledge in the field of GIS analysis and statistics in the analysis of biological data of spatial nature – K\_U01  U2: Makes use of a computer to find information, arrange data, develop reports and presentations of results obtained based on the numeric maps analysis – K\_U04  U3: Puts correct scientific hypotheses based on logical reasoning – K\_U07  K1: Demonstrates the ability to use mathematical, statistical and IT methods for the development and presentation of results and analyses – K\_K08  K2: Is responsible for the entrusted equipment, own work and activities of others – K\_K10 | | Seeker teaching methods: practical classes; project method. | | Assessment methods:  - test  Assessment criteria: number of points obtained on final test  fail- 0-55 pts (0-55 %)  satisfactory- 55-64 pts (55-64%)  satisfactory plus- 65-74 pts (65-74%)  good - 75-84 pts (75-84%)  good plus- 85-94 pts (85-94%)  very good- 95-100 pts (95-100%) | |
| **Social and legal affairs** | | European legal regulations in environmental protection | W1: Ma pogłębioną wiedzę na temat wpływu środowiska na zdrowie człowieka - K\_W07  W2: Wykazuje znajomość aktualnych problemów w zakresie biologii - K\_W15  U1: Stawia poprawne hipotezy naukowe oparte na logicznym rozumowaniu - K\_U07  U2: Korzysta z informacji źródłowych w języku polskim i angielskim, wykonuje analizę, syntezę, podsumowuje i dokonuje krytycznej oceny, co umożliwia poprawne wnioskowanie - K\_U09  K1: Rozumie potrzebę ustawicznego pogłębiania wiedzy z wykorzystaniem czasopism naukowych i popularnonaukowych - K\_K01  K2: Racjonalnie i krytycznie podchodzi do informacji uzyskanej z literatury naukowej, internetu, i innych źródeł masowego przekazu, a także obiegowych przekonań odnoszących się do nauk biologicznych - K\_K03 | | WYKŁAD:  a) metody dydaktyczne podające:  - wykład informacyjny (konwencjonalny)  - wykład problemowy  b) metody dydaktyczne poszukujące:  - klasyczna metoda problemowa  ĆWICZENIA:  Metody dydaktyczne poszukujące:  - klasyczna metoda problemowa  - referatu  - studium przypadku | | WYKŁAD  Zaliczenie na ocenę (test pisemny) – W1, W2  ĆWICZENIA  Kolokwium – W1, W2, U1, U2  Referat – W1, W2, U1, U2  Aktywność – K1, K2  WYKŁAD  Egzamin pisemny: test pisemny złożony z 25 pytań (pytania zamknięte-jednokrotnego wyboru; 1 pytanie – 1 pkt):  nst - 12 pkt (48%)  dst - 13-18 pts (52-72%)  dst plus - 19 pkt (76%)  db - 20-21 (80-84%)  db plus - 22 pkt (88%)  bdb - 23-25 pkt (93-100%)  ĆWICZENIA  Kolokwium: test pisemny złożony z 15 pytań (pytania zamknięte-jednokrotnego wyboru; 1 pytanie – 1 pkt):  nst - 7 pkt (46%)  dst - 8-9 pts (53-60%)  dst plus - 10 pkt (66%)  db - 11-12 (73-80%)  db plus - 13 pkt (86%)  bdb - 14-15 pkt (93-100%)  Referat – zwykła skala ocen (kryterium oceny – sposób wyczerpania tematu)  Aktywność – trzy plusy równe 0,5 oceny w ramach zwykłej skali ocen | |
| Socioeconomic aspects of global change | W1: discuss possible ways of ensuring sustainable futures in the face of global environmental change (K\_W16)  W2: explore emerging environmental governance issues and legislative frameworks (K\_W13)  W3: introduce concepts and terms used in socio-economic analysis of environmental issues as well as methods of data collection, analysis and use of information (K\_W15)  Students should be able to:  W4: understand the economic, socio-cultural, and political incentives and impediments to rainforest conservation; (K\_W02)  W5: students understand the interactions between human and ecological systems; (K\_W04)  W6: students appreciate the dilemmas in choosing between economic development and the environment;( K\_W02, K\_W04, K\_W05)  W7: students describe changes and environmental hazards caused by human activity on the surface of the earth, in soils and waters;( K\_W07)  W8: students know professional Polish and foreign language literature in the field of selected specialization (K\_W16)  W9: students know the rules of ethics; (K\_W14)  Students should be able to:  U1: