Odessa I. I. Mechnikov National University
Faculty of Geology and Geography
Department of Marine Geology, Hydrogeology, Engineering Geology and Paleontology

Syllabus of the course
"Advanced Topics in Paleontology, Micropaleontology and Paleoecology»"

1. Description of academic discipline

<table>
<tr><td rowspan="2">Name of indicators</td><td rowspan="2">Field of knowledge, specialty, specialization, level of higher education</td><td colspan="2">Characteristics of academic discipline</td></tr>
<tr><td>Daytime form of education</td><td>Evening form of education</td></tr>
<tr><td rowspan="15">Total number: credits – 3

Hours - 90

Content modules - 2</td><td rowspan="15">Field of knowledge
10 Natural sciences

Specialty
103 Earth Sciences

Level of higher education:
Third (educational and scientific)</td><td colspan="2">Selective</td></tr>
<tr><td colspan="2">Year of study:</td></tr>
<tr><td>Ist</td><td></td></tr>
<tr><td colspan="2">Semester</td></tr>
<tr><td>2d</td><td></td></tr>
<tr><td colspan="2">Lectures</td></tr>
<tr><td>12 hours</td><td></td></tr>
<tr><td colspan="2">Practical work</td></tr>
<tr><td>10 hours</td><td></td></tr>
<tr><td colspan="2">Lab work</td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td colspan="2">Individual work</td></tr>
<tr><td>68 hours</td><td></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Final control
Credit</td></tr>
</table>

COMMUNICATION

Communication in the classroom according to the schedule. Other types of communication according to the schedule.

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Skype: valyan45
Tel.: 0671690442
Classroom: according to the schedule

SUMMARY OF THE COURSE

The ***subject*** of the discipline is the study of modern achievements of paleontology, micropaleontology, and paleoecology for stratigraphy, facies analysis, and paleoceanographic reconstructions.

Prerequisites of the course: lecture course and practical classes from the course "Topics in Paleontology, Micropaleontology and Paleoecology" are taught in English to postgraduate students of the second year after students have mastered the disciplines "Historical Geology and Paleontology", "Micropaleontology".

The ***main goal*** of the course is to provide postgraduate students with in-depth knowledge of modern achievements in paleontology, micropaleontology and paleoecology for their further implementation in the practice of natural sciences and life sciences. ***Main tasks*** of the discipline: to teach postgraduate students modern achievements in paleontology, micropaleontology and paleoecology, to form a common point of view on their a place in the series of Earth Sciences and to demonstrate their implementation in the practice of scientific research.

As a result of studying the academic discipline, the student must

know:

• the latest views on modern paleontology, micropaleontology and paleoecology;
• the latest views on modern methods of developing the phylogeny of fossil organisms;
• the latest views on the molecular taxonomy of fossil organisms;
• the difference between classical and environmental micropaleontology;
• basics of quantitative paleoecological analysis of marine invertebrate complexes.

be able:

• to implement the acquired knowledge in the practice of geological research and teaching activities;
• to build phylogenetic schemes of intelligence of individual groups of organisms;
• use traces of life activity of organisms to reconstruct marine paleoenvironments.

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Description of the course

Forms and methods of education. The course will be taught in English in the form of lectures (12 hours), practical classes (10 hours), organization of students' individual work (68 hours).

The main training of students is carried out in form lectures and practical classes, but to a large extent it relies on individual study of the subject by full-time graduate students during semester. During lectures and practical classes, both verbal-informational and visual-demonstration teaching methods are used with the application of multimedia devices for showing film and photo materials illustrating the relevant topic. Practical classes are conducted with the use of educational collections of fossil organisms in the Paleontological Museum of the Odessa I.I. Mechnikov National University

The main task of the teacher is to provide an accessible presentation of the material of the course program «Advanced Topics in Paleontology,

Micropaleontology and Paleoecology», which involves the study of problematic groups of various fossil organisms; the basics of molecular taxonomy of fossil organisms, the latest approaches to the phylogeny of invertebrates and vertebrates, the basics of ecological micropaleontology; the use of micropaleontological objects for monitoring the marine environment and detecting hydrocarbon accumulations under the seabed; the latest methods of quantitative paleoecological analysis and paleoichnological analyses; the latest data on biotic crises and mass extinctions.

