**SYLLABUS**

**regarding the qualification cycle FROM 2022TO 2023**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | Insects in fossil record |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | College of Natural Sciences |
| Name of the unit running the course | Institute of Biology |
| Field of study | Biology and Biotechnology |
| Qualification level | I degree |
| Profile | general academic |
| Study mode | stationary |
| Year and semester of studies | winter |
| Course type | Primary course |
| Language of instruction | English |
| Coordinator | dr hab. Iwona Kania-Kłosok, prof. UR |
| Course instructor | dr hab. Iwona Kania-Kłosok, prof. UR |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester  (n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits** |
| winter |  | 30 |  |  |  |  |  |  | 5 |

1.2. Course delivery methods

- conducted in a traditional way

- involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

pass with a grade

2. Prerequisites

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| Good communication, reading and writing English; high school zoology level. |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| O1 | - Explain and be able to discuss the processes of taphonomy, autotaphonomic, ecological, taphotopic, postburial, products of the taphonomic process. |
| O2 | - Characterize different kinds of fossil resins, selected groups of insects in Mesozoic and Cenozoic resins; general features of the late Cretaceous insects; insect impressions |
| O3 | - Explain dynamics of the insect taxonomic diversity; environments of insect origin and early stages of evolution; origin of insects; evolution of selected groups of insects with particular reference to the Diptera. |
| O4 | - Characterize morphology and phylogeny of selected groups of fossil insects. |
| O5 | - Characterize examples of behavior of fossil insects preserved in amber. |
| O6 | - Develop skills in performing collaborative research. |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

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| --- | --- | --- |
| Learning Outcome | The description of the learning outcome  defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | - students will be able to characterize the major types of fossil resins with the particular references to the insects, the morphology and evolution of selected groups of fossil insects | K\_W01 |
| LO\_02 | - students will understand the way and the directions of evolution in particular group of fossil insects, their morphology and taxonomy and the processes of taphonomy and fossilization; | K\_W01 |
| LO\_03 | - students will be able to perform basic assessment of the types of resins and recognize representatives of most common groups of insects preserved in fossil resins; | K\_U04 |
| LO\_04 | - students will be able to plan, establish and carry out experiments with application of taphonomy of insects in sediment; | K\_U04 |
| LO\_05 | - students will be able to carry out the biometric measurements of fossil insects with application of the basic techniques used in the paleoentomology; | K\_U04 |
| LO\_06 | - students will be able to develop skills in performing collaborative research; | K\_K01 |

**3.3. Course content (to be completed by the coordinator)**

1. Lectures

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| Content outline |
| Types of fossil resins, autotaphonomic, ecological, taphotopic, postburial, products of the taphonomic process: insects fossils  and ichnofossils in different paleoenvironments and modes of their preservation; marine deposits, non-marine subaquatic paleoenvironments; lacustrine deposits; swamp, marsh and other wetlands, fluvial, spring deposits, subaerial paleoenvironments. |
| Dynamics of the insect taxonomic diversity; environments of insect origin and early stages of evolution; origin of insects; evolution  of selected group of insects with the particular references to the Diptera. |
| Evidence of relationships between ancient living insect organisms  in different age of fossil resins. |

1. Classes, tutorials/seminars, colloquia, laboratories, practical classes

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| Content outline |
| Insects fossilization; types of preservation; dating and ages; major fossil insects deposits; insects as contaminants in fossil assemblages; insect activities as a taphonomic factor. |
| Different kinds of fossil resins, selected groups of insects in Mesozoic and Cenozoic resins; general features of the late Cretaceous insects; insect impression. |
| Insects in amber, insect taphonomy; direct burial in sedimentary deposits; autotaphonomic factors, ecological factors, ecological factors affecting organisms in their life-time; mortality factors; post-moderns ecological factors, taphotopic factors, technical factors. |
| Morphology and phylogeny of selected groups of fossil insects. |
| Mutualism; ant and symbiotic scale insect; termite and cockroach gut mutualists; hickory aphid-leaves and aphid-plant relationships; symbiotic association traces in amber; traces behavior of insects in fossil resins; phoresy; camouflage; examples of autotomy of fossil insects; social insects in amber. |

3.4. Methods of Instruction

e.g.

*Lecture: a problem-solving lecture/a lecture supported by a multimedia presentation/ distance learning*

*Classes: text analysis and discussion/project work (research project, implementation project, practical project)/ group work (problem solving, case study, discussion)/didactic games/ distance learning*

*Laboratory classes: designing and conducting experiments*

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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| --- | --- | --- |
| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01-06 | Lecture, audio/video presentations. | LECTURES |
| LO-o1-06 | Practical laboratory work, discussion, deporting and presenting results. | CLASSES |

4.2 Course assessment criteria

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| Attendance is expected in all lectures, indoor workshop. Assessment for this course  is carried out in many different ways. It takes into consideration both knowledge  of the lecture but also critical thinking skills, technical skills, communication skills  and collaborative skills. |

5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

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| --- | --- |
| Activity | Number of hours |
| Scheduled course contact hours | 30 |
| Other contact hours involving the teacher (consultation hours, examinations) | 66 |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 29 |
| Total number of hours | 125 |
| Total number of ECTS credits | 5 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

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| --- | --- |
| Number of hours | n. a. |
| Internship regulations and procedures | n. a. |

7. Instructional materials

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| Compulsory literature:  - Boucot A.J., Poinar G.O. 2010. Fossil behavior compendium. CRC Press.  - Grimaldi D., Engel M.S. 2005. Evolution of the insects. Cambridge University Press, Cambridge.  - Kosmowska-Ceranowicz B. 2012. Amber in Poland and in the world. WUW, Warszawa.  - Penney D., Jepson J.E. 2015. Fossil insects. An introduction  to palaeoentomology. Siri Scientific Press, Manchester.  - Rasnitsyn A.P., Quicke D.L.J. History of insects. Kluwer Academic Publishers, Dordrecht. |
| Complementary literature:  - Martínez-Delclòs X.; Briggs D.E.G., Peñalver E. 2004. Taphonomy of insects  in carbonates and amber. Palaeogeography Palaeoclimatology Palaeoecology 203: 19-64.  - Szwedo J., Sontag E. 2009. The traps of the ‘amber trap’. Amber-trapped insects trap scientists with enigmas. In: Berning B., Podenas S. (Eds.), Amber: Archive of the deep time. Denisia 26: 155–169.  - Szwedo J., Sontag E. 2013. The flies (Diptera) say that amber from the Gulf of Gdańsk, Bitterfeld and Rovno is the same Baltic amber. Polish Journal  of Entomology 82: 379–388.  - Kania I., Wegierek P. 2008. Palaeoaphididae (Hemiptera, Sternorrhyncha) from Lower Cretaceous Baissa deposits. Morphology and classification. Instytut Systematyki i Ewolucji Zwierząt, Polska Akademia Nauk, Kraków. Monografie faunistyczne, 25: 132. |

Approved by the Head of the Department or an authorised person