better understand the array of socio-cultural, economic and political factors that shape resource use; (K\_U14, K\_U15)  U2: conduct original, independent scientific research of professional quality in their specialization area; (K\_U17)  U3: use source information in Polish and English, carry out analyzes, syntheses, summaries, critical assessments and correct conclusions; (K\_U09)  U4: recognize the health and environmental hazards and put the correct hypotheses about their causes; (K\_U05, K\_U07)  U5: demonstrate the information literacy skills of collecting, analysing and reporting data; (K\_U09)  K1: Students demonstrate the desire to deepen knowledge in the field of socio-economic sciences; (K\_K01)  K2: Students show caution and criticism in receiving information from the scientific literature, the Internet, and especially accessible in mass media, referring to social issues (K\_K03)  K3: Students can cooperate with a good communication and work with other students; (K\_K11)  K4: Students are willing to work in a team as a member; (K\_K11)  K5: Students show criticism in relation to the results of his work; (K\_K06) | | Laboratory: group work - students carry out projects in groups of 2-3 persons and presentation, discussion and case study analysis, two essays  Lecture: informative lecture, discussion | | Assessment methods:  - written project with oral presentation  - written examination  - test  - activity  Assessment criteria for lecture:  - activity,  - the presence of the lecture  - written exam  Assessment criteria for tutorial:  - activity,  - the presence of the tutorial  - positive test passed  - positive written project passed  - well received presentation of the project  - two essays  Assessment a percentage for test:  fail - below 55%  satisfactory - 56-64 %  satisfactory plus - 65-74 %  good – 75-84 %  good plus - 85-94 %  very good - 95-100 % | |
| **Realisation of Master Thesis** | | Journal Club | W1: has knowledge of how to prepare presentations, reports, studies and manuscripts and mathematical knowledge in the field of data processing and analysis K\_W08, K\_W12,  W2: has in-depth knowledge in main disciplines enabling research and practical activities in the field of biology K\_W01, K\_W02, K\_W03, K\_W04, K\_W05, K\_W06, K\_W07, K\_W11, K\_W15,  W3: identifies sources of scientific information on current trends in the discipline development, planning experiments, analyzes and interprets the obtained results K\_W09, K\_W11, K\_W12, K\_W15,  W4: speaks English to the extent necessary to read the current specialist literature in the field of study K\_W15,  U1: can prepare and present lectures, reports, documentation of experiments/analyzes, and expert opinions using correct scientific and technical terminology. K\_U01, K\_U04, K\_U07, K\_U08  U2: uses knowledge from field disciplines enabling research and practical activities in the field of biology K\_U01, K\_U02, K\_U03, K\_U06, K\_U07,  U3: acquires, interprets and critically evaluates information from scientific sources relating to the discipline studied K\_U04, K\_U09, K\_U11,  U4: speaks English on B2 ESOKJ level K\_U12, K\_U14,  K1: is aware the importance of the ethics principle in the activity of molecular diagnostics, both in scientific and professional work K\_K05, K\_K04,  K2: is aware the limitations, but also the ever-widening knowledge and development of technology; understands the need for lifelong learning K\_K01, K\_K02,  K3: is aware the social problems and dangers associated with the development of molecular biology, in particular the development and use of genetically modified organisms; can explain the true meaning of these threats based on rational arguments but in a way that is understandable to the general public K\_K03, K\_K04, K\_K05,  K4: critically analyzes the results of own research and research of other authors and is aware the need to undertake activities that increase the value of research and increase the effectiveness of work K\_K03, K\_K07, | | Journal Club; 8-12 persons/group. During the Journal Club one research problem is discussed in the research topics of the Chair, Department or Laboratory where the seminar takes place. | | During the Journal Club, the supervisor evaluates the presentation, speech and participation in the discussion.  Evaluation criteria:  • attendance  • active participation in Journal Club including discussions | |
