

**INSTITUTE OF GEOLOGICAL SCIENCES**  
**NATIONAL ACADEMY OF SCIENCES OF UKRAINE**

"APPROVED"

Director IGN NAS of Ukraine  
Academician of the NAS of Ukraine.

P.F.Gozhyk  
2020 year



**CURRICULUM OF THE ACADEMIC COURSE**

***INTEGRATED APPROACH TO GEODYNAMICS AND GEOTECTONICS***

**For PhD students**

Field of Science	<b>10 Natural Sciences</b>
Area of study	<b>103 Earth Sciences</b>
Educational level	<b>Doctor of Philosophy</b>
Major Field of Study	<b>Geology</b>
Specialization	<b>Physical and regional geology; geotectonics; geology of oceans and seas; geology of metallic and nonmetallic minerals; oil and gas geology; hydrogeology.</b>
Type of discipline	<b>Optional</b>
Form of training	<b>Full-time</b>
Academic year	<b>2020/2021</b>
Semester	<b>1</b>
Number of ETS credits	<b>4</b>
Teaching and evaluation language	<b>Ukrainian, English</b>

*Lecturer: Naumenko Ulyana Zenovyyevna, Ph.D. in Geology, Senior Researcher of the Department of Geology of Mineral Resources of the Institute of Geological Sciences of NAS of Ukraine*

Extended: for 2021/2022 year Shekunova «10» 06 2021 year.  
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for 20  /20   year \_\_\_\_\_ (\_\_\_\_\_) «\_\_\_\_» 20   year.  
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на 20  /20   year \_\_\_\_\_ (\_\_\_\_\_) «\_\_\_\_» 20   year.  
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Kyiv – 2020

Developed by:

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Approved:

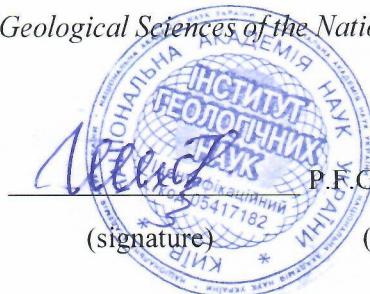
Supervisor of the educational program  
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Approved by: Scientific Council of the Institute of Geological Sciences of the National academy of Sciences of Ukraine

Protocol №4 from « 25 » June 2020 year

### Head of the Scientific Council



— S.B.Shekhnova

(signature)

(surname)

### Secretary of the Scientific Council

 R.B.Havriluk  
(signature) (surname)

R.B.Havriluk

«25» June 2020 year

**1. The aim** of the discipline is in-depth study of general regularities of formation and structure of tectonosphere, tectonic movements, plate tectonics, deep faults, plumes, diapirs, crustal folding and rupture structures.

**2. Prerequisites for the selection of an academic discipline:**

- A master's degree in geology and other earth science fields.
- Masters should have a basic theoretical knowledge of general and structural geology. A basic knowledge of English is recommended.

**3. Summary of the academic discipline.**

The most fundamental problem of geological science is the problem of the origin and transformation of the Earth in the past and the present. All other questions are somehow related to its solution, since any geological process can be considered as a part of the general process of formation and development of the planet and all its domains. In any mature science and geology is no exception, one can observe the presence of mindsets, which periodically replace each other and the stages of their formation are based on certain paradigms. New data and new research methods in geology expand the possible ways of logically consistent interpretation of geodynamic processes on the Earth. The discipline synthesizes and summarizes geological data and teaches how to conduct research on the structure and development of the Earth, movements and deformations of the Earth's crust and its structures. The study of ancient structures and movements is based on actualistic approach, with detailed observation of modern tectonic processes, using various geological-geophysical, petrological-chemical, geomorphological, geodesic and other methods of research.

**4. Learning Objectives:**

The objectives of the discipline are: the development of advanced professional skills to study the basics of geotectonics (the science of structure, movement and deformation of the lithosphere) and the basics of geodynamics (geodynamic processes in the core, lower and upper mantle and lithosphere), to acquire the necessary technical and methodological knowledge and practical skills.

For achievement of the stated purpose such objectives of course are formulated:

- mastering the material on modern areas of tectonic activity related to the movement of lithospheric plates and mantle plumes, the main types of structures on the Earth's surface
- understanding of the relationship between geodynamics and the basic methods of geology, geotectonic, mapping, petrology and geophysics
- students' assimilation of basic knowledge of the main theoretical and practical achievements of modern geological science.

**5. Course Outcomes:**

<i>Course Outcomes:</i> <i>(1. knowing 2. being able to 3. communicating 4. being autonomous and responsible)</i>		<i>Methods of teaching and learning</i>	<i>Assessment Methods</i>	<i>Percentage in the final grade for the course</i>
<i>Code</i>	<i>Course Outcome</i>			
1.1	Aims and objectives of geotectonics.  The main paradigms of geology	Lecture		<2.5%
	The concept of the geosphere and the processes that take place in it	Lecture		< 2.5%
1.2	The concept of plate tectonics, types of tectonic plate boundaries	Lecture		< 5%
1.3	Determination of tectonic regime types (compression, extension, strike slip)	Lecture, seminar	Seminar, test	< 10%

