University of Gdańsk

Subject card

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| Subject name and code | Molecular methods in species identification, PG_00198102 | | |
| Field of study | Natural Resources Conservation | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | 2027/2028 |
| Education level | Bachelor's studies | Subject group | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |
| Mode of study | full-time studies | Mode of delivery | at the university |
| Year of study | 2 | Language of instruction | Polish |
| Semester of study | 3 | ECTS credits | 2.0 |
| Learning profile | academic | Assessment form | credit |
| Conducting unit | Faculty of Biology -> Rector | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr Magdalena Dudek | |
| | Teachers | | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 30.0 | 0.0 | 0.0 | 30 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 30 | 5.0 | 15.0 | 50 |

**Subject objectives**

1. To familiarize students with the problems of molecular methods and techniques used in taxonomic studies.

2. Introduction to integrative taxonomy, cybertaxonomy, data repositories.

3. To learn the basic terminology, tools and steps of data analysis in molecular taxonomy, as well as current methods for determining new taxonomic units.

4. Introducing ways to identify plant, animal and fungal species from biological material and environmental samples.

## Learning outcomes

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [OZPL3_U04] The graduate is able to plan and carry out simple research tasks in the biological sciences under the guidance of a supervisor | - the student, under the guidance of the supervisor, plans and performs simple research tasks in the field of molecular taxonomy | [SU2] presentation/project/paper/ report<br>[SU5] implementation of a problem task<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work |
| [OZPL3_U05] The graduate is able to apply basic statistical methods and computer techniques and tools to describe phenomena and analyse biological data | - the student applies basic statistical methods and computer algorithms and techniques used to identify species | [SU2] presentation/project/paper/ report<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work |
| [OZPL3_K08] The graduate is ready to systematically update his/ her natural knowledge and to apply it in practice | - the student updates his knowledge of molecular taxonomy and knows its practical applications | [SK2] presentation/project/paper/ report<br>[SK5] implementation of a problem task |
| [OZPL3_W02] The graduate possesses advanced knowledge and understanding of the mechanisms governing the flow of genetic information, its regulation, the principles of inheritance, and the origins of variation in organisms | - the student explains the rules of inheritance and the sources of variation of organisms in the problem of species identification | [SW2] presentation/project/paper/ report<br>[SW5] implementation of a problem task |
| [OZPL3_K02] The graduate is ready to work effectively in a team, taking on different roles within it | - the student is able to work effectively in a team taking on different roles in it | [SK2] presentation/project/paper/ report<br>[SK5] implementation of a problem task |
| [OZPL3_W05] The graduate understands the principles and mechanisms of life at the population, biocenosis, and ecosystem levels, as well as the temporal and spatial factors that influence biodiversity. | - the student explains the temporal and spatial determinants of biodiversity in the context of context of alternative definitions of species | [SW2] presentation/project/paper/ report<br>[SW5] implementation of a problem task |
| [OZPL3_U01] The graduate is able to use basic apparatus and research tools, maintains the correct sequence of operations in laboratory and field work and apply the principles of savoir-vivre in practice | - the student uses basic research apparatus and tools and has knowledge of the work of the laboratory work used in taxonomic studies | [SU1] oral statement/conversation/ discussion<br>[SU2] presentation/project/paper/ report<br>[SU6] demonstration of practical skills<br>[SU8] observation of student's independent or team work |
| [OZPL3_W09] The graduate possesses an advanced comprehension of the current state of knowledge and the latest trends in protection of natural resources, as well as their relationship to other natural disciplines | - the student explains the principles of using molecular methods in species identification and understands the advantages, disadvantages and limitations of their application | [SW2] presentation/project/paper/ report<br>[SW5] implementation of a problem task |

## Subject contents

Learn the techniques and methods used in molecular species identification (DNA isolation, PCR technique). Learn about online databases, methods of depositing and retrieving DNA sequences. Understand basic concepts of molecular taxonomy and phylogenetic analysis. Ability to perform computational and statistical analyses of molecular data and phylogenetic analyses.

## Prerequisites and co-requisites

absence of

## Assessment methods and criteria

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| preparation of the final report on the conducted project (written report or presentation) | 51.0% | 90.0% |
| execution of the sets of tasks provided for in the exercises | 51.0% | 10.0% |

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| Recommended reading | Basic literature | Avise J.C. 2008. Markery molekularne, historia naturalna i ewolucja. Wyd. Uniwersytetu Warszawskiego, Warszawa.<br><br>Baxevanis A.D., Quellette B.F.F. (red.). 2005. Bioinformatyka. Wydawnictwo Naukowe PWN, Warszawa.<br><br>Brown T.A. 2001. Genomy. Wydawnictwo Naukowe PWN, Warszawa.<br><br>Futuyma E.J. 2008. Ewolucja. Wydawnictwo Uniwersytetu Warszawskiego, Warszawa.<br><br>Hall B.G. 2008. Łatwe drzewa filogenetyczne. Poradnik użytkownika. Wyd. Uniwersytetu Warszawskiego.<br><br>Krzanowska H. i in. 2002. Zarys mechanizmów ewolucji. Wydawnictwo Naukowe PWN, Warszawa. |
| | Supplementary literature | Cichocka JM, Bielecki A, Kur J, Pikuła D, Kilikowska A, Biernacka B. A new leech species (Hirudinida: Erpobdellidae: Erpobdella) from a cave in the West Azerbaijan province of Iran. Zootaxa. 2015 Sep 9;4013(3): 413-27. doi:10.11646/zootaxa.4013.3.5. PMID: 26623905<br><br>Falniowski A. 2003. Metody numeryczne w taksonomii. Wydawnictwo UJ, Kraków.<br><br>Graur D., Wen-Hsiung L. 2000. Fundamentals of Molecular Evolution. Second Edition. Sinauer Associates, Sunder-land, MA.<br><br>Hall B.G. 2004. Phylogenetic trees made easy: A how to manual. Sinauer Associates, Sunderland, MA.<br><br>Hennig W. 1966. Phylogenetic Systematics. University of Illinois Press, Urbana IL.<br><br>Hills D.M. i in. (red.). 1996. Molecular systematic. Sinauer Associates, Sunderland, MA.<br><br>Salemi M. Vandamme A.M. 2003. The Phylogenetic Handbook: A Practical Approach to DNA and Protein Phylogeny. Cambridge University Press. |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | Using molecular biology techniques in taxonomy and phylogenetic studies;<br><br>DNA barcoding as a new tool in species identification;<br><br>Molecular markers used in phylogenetics and species identification; | |
| Work placement | Not applicable | |

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