

# Ecophysiology - opis przedmiotu

| Informacje ogólne   |                                            |
|---------------------|--------------------------------------------|
| Nazwa przedmiotu    | Ecophysiology                              |
| Kod przedmiotu      | 13.9-WB-P-Ecop-S20                         |
| Wydział             | <a href="#">Wydział Nauk Biologicznych</a> |
| Kierunek            | WNB - oferta ERASMUS                       |
| Profil              | -                                          |
| Rodzaj studiów      | Program Erasmus                            |
| Semestr rozpoczęcia | semestr zimowy 2022/2023                   |

| Informacje o przedmiocie        |                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------|
| Semestr                         | 1                                                                                |
| Liczba punktów ECTS do zdobycia | 2                                                                                |
| Typ przedmiotu                  | obowiązkowy                                                                      |
| Język nauczania                 | angielski                                                                        |
| Sylabus opracował               | <ul style="list-style-type: none"><li>dr hab. Piotr Kamiński, prof. UZ</li></ul> |

| Formy zajęć  |                                         |                                        |                                            |                                           |                     |
|--------------|-----------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------|---------------------|
| Forma zajęć  | Liczba godzin w semestrze (stacjonarne) | Liczba godzin w tygodniu (stacjonarne) | Liczba godzin w semestrze (niestacjonarne) | Liczba godzin w tygodniu (niestacjonarne) | Forma zaliczenia    |
| Laboratorium | 15                                      | 1                                      | -                                          | -                                         | Zaliczenie na ocenę |
| Wykład       | 15                                      | 1                                      | -                                          | -                                         | Zaliczenie na ocenę |

## Cel przedmiotu

The aim of the course (series of lectures and seminar classes in the form of seminars) is to develop the student's ability to independently analyze, define, formulate, identify, interpret, coordinate, name, explain, summarize, describe, recognize, distinguish, use, prepare, estimate, create, translating, explaining processes and issues in environmental ecophysiology. The student becomes familiar with the ecophysiological aspects of the protection of the atmosphere, lithosphere, hydrosphere, learns toxicity tests. The student defines the concepts related to the overall biogeochemical and ecophysiological processes, phenomena occurring in the biosphere and their multilateral effects in living organisms. The student makes an appropriate analysis of the information obtained during lectures and seminar classes, draws the right conclusions and skilfully uses the resulting data in practice. The course also intends to become familiar with the basic aspects of knowledge in the discussed subject matter.

## Wymagania wstępne

The proper interpretation and understanding of the role of ecophysiological and biogeochemical processes in shaping the state (condition) of the body in the natural environment. Basic knowledge of physiology, biochemistry, ecology, general and physical chemistry is required at general level.

## Zakres tematyczny

Physiological ecology. Biogeochemistry of environmental processes. Determinants of biogeochemical processes in the lithosphere, hydrosphere and atmosphere. Bioenergetics and ecophysiological bioclimatology. Biochemical and ecological effects of organisms. Place of biogeochemistry in ecophysiology. Bioaccumulation of elements in the environment; ecophysiological conditions of body condition. Nutrition and respiration of heterotrophs, the role of blood. Environmental impacts through the digestive tract, respiration and skin; conditioning of body condition. Pathophysiological changes in the body as ecophysiological reactions to degradation changes in the environment. Absorption and transfer of xenobiotics in the body. The impact of atmospheric air pollution on the health and condition of the body. Adaptations of animals to polluted environments. Biogeochemical transformations in the environment caused by anthropopressure. Water Pollution. Atmospheric air pollution. Radiation problems; radioactive contamination. Noise and vibrations in the environment. The fate of xenobiotics in the body. Dangerous organic compounds. Factors affecting toxicity. Mutagenic and carcinogenic effects of xenobiotics. Physiology of kidneys and liver in the face of environmental threats. Occupational ecotoxicology; ecophysiological conditions of the environment and health. Cell ecophysiology; pro-antioxidant balance. Pro-antioxidant balance of living organisms in various environments. Mechanisms of defending organisms against reactive oxygen species. Oxygen supply and thermoregulation in warm-blooded animals; conditioning of body size. Phosphatases and their importance in the environment. Influence of biogeochemical barriers on the circulation of matter and energy flow. The immune system of living organisms in various conditions of environmental stress. Mechanisms of shaping ecophysiological reactions in degraded environments. Physiological and biochemical methods of defending organisms against toxic substances. Impact of stress factors on the metabolism of living organisms. Biological reactions of plants to pollution; ecophysiological and environmental conditions. The importance of elemental interaction at trophic levels; ecophysiological conditions. Ion transport through ion channels; environmental conditions. The role of element ions in shaping the ecophysiological response of living organisms. Mechanisms of defending organisms against reactive oxygen species. The role of reactive oxygen species as substrates of enzymatic reactions. Non-enzymatic defenses of organisms against environmental stress. The importance of stress proteins in the defense processes of living organisms. Lipoperoxidation as a defense mechanism of living organisms against environmental stressors. Protein biosynthesis induction by reactive oxygen species. Reactive oxygen species as mediators and regulators of metabolic pathways. Chemical pro-ecological processes in anthropogenic environments. Biogeochemical processes and population and ecophysiological reactions in warm-blooded synanthropic animals. Calcium conditioning in birds during the breeding period, as an example of ecophysiological relationships. Environmental conditions of parasitic diseases; defense mechanisms. Biogeochemical processes and population and ecophysiological reactions in warm-blooded synanthropic animals. Strategies for the adaptation of metabolic organisms to physical and chemical factors of the environment. Ecophysiological conditions of plant and animal sizes. Ecological biochemistry in trophic chains, interactions of organisms. Strategies for the adaptation of metabolic organisms to changes in physical and chemical factors of the environment. Physical and chemical pollution of the environment and their impact on changes in the metabolism of living organisms. Ecophysiology of ecosystems.