| Lab | W1: student ma pogłębioną wiedzę teoretyczną z dyscyplin kierunkowych, umożliwiającą pracę badawczą i działania praktyczne w zakresie biologii, K\_W01, K\_W02, K\_W03, K\_W04, K\_W05, K\_W06, K\_W07, K\_W15  W2: student definiuje zadanie lub problem badawczy i dobiera właściwe metody eksperymentalne do ich rozwiązania, K\_W09, K\_W10, K\_W11,  W3: zna specjalistyczną terminologię i język angielski w stopniu niezbędnym do posługiwania się bieżącą literaturą specjalistyczną w zakresie studiowanego kierunku, K\_W016,  W4: zna przykłady praktycznego zastosowania metod obliczeniowych z wykorzystaniem odpowiednich narzędzi informatycznych, K\_W08, K\_W12  W5: ma wiedzę dotyczącą sposobu przygotowywania prezentacji, raportów, opracowań i manuskryptów w zakresie tematyki pracy magisterskiej, K\_W12, K\_W13  W6: zna podstawy metodologii konstrukcji pracy dyplomowej oraz metody i techniki niezbędne w realizacji zadania wyznaczonego tematem pracy, K\_W03, K\_W15,  W7: zna zasady etyki i jest przekonany konieczności przestrzegania ich w przyszłej pracy zawodowej K\_W14,  W8: zna podstawowe zasady bezpieczeństwa pracy obowiązujące przy prowadzeniu badań naukowych – K\_W17  W9: zna zasady tworzenia form indywidualnej przedsiębiorczości - K\_W18  U1: stosuje znane metody i techniki badawcze w procedurze realizacji własnego zadania eksperymentalnego, K\_U02, K\_U03, K\_U06, K\_U07, K\_U08, K\_U10  U2: korzysta ze źródeł książkowych i czasopism naukowych, zarówno w języku polskim, jak i angielskim, dostępnych w formie papierowej i elektronicznej, K\_U09, K\_U12  U3: stosuje metody statystyczne i specjalistyczne narzędzia bioinformatyczne do analizy i interpretacji danych oraz opisu uzyskanych wyników doświadczeń, K\_U01, K\_U04  U4: pozyskuje, integruje, interpretuje i krytycznie ocenia uzyskane dane i informacje pochodzące z różnych źródeł, a także wyciąga wnioski oraz formułuje i wyczerpująco uzasadnia opinie na dany temat, K\_U09, K\_U07,  U7: samodzielnie przygotowuje opracowanie wyników swoich prac eksperymentalnych, krytycznie je dyskutuje i przedstawia podczas wystąpień ustnych, K\_U14, K\_U15  U8: określa własne zainteresowania, samodzielnie planuje swój rozwój intelektualny i wspiera w tym zakresie innych K\_U16  U9: przestrzega zasad etyki K\_U13  K1: konsekwentnie stosuje zasadę podnoszenia kompetencji osobistych i zachowanie odpowiedniej postawy zawodowej, K\_K01, K\_K02, K\_K04,  K2: rozumie potrzebę samorozwoju naukowego również po skończeniu studiów, K\_K01, K\_K02  K4: współpracuje w zespole na zasadach partnerskich, K\_K11  K5: jest zdolny do rzeczowej i krytycznej oceny poziomu własnej wiedzy i umiejętności, K\_K04, K\_K07,  K6: jest świadomy roli społecznej absolwenta kierunku biologii i ryzyka wykonywanej działalności oraz ponoszenia odpowiedzialności w zakresie stosowania metod badawczych, K\_K04, K\_K07, K\_K09, K\_K10, K\_K12, | | Laboratory work: project planning, experimental phase, data analysis, literature review, discussion.  Working out the theoretical background, literature search, thesis layout, data analysis, final writing. | | Continuous marking according to the criteria stablished by the thesis promotor | |
| Preparation of MSc thesis | (K\_W16) - The graduate describes the rules of preparing and writing research papers;  (K\_W15) - The graduate enumerates and discusses most important specialist literature in the field that is the focus of the Master’s thesis;  (K\_U15) - The graduate prepares simple research papers in Polish and short scientific reports in a foreign language following general standards of writing research papers;  (K\_U15) - The graduate is able to use specialist terminology in the field of environment protection in Polish and English;  (K\_U08) - The graduate combines information from various sources in order to verify the existing opinions and hypotheses; | |  | | assessment of the thesis | |
