



# Study programme

**Major:** Geophysics

**Specialty:** Applied geophysics

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## General characteristics of the major

### Basic information

Faculty name:	Faculty of Geology, Geophysics and Environmental Protection
Major name:	Geophysics
Specialty name:	Applied geophysics
Level:	Second-cycle (engineer) programme
Profile:	General academic
Form:	Full-time studies
ISCED classification:	
Number of ECTS credits necessary to complete studies at a given level:	90
Professional title awarded to graduates:	magister inżynier
Cycle start date:	2021/2022, summer semester
Duration of studies (number of semesters):	3

### Field of science to which the major is assigned:

Field of the exact and natural sciences

### Discipline of science to which the major is assigned:

Discipline	Percentage	ECTS
Earth sciences and the environment	100%	90

### Relationship between the major and the AGH UST development strategy and the AGH UST mission

The mission of the AGH University Science and Technology in Krakow involves educating students in the fields of critical importance to the economy based on knowledge, which are essential for a dynamic and sustainable development of the country and Europe. This strategy is to continually improve the level of education, while adapting it to the current requirements of the labor market. The directions of critical importance to the economy include the direction of Geophysics. This branch of science deals with, inter alia, engineering projects aimed at prospecting deposits, geological environment monitoring, geotechnical testing ground conditions as well as the study of mass movements.

### Information on taking into account the socio-economic demand while creating the study programme and indication of the assumed learning outcomes matching the identified demand

The acquired knowledge of the application of geophysical methods allows graduates of the Applied Geophysics to use these methods for exploratory and engineering tasks. In addition, graduates are able to design and perform geophysical surveys for the assessment of natural hazards and induced by human activities, in particular threats associated with obtaining energy and raw materials. An additional skill is the planning and implementation of geophysical monitoring of the environment in time and space.

Graduates are prepared to work in geophysical, geological and mining enterprises. They also have qualifications allowing them to undertake research in higher schools, scientific and research institutes and other development units. In addition, they are prepared to undertake third-degree studies (PhD studies) due to the fact that they have mathematical-physical and IT knowledge to the extent that they allow creative work.

Graduates of both degrees of Applied Geophysics will find employment in companies with geophysical, geological and

mining profile. They can work independently in the field by carrying out measuring work. They can also work as system designers for the processing and interpretation of geophysical and geological-mining data. In addition, they can work in geophysical observatories and operate seismometric networks in hard coal and copper mines.

As people with a good knowledge of exact sciences and IT tools, they can also work in other institutions requiring higher technical education.

#### **Learning paths - scope in Polish and in English**

- Do not occur (PL)
- Do not occur (EN)

#### **Diploma paths - scope in Polish and in English**

##### **The names of the specialties in Polish and in English**

<b>Name [pl]</b>	<b>Name [en]</b>
Applied geophysics	Applied Geophysics

## General information about the study programme

Major: Geophysics

Specialty: Applied geophysics

### **General information related to the study program (general learning objectives and employment opportunities, typical jobs and opportunities for graduate continuing education)**

Geophysics covers a broad range of earth science and offers a variety of options. Our graduates might find job in different branches of geophysics, e.g:

exploration geophysics  
engineeringGeophysics  
environmentalGeophysics

end work as:

acquisition geophysicists  
petroleum geophysicists  
mining geophysicists  
environmental geophysicists  
petrophysicists  
seismologists

### **Information on the study programme including the conclusions from the students and graduates careers monitoring**

The Faculty of Geology and Geophysics cooperates with the Career Office of the AGH - UST, which prepares annual reports, the conclusions of which are taken into account in the program changes. Changes in the programs are also consulted with the faculty student self-government.

### **Information on the study programme taking into account the requirements and recommendations of the accreditation committees, in particular the Polish Accreditation Committee and industry accreditation committees**

The Faculty of Geology, Geophysics and Environmental Protection obtained institutional accreditation with distinction.

### **Information on including examples of good practice in the study program**

The study program envisages the implementation of education modules based on certified and licensed geophysical data processing systems that are used in the oil, mining and geophysical industry (Techlog, Promax, Hampson-Russell, Petrel, etc.).

### **Information on cooperation in the preparation of the study programme with external stakeholders, in particular associations, professional and social organizations**

Representatives of the Department conduct monitoring of job fairs organized by AGH-UST and other universities as well as external entities. Applications regarding potential employment opportunities in enterprises seeking employees are included in the study program. Cooperation agreements with private companies (eg BAARS, Geod) and local administration authorities (Limanowa, Sławków, and Olkusz Communes) and national (Regional Water Management Authority in Krakow, Regional Directorate for Environmental Protection in Bydgoszcz) are signed. During negotiations of these agreements, the subject of expectations of these entities as future potential employers in relation to the Faculty's graduates is discussed. Thanks to direct contacts of Faculty employees with graduates from previous years, information, opinions and suggestions regarding trends in the geological-resource, geotechnical and hydrogeological industry are obtained. The Department also offers employment offers for graduates, or offers for paid internships for graduates and students. All requirements contained in these offers are taken into account when formulating the study program or modifying the programs of individual subjects.