## Metody kształcenia

### Educational methods:

Lectures and seminars. During the semester there are regular colloquiums (= conversations with the student), oral, during seminars, seminars and practical classes. At the end of the series of classes final test (end of the semester) with knowledge of issues including the content of lectures and seminar classes is possible. During lectures and practical classes, colloquia (conversations) are carried out, which will allow for continuous registration and evaluation of the current preparation for classes and student activity during them. This is the basis for passing individual classes.

### Didactic methods:

In order to increase the effectiveness of teaching the teacher:

- explains all incomprehensible issues, both regarding substantive and practical issues before starting the seminars, in addition to assessing the substantive preparation of students for classes,
- draws attention to the most important issues in a given basic topic of the seminar, in order to avoid any mistakes by the participants and to emphasize the importance of the issues,
- answers students' questions about the subject and data analysis, however, students conduct a discussion, draw conclusions and prepare reports from each seminar (seminar), because a practical approach to a given issue is the most effective in terms of speed of teaching.

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

| Opis efektu                                                                                                                                              | Symbole efektów | Metody weryfikacji                                                                                                                                                                                                                                                                                                                                                                                                       | Forma zajęć                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| The student uses bibliographic and other sources (e-learning), is able to interpret and combine in a coherent whole obtained information on the subject. |                 | <ul style="list-style-type: none"><li>• aktywność w trakcie zajęć</li><li>• bieżąca kontrola na zajęciach</li><li>• dyskusja</li><li>• kolokwium</li><li>• konspekt</li><li>• obserwacja i ocena aktywności na zajęciach</li><li>• odpowiedź ustna</li><li>• projekt</li><li>• przygotowanie projektu</li><li>• przygotowanie referatu</li><li>• referat</li><li>• zaliczenie - ustne, opisowe, testowe i inne</li></ul> | <ul style="list-style-type: none"><li>• Wykład</li><li>• Laboratorium</li></ul> |

| Opis efektu                                                                                                                                                                                                                                                                                                                                                                                         | Symbole efektów | Metody weryfikacji                                                                                                                                                                                                                                                                                                                                                                                                                    | Forma zajęć                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| The student works in an active group and organizes work in a specific area, listens to the teacher's remarks and follows his recommendations.                                                                                                                                                                                                                                                       |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |
| The student explains and defines the concepts related to the overall biochemical and physiological processes and phenomena occurring in the biosphere and their multilateral effects in living organisms. The student makes an appropriate analysis of the information obtained during lectures and seminar classes, draws the right conclusions and skilfully uses the resulting data in practice. |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |
| The student has knowledge of the proper interpretation and understanding of the role of ecophysiological and biochemical processes in shaping the state (condition) of the body in its natural environment. In addition, the student demonstrates knowledge of the basic rules of physiology, biochemistry and ecology at the level of general high school.                                         |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |

| Opis efektu                                                                                                                                                                                                                                                                                                                                                            | Symbole efektów | Metody weryfikacji                                                                                                                                                                                                                                                                                                                                                                                                                    | Forma zajęć                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| The student knows and understands the basic knowledge of the proper interpretation and understanding of the role of ecophysiological and biochemical processes in shaping the state (condition) of the body in its natural environment. Interprets comprehensive possibilities of applying ecophysiology in agriculture, industry, medicine, environmental protection. |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |
| The student applies the self-education method and sees the need to learn and improve their skills in the field of overall issues related to the subject.                                                                                                                                                                                                               |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |
| The student uses the methods learned during the course of the subject.                                                                                                                                                                                                                                                                                                 |                 | <ul style="list-style-type: none"> <li>• aktywność w trakcie zajęć</li> <li>• bieżąca kontrola na zajęciach</li> <li>• dyskusja</li> <li>• kolokwium</li> <li>• konspekt</li> <li>• obserwacja i ocena aktywności na zajęciach</li> <li>• odpowiedź ustna</li> <li>• projekt</li> <li>• przygotowanie projektu</li> <li>• przygotowanie referatu</li> <li>• referat</li> <li>• zaliczenie - ustne, opisowe, testowe i inne</li> </ul> | <ul style="list-style-type: none"> <li>• Wykład</li> <li>• Laboratorium</li> </ul> |