During the teaching of the course, a modern approach to solving critically important issues of paleontology, micropaleontology, and paleoecology is used. The scientific orientation of the discipline consists in the ability to apply the acquired knowledge in stratigraphy, geochronology, and reconstruction of the history of exploration of the Earth during the Phanerozoic.

The professional direction of the discipline is to help the student acquire the sum of theoretical knowledge and practical skills necessary for the formation of a competent Doctor of Philosophy.

Lectures are given in the sequence provided by the course program. The sequence of practical classes is determined by the logic of the lecture material. At practical classes and tests, the knowledge acquired in the theoretical course is consolidated and the skills of independent work necessary for the specialist in future practical or research work are acquired, debatable issues are discussed.

Understanding the basics of this course is possible only on the basis of knowledge in the field of paleontology, micropaleontology, historical geology in combination with other special disciplines. It aims to prepare a Doctor of Philosophy who would be erudite in matters relevant to his future specialty.

Content of the academic discipline

Content module 1. Modern achievements of paleontology.

Topic 1.1 Little-studied and problematic groups of fossil organisms.

Topic 1.2 Molecular taxonomy of fossil organisms. Genome and its sequencing. The genome of fossil vertebrates. Examples of contradictions between the molecular taxonomy of modern groups of organisms (elephants, mammoths, bulls, etc.) and paleontological data on their kinship.

Topic 1.3 New approach.

Content module 2. Modern achievements of micropaleontology.

Topic 2.1 Environmental micropaleontology.

Topic 2.2 The use of micropaleontological objects to track the pollution of the marine environment by various substances.

Topic 2.3 Use of micropaleontological objects to detect hydrocarbon accumulations under the seabed.

Content module 3. Modern achievements of paleoecology.

Topic 3.1. The latest methods of quantitative paleoecological analysis of marine invertebrate complexes for the purpose of reconstructing paleodepths, paleotemperatures, and other features of ancient basins.

Topic 3.2. The latest methods of paleoichnology. Types of traces. Ichnofacies. The use of traces of life activity of organisms for the reconstruction of marine paleoenvironments.

Topic 3.3. Recent data on biotic crises and mass extinctions. Concept of biotic crisis, its model. Phanerozoic mass extinctions: large (end of the Ordovician, end of the Permian, end of the Triassic,

border of the Cretaceous and Paleogene) and small (Frankish / Famennian, Mississippian / Pennsylvanian, etc.), features and possible causes.

Educational and methodological support

1. Work program and course syllabus.
2. Yanko V.V. Methodological recommendations for the lecture course "Paleontology and historical geology". Paleontology. Part 1. Invertebrates (Invertebrata). Odesa: Astroprint, 2007. 45 p.
3. Yanko V.V., Kravchuk A.O., Kulakova I.I. Meiobenthos of methane outlets of the Black Sea. Odessa: Phoenix, 2017. 240 p.

Recommended literature

Basic

1. Bottjer D. J. Paleoecology: Past, Present and Future. John Wiley & Sons, 2016. 232 p. https://www.academia.edu/36747676/Palaeoecology_Past_Present_and_Future_Bottjer_2016_ (application date 31.08.2022)
2. Bresler V., Yanko V. Chemical Ecology: A new approach to study living benthic epiphytic foraminifera. J. Foram. Res. 1995. Vol. 25. Issue 3. P. 267-279.
3. Environmental Micropalaeontology / ed. R. Martin. New York, Boston, Dordrecht, London, Moscow: Kluwer Academic Plenum Publishers, 2000. 481 p. (Library of Paleontological Museum, Odessa I.I. Mechnikov National University)
4. Modern Foraminifera / ed. B.K. Sen Gupta. Dordrecht: Kluwer Academic Publishers, 1999.. 371 p. (Library of Paleontological Museum, Odessa I.I. Mechnikov National University)
5. Pawlowski J. Introduction to the Molecular Systematics of Foraminifera. Micropaleontology. 2000. Vol. 46, Supplement 1: Advances in the Biology of Foraminifera. P. 1-12.
6. Topics in Paleobiology / ed. P. J. Harries. Dordrecht: Kluwer Academic Publishers, 2003. 474 p.
7. Yanko V. Quaternary Foraminifera of the Caspian-Black Sea-Mediterranean Corridors: Volume 1 Ponto-Caspian Foraminifera : Monography. Switzerland: Springer, 2022. 409 p. (Library of Paleontological Museum, Odessa I.I. Mechnikov National University)