**Duration, rules and form of the apprenticeship**

No compulsory apprenticeships are planned in the second-cycle studies.

## **Admission criteria, rules and policies**

Major: Geophysics

Specialty: Applied geophysics

### **Description of competences expected from the candidate applying for admission to studies**

The candidates should have general knowledge in the natural sciences and the skills to use it in their work and life with the legal and ethical principles. The candidates should understand and analyze the processes that take place in nature, and the human impact on the environment. They should know the basic technological issues relevant to geophysics and they should regard the principles of sustainable development. The candidates should have the skills that allow them active participation in the team work, perform the assigned tasks, and using of professional literature. They should have the ability to conduct laboratory and field work and organize safe and efficient operating positions of such work. They also should demonstrate knowledge of English at level B2 of the European Framework of Reference for Languages.

### **Recruitment conditions, including the winners and finalists of the central level high school scientific Olympics, as well as winners of international and national contests**

The rules and conditions of recruitment are set out in Resolution No. 97/2019 of the AGH UST Senate of June 26, 2019 on the conditions, procedure and start and end date of recruitment for the first year of first- and second-cycle studies in the academic year 2020/2021.

### **The expected limit of admissions to studies along with an indication of the minimum number of admitted candidates required to successfully launch a study cycle**

Minimum number of students: 10

Maximum number of students: 30

## Learning outcomes

Major : Geophysics

Specialty: Applied geophysics

### Knowledge

KEU symbol	Directional learning outcomes	CEU symbol
<b>GF12A_W01</b>	The graduate knows and understands the complex physical phenomena and natural processes that apply in geophysics	P7S_WG_A
<b>GF12A_W02</b>	The graduate has knowledge and understands advanced mathematical, statistical and computational methods required for description of the complex geophysical problems	P7S_WG_A
<b>GF12A_W03</b>	The graduate has advanced knowledge in the field of earth sciences	P7S_WG_A
<b>GF12A_W04</b>	The graduate has extensive specialist knowledge in the field of general and applied geophysics	P7S_WG_A, P7S_WG_A_Inz
<b>GF12A_W05</b>	The graduate has the knowledge enabling description and analysis of geophysical parameters in the context of determining the physical properties of rocks and the dynamics of natural processes taking place.	P7S_WG_A
<b>GF12A_W06</b>	The graduate has knowledge about modern geophysical techniques and specialized software	P7S_WG_A, P7S_WG_A_Inz
<b>GF12A_W07</b>	The graduate has the knowledge necessary to solve a simple and reverse task in geophysics	P7S_WG_A
<b>GF12A_W08</b>	The graduate has knowledge related to the design and conduct of geophysical research in complex geological conditions related to natural, induced and anthropogenic hazards	P7S_WG_A, P7S_WG_A_Inz, P7S_WK_A_Inz
<b>GF12A_W09</b>	The graduate knows the methodology and specialized tools for data processing field and laboratory measurements using specialized computational tools	P6S_WG_A_Inz, P7S_WG_A
<b>GF12A_W10</b>	The graduate understands the principles and methodology of analyzing and interpreting geophysical data using specialized software	P7S_WG_A
<b>GF12A_W11</b>	The graduate has knowledge about the method of acquiring and accounting for funds needed to design and carry out geophysical surveys	P7S_WK_A, P7S_WK_A_Inz
<b>GF12A_W12</b>	The graduate knows the basic health and safety rules that apply when conducting field and laboratory work	P7S_WK_A
<b>GF12A_W13</b>	The graduate has knowledge in the field of intellectual property and patent law management	P6S_WG_A_Inz, P7S_WK_A
<b>GF12A_W14</b>	The graduate has general knowledge in the field of management and running a business	P7S_WK_A, P7S_WK_A_Inz

### Skills

KEU symbol	Directional learning outcomes	CEU symbol
<b>GF12A_U01</b>	The graduate can acquire, from literature and electronic sources, advanced knowledge in the field of natural sciences and extensive specialist knowledge in the field of general and applied geophysics	P7S_UW_A
<b>GF12A_U02</b>	The graduate has theoretical knowledge and the ability to describe and analyze geophysical parameters measured in a variety of methods in the aspect of the diversification of physical properties of rocks and the dynamics of physical processes	P7S_UW_A