## Warunki zaliczenia

### Form and conditions of passing the subject (methods of verification for achieving educational effects):

The grade for active participation in lectures and practical classes (seminars, practical classes; laboratories) is the arithmetic average of the grades for individual conversations carried out during these forms of classes and the assessment of the oral presentation of the selected issue. In addition, each student can get extra points from interviews checking preparation for classes. These points are added to the points gained earlier, and thus give a chance for a higher grade of classes and are a motivation to systematically acquire knowledge. During the semester, colloquia (conversations with the student) take place during seminars, and practical classes. At the end of the series of classes, a final colloquium (end of the semester) with knowledge of issues including the content of lectures and seminar classes may take place. During lectures and practical classes, colloquia (conversations) are carried out, which will allow for continuous registration and evaluation of the current preparation for classes and student activity during them. This is the basis for passing individual classes.

## Literatura podstawowa

1. Kabata-Pendias A., Mukherjee A.B. 2007. Trace Elements from Soil to Human. Springer-Verlag, Berlin-Heidelberg-New York, 550 pp.
2. Kabata-Pendias A., Pendias H. 2010. Trace Elements in Soils and Plants. CRC Press, Boca Raton, 4th ed., 520 pp.
3. Shtangeeva I. (Ed.). 2004. Trace and Ultratrace Elements in Plants and Soil. WIT Press, Ashurst Lodge, Ashurst, Southampton, St. Petersburg State Univ., 364 pp.
4. Merian E. (Ed.). 1991. Metals and Their Compounds in the Environment. VCH, Weinheim, N.York, Basel, Cambridge, v. I, II, 1438 pp.
5. Nriagu J.O. (Ed.). 1976. Environmental Biogeochemistry. Ann Arbor Sci. Pub. Inc., Michigan, v.1, v.2, 815 pp.
6. Volesky B. 1990. Biosorption of Heavy Metals. CRC Press, Boca Raton, Ann Arbor, Boston, 396 pp.
7. Waugh A., Grant A. 2006. Anatomy and Physiology in Health and Illness. Churchill Livingstone, Elsevier Sci., Edinburgh, London, N. York, Oxford, Philadelphia, St. Louis, Sydney, Toronto, 485 pp.

## Literatura uzupełniająca

1. Martin M. H., Cughtrey P. J., 1982. Biological Monitoring of Heavy Metal Pollution. Land and Air. Appl. Sci. Pub., London, N.York.
2. Russell McDowell L. 1992. Minerals in animal and human nutrition. Acad. Press, San Diego, N. York, Boston, London, Sydney, Tokyo, Toronto, 524 pp.
3. Petruszewicz K., MacFadyen A., 1970. Productivity of Terrestrial Animals, Principles and Methods. IBP Handbook No 13. Blackwell Sci. Publ., Oxford, Edinburgh, 475 pp.
4. Kendeigh S.C., Dol'nik V.R., Gavrilov V.M. 1977. Avian energetics (pp. 127-204). In: Pinowski J., Kendeigh S.C. (Eds.) Granivorous birds in ecosystems – Their evolution, populations, energetics, adaptations, impact and control. Cambridge Univ. Press, Cambridge, London, N. York, Melbourne, 435 pp.
5. Schmidt-Nielsen K., 1993. Scaling. Why is animal size so important ? Cambridge Univ. Press, 324 pp.
6. Fergusson J.E. 1990. The Heavy Elements: Chemistry, Environmental Impact and Health Effects. Pergamon Press, Oxford, N.York, Beijing, Frankfurt, Sao Paulo, Tokyo, Toronto, 614 pp.
7. Khan M.A.Q., Bederka J.P., Jr. (Eds.). 1974. Survival in Toxic Environments. Acad. Press, Inc., N.York, San Francisco, London, 553 pp.
8. Wolf K., Van den Brink W.J., Colon F.J. (Eds.). 1988. Contaminated Soil. Kluwer Acad. Pub., Dordrecht, Boston, London, v.1, 2, 1661 pp.

## Uwagi

Zmodyfikowane przez dr Elżbieta Roland (ostatnia modyfikacja: 13-05-2022 09:23)

Wygenerowano automatycznie z systemu SylabUZ