Additional

8. Foster, W. J., Danise, S., Price, G. D., Twitchett, R. J. Subsequent biotic crises delayed marine recovery following the late Permian mass extinction event in northern Italy. National Academy of Sciences colloquium, “The Future of Evolution,” March 16–20, 2000. https://doi.org/10.1371/journal.pone.0172321 (application date 31.08.2022)
9. Myers N., Knoll H.A. The biotic crisis and the future of evolution. 2001. https://doi.org/10.1073/pnas.09109249 (application date 31.08.2022)

15. Electronic information resources

https://en.wikipedia.org/wiki/Genome
https://en.wikipedia.org/wiki/Extinction_event
https://en.wikipedia.org/wiki/Trace_fossil
https://en.wikipedia.org/wiki/Paleoecology
https://en.wikipedia.org/wiki/Molecular_biology
https://en.wikipedia.org/wiki/Phylogenetic_tree

Independent work of students

Control of indipendent work: improvement of knowledge and skills in the process of participation in discussions on topics of independent work during practical classes.

List of topics for individual work:

1. Molecular taxonomy of fossil organisms
2. Latest approaches to the phylogeny of invertebrates and vertebrates
3. Ecological micropaleontology
4. The latest methods of quantitative paleoecological analysis
5. Molecular taxonomy of fossil organisms
6. Latest approaches to the phylogeny of invertebrates and vertebrates
7. Environmental micropaleontology
8. The latest methods of quantitative paleoecological analysis

Course policy: Deadlines and Rescheduling Policy: Assignments that are submitted late without good reason will be graded at a lower grade (75% of the maximum possible points for the scoring activity). Rearranging modules takes place with the permission of the dean's office if there are good reasons (for example, sick leave).

Academic Integrity Policy: Copying during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing and preparation of practical tasks during class.

Attendance Policy: Attendance is a non-credit required component of the assessment. For objective reasons (for example, illness, employment, international internship), training can take place online upon agreement with the course leader.

Mobile devices: using smartphone, tablet or other device is allowed with the permission of the teacher.

Behavior in the audience: an active business atmosphere.

Distribution of points received by students

<table>
<tr><td colspan="10">Ongoing and periodical control</td></tr>
<tr><td colspan="3">Content module 1</td><td colspan="3">Content module 2</td><td colspan="3">Content module 3</td><td>Individual independent task</td><td>Total points</td></tr>
<tr><td>T1</td><td>T2</td><td>T3</td><td>T4</td><td>T5</td><td>T6</td><td>T7</td><td>T8</td><td>T9</td><td rowspan="2">26</td><td rowspan="2">100</td></tr>
<tr><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td></tr>
<tr><td colspan="3">Test work on the content module 1</td><td colspan="3">Test work on the content module 2</td><td colspan="3">Test work on the content module 3</td><td>20</td><td></td></tr>
</table>

Final control of the discipline - credit. The credit is given to a student who completed all the mandatory types of work provided by the curriculum of the discipline and scored 60 or more points while mastering the discipline.

For students who scored a total of less points than the minimum for credit (60) during the semester, it is allowed to write an essay on the topics of lectures, practical classes or individual work, for which an unsatisfactory grade was received, or to rewrite the test, for which an unsatisfactory grade was received.

Individual work of graduate students

Students' work consists of independent study from a certain list of topics or topics that require in-depth study. Individual work is monitored in the form of tests and reports. Questions on topics assigned to independent study are included in the control measures. The entire volume of individual work contains tasks that require systematic individual work from the graduate student.