1.4	Main types of deep faults and their formation	Lecture, seminar	Seminar, test	< 10%
1.5	The main types of folds and their formation	Lecture, seminar, self-study	Seminar, test	< 10%
1.6	The concept of mantle dynamics, hotspots, plumes, diapirs, and domes and basins	Lecture		< 5%
1.7	Identify the main types of magmatic intrusions and processes associated with mantle dynamics	Seminar	Seminar, test	< 10%
1.8	Subduction process and processes that take place with the slab in the upper mantle	Lecture		< 5%
2.1	Identify types of thrusts, faults and magmatic bodies	Lecture, self-study, seminar	Seminar, test	< 10%
2.2	Identify the main tectonic plates of the world and identify the types of their boundaries	Lecture, self-study, seminar	Seminar, test	< 10%
3.1	Prepare a presentation on geodynamic topics, use modern English-language literature, and present a work in a concise manner	Self-study, seminar	Seminar	< 10%
4.1	Use the above-mentioned knowledge and skills in practical work tasks related to geotectonics and geodynamics	Seminar	Seminar, test	< 10%

**Course structure:** lectures, tests, seminars and self-study of PhD students.

## **6. Correlation of learning outcomes of the discipline with the program learning outcomes:**



Competences	PLO7.	To analyze modern scientific works, highlighting debatable and little-studied issues, monitor scientific sources of information on a researched problem, establish their information value by comparative analysis with other sources; formulate a scientific problem	+	+	+	+	+	+	+	+	+	+	+	+
	PLO8.	To use methods of geological, geotectonic and geodynamic research, to substantiate measures for ecological safety and efficient use of natural recourses, to determine geodynamic criteria for forecasting mineral deposits, and to reproduce the geodynamic situation of the geological past of a particular area of the earth's surface.	+	+	+	+	+	+	+	+	+	+	+	+
	PLO17.	To carry out professional interpretation of materials using modern software and existing theoretical models.	+	+	+	+	+	+	+	+	+	+	+	+
Communication	PLO18.	To be able to convey modern scientific knowledge and research results to a professional and non-professional audience at a high scientific level. To obtain the skills of oral and written presentation of research results in state and foreign languages.												+
Individual work and responsibility	PLO22.	To be able to use rules of citation and to prepare a bibliography correctly.							+	+	+	+	+	+
	PLO23.	To adhere to ethical norms, to respect copyright and norms of academic integrity in conducting scientific research, presenting of their results and in scientific and pedagogical activities.							+	+	+	+	+	+

## **7. Evaluation scheme:**

### **7.1. Student assessment modes.**

### **1. Semester grades:**

1) Presentation at one of the three seminars - 20 points

2) Test 1 for lectures 2 and 3 - 20 points

3) Test 2 on lecture 4 - 20 points

4) Exam - 40 points (threshold 24 points)

**2 The final assessment is based on the semester grades and the exam.** The maximum number of points is 100, 60 points is sufficient to get the credit for the course. Final assessment in the form of the exam is not mandatory, if a student refuses to participate in this form of assessment, the graduate student will not receive the corresponding points to the final grade.

The results of academic activities of PhD students are evaluated on a 100-point scale.

	Semester amount of points	Test or exam	Final grade
Min	12	48	60
Max	20	80	100

A PhD student is not allowed to take the final assessment in the form of an exam, if during the semester gained less than 20 points.

## 7.2 Organization of assessment

The assessment is carried out by the module-rating system and consists of participation in 3 seminars, where graduate students must demonstrate the ability to study independently, collect information, and present it in a concise format, as well as passing two tests and the final exam. The final assessment is carried out by the number of points earned during the seminars, tests and the exam.

## 7.3. Correspondence scale

Excellent	90-100
Good	75-89
Satisfactory	60-74
Fail	0-59

# 8. THE STRUCTURE OF THE COURSE

## SUBJECT SYLLABUS OF LECTURES AND PRACTICAL CLASSES

№	Course	Number of hours		
		lections	practical work and tests	self-study
<b>Integrated approach to Geodynamics and Geotectonics</b>				
1	Introduction to geotectonics and geodynamics <b>Lecture 1:</b> Plate tectonics.	2		12

2	<b>Lecture 2:</b> Tectonic regimes and deep thrust systems.	2		12
3	<b>Seminar 1.</b> Plate tectonics		2	14
4	<b>Lecture 3:</b> Strike-slip tectonics.	2		12
5	<b>Seminar 2.</b> Faults and folds systems		2	14
6	Test 1			
7	<b>Lecture 4:</b> Mantle dynamics. Plumes, diapirs and dome-basin structures	2		10
8	<b>Seminar 3.</b> Magmatic intrusions as representatives of plumes and diapirs		2	14
9	Test 2			
10	<b>Lecture 5:</b> Tectonic slab subduction and further deep processes	2		12
	<b>Exam</b>		2	
	<b>In total – 120 hours.</b>	<b>10</b>	<b>10</b>	<b>96</b>

**Total 120 hours.**, including:

Lectures – **10 hours.**

Seminars – **10 hours.**

Self-study – **96 hours.**

Exam and consultation – **4 hours.**

#### **Recommended literature:**

**Main:**

1. Александров А.Л., Гордиенко В.В., Деревская Е.И. и др. Глубинное строение, эволюция флюидно-магматических систем и перспективы эндогенной золотоносности юго-восточной части Украинского Донбасса. Киев: ИФИ. – 1996. – 74 с.
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11. Геотектоника Волыно-Подолии. Киев: Наук. думка. – 1990. – С. 221-229.
12. Калашник А.А. Минералогический потенциал широтных разломных зон Украинского щита. Мінеральні ресурси України. – 2010. – 2. – С.24-35.
13. Карта разрывных нарушений и основных зон линеаментов юго-запада СССР / Ред. Н.А. Крылов. М.: Мингео СССР. – 1988. – 4 л.

14. Краюшкин В.А. Древнейшие геоблоки Мирового взморья – щиты: их рельеф, молодой тектономагматизм, современная сейсмичность и нефтегазоносность. Геология и полезные ископаемые мирового океана. – 2007. – 3. – С. 15-50.
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