| MSc exam | (K\_W16) - The graduate enumerates and discusses most important specialist literature in the field that is the focus of the Master’s thesis;  (K\_U14) - presents to the public the results of their own work;  (K\_U08) - The graduate provides research-based justification for the selection of his/her Master’s thesis topic with a view to professional and research career;  (K\_K02) - The graduate is able to adequately specify his/her priorities in order to accomplish a task set by himself/herself or by other persons; | |  | | evaluation of the oral exam | |
| **Szczegółowe wskaźniki punktacji ECTS** | | | | | | | | |
| **Dyscypliny naukowe lub artystyczne, do których odnoszą się efekty uczenia się:** | | | | | | | | |
|  | **Dyscyplina naukowa** | | | | | **Punkty ECTS** | | |
| **liczba** | | **%** |
| **1.** | **nauki biologiczne** | | | | | **120** | | **100,0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Grupy przedmiotów zajęć** | **Przedmiot** | **Liczba punktów ECTS** | **Liczba ECTS w dyscyplinie:**  **(wpisać nazwy dyscyplin)\*\*\*\*** | **Liczba punktów ECTS z zajęć do wyboru** | **Liczba punktów ECTS, jaką student uzyskuje w ramach zajęć prowadzonych z bezpośrednim udziałem nauczycieli akademickich lub innych osób prowadzących zajęcia** | **Liczba punktów ECTS, które student uzyskuje realizując:**  **zajęcia związane z prowadzoną w uczelni działalnością naukową w dyscyplinie lub dyscyplinach, do których przyporządkowany jest kierunek studiów\*\*\*\*\*/ zajęcia kształtujące umiejętności praktyczne \*\*\*\*\*\*** |
| **nauki biologiczne** |  |  |  |
| **Ecology and Evolution** | Evolutionary ecology | 2 | 2 |  | 1,0 | 2 |
| Environmental genomics | 2 | 2 |  | 0,7 | 2 |
| Dynamic plant biogeography | 3 | 3 |  | 1,6 | 3 |
| Dynamic animal biogeography | 4 | 4 |  | 1,8 | 4 |
| Dynamic marine and freshwater biogeography | 4 | 4 |  | 1,8 | 4 |
| Molecular biogeography | 5 | 5 |  | 2,2 | 5 |
| The global dynamics of parasites and diseases | 4 | 4 |  | 2,2 | 4 |
| **Bioconser-vation** | Hydrobiology and water management | 3 | 3 |  | 1,8 | 3 |
| Urbanization and the future of natural resources | 4 | 4 |  | 2,0 | 4 |
| Environmental impacts of genetically modified organisms | 2 | 2 |  | 1,0 | 2 |
| Applied ecosystem services | 5 | 5 |  | 2,2 | 5 |
| The future of land use | 5 | 5 |  | 2,2 | 5 |
| The last of the wild: European protected areas | 4 | 4 |  | 2,2 | 4 |
| Ecological impacts of invasive species | 4 | 4 |  | 2,2 | 4 |
| Case studies in global change | 4 | 4 |  | 1,2 | 4 |
| **Data handling** | Data compilation, organization, and analysis in biology | 2 | 2 |  | 1,6 | 2 |
| Scientific publishing | 2 | 2 |  | 0,8 | 2 |
| Basics in climatic modelling | 5 | 5 |  | 2,0 | 5 |
| Advanced techniques in environmental data analysis | 4 | 4 |  | 2,2 | 4 |
| Applied geostatistical analysis | 3 | 3 |  | 1,6 | 3 |
| **Social and legal affairs** | European legal regulations in environmental protection | 3 | 3 |  | 1,6 |  |
| Socioeconomic aspects of global change | 3 | 3 |  | 1,8 |  |
| **Realisation of Master Thesis** | Journal Club | 12 | 12 | 12 | 6,8 | 12 |
| Lab | 28 | 28 | 28 | 14,6 | 28 |
| Preparation of MSc thesis | 3 | 3 | 3 | 1,0 | 3 |
| MSc exam |  |  |  |  |  |
| **Total:** | | **120** | **120**  **100,0 %** | **43**  **35,8 %** | **60,1**  **50,1 %** | **114**  **95,0 %** |

Program studiów obowiązuje od semestru **zimowego** roku akademickiego **2019/2020.** Program studiów został uchwalony na posiedzeniu Rady Wydziału Biologii i Ochrony Środowiska w dniu 15 marca 2019 r.

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*(podpis Dziekana)*