<b>KEU symbol</b>	<b>Directional learning outcomes</b>	<b>CEU symbol</b>
<b>GF12A_U03</b>	The graduate uses modern systems for processing and interpretation of geophysical data, can design new modules in systems for advanced processing and interpretation	P7S_UW_A_Inz_01, P7S_UW_A
<b>GF12A_U04</b>	The graduate has the ability to select the geophysical methods to solve the task	P7S_UW_A_Inz_01, P7S_UW_A
<b>GF12A_U05</b>	The graduate will design and carry out geophysical measurements in all methods	P7S_UW_A_Inz_01, P7S_UW_A, P7S_UW_A_Inz_02
<b>GF12A_U06</b>	The graduate knows how to solve exploration problems in complex geological conditions	P7S_UW_A_Inz_01, P7S_UW_A, P7S_UW_A_Inz_02
<b>GF12A_U07</b>	The graduate will design, perform and interpret geophysical research for the assessment of natural hazards and induced by human activity	P7S_UW_A_Inz_01, P7S_UW_A, P7S_UW_A_Inz_02
<b>GF12A_U08</b>	The graduate can plan, perform and interpret geophysical monitoring of the state of the environment in time and space	P7S_UW_A_Inz_01, P7S_UW_A, P7S_UW_A_Inz_02
<b>GF12A_U09</b>	The graduate is able to assess and usefulness of the latest solutions used in: geophysical research, trends in apparatus development, measurement techniques and specialized software	P7S_UW_A_Inz_01, P7S_UW_A
<b>GF12A_U10</b>	The graduate has the ability to independently design the implementation and conduct interpretation of field and laboratory geophysical measurements	P7S_UW_A_Inz_01, P7S_UW_A, P7S_UW_A_Inz_02
<b>GF12A_U11</b>	The graduate can correctly interpret the obtained results of research coming from various sources and on this basis provide a comprehensive mapping of the physical properties of the center	P7S_UW_A_Inz_01, P7S_UW_A
<b>GF12A_U12</b>	The graduate has the ability to conduct independent interpretation of geophysical measurements using simulation and statistical results	P7S_UW_A_Inz_01, P7S_UW_A
<b>GF12A_U13</b>	The graduate uses economic instruments to design and carry out geophysical surveys	P7S_UU_A, P7S_UW_A_Inz_01
<b>GF12A_U14</b>	The graduate is prepared to take up work wherever knowledge of general geophysics and applied at the level of basic knowledge and engineering skills is required, in particular in geophysical, mining and geological enterprises	P7S_UU_A, P7S_UW_A_Inz_01
<b>GF12A_U15</b>	The graduate uses a foreign language at the B2+ level	P7S_UK_A
<b>GF12A_U16</b>	The graduate has the ability to fluently use a foreign language to communicate and read and understand advanced texts in the field of natural sciences	P7S_UK_A, P7S_UW_A
<b>GF12A_U17</b>	The graduate has the ability to create detailed studies of geophysical research and short scientific publications in Polish and foreign language	P7S_UK_A
<b>GF12A_U18</b>	The graduate can in a clear and logical way consistently present an oral presentation of the method of solving the task in the field of geophysics in Polish and foreign language using various means for verbal communication	P7S_UK_A
<b>GF12A_U19</b>	The graduate can teach and educate himself and inspire others with his actions	P7S_UO_A, P7S_UU_A
<b>GF12A_U20</b>	The graduate can interact with other people as part of team work and take a leading role in the team	P7S_UO_A

## Social competence

KEU symbol	Directional learning outcomes	CEU symbol
<b>GF12A_K01</b>	The graduate is ready to constantly update knowledge in the field of geophysics, earth sciences and mathematical-natural sciences and understands the need to broaden and deepen his knowledge	P7S_KK_A
<b>GF12A_K02</b>	The graduate is responsible for the safety of his own and other people during the implementation of engineering works and knows how to proceed in states of danger	P7S_KO_A
<b>GF12A_K03</b>	The graduate can think and act in an entrepreneurial way	P7S_KO_A
<b>GF12A_K04</b>	The graduate can determine the validity and sequence of tasks performed in the implemented project in a competent and responsible manner	P7S_KR_A

# Compliance table of engineering competence (Inz) with directional learning outcomes (KEU)

Major : Geophysics

Speciality: Applied geophysics

## Knowledge

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
<b>P6S_WG_A_Inz</b>	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	GFI2A_W09, GFI2A_W13
<b>P7S_WG_A_Inz</b>	knowledge of basic processes taking place in the life cycle of technical devices, facilities and systems	GFI2A_W04, GFI2A_W06, GFI2A_W08
<b>P7S_WK_A_Inz</b>	knowledge of basic principles of creating and developing various forms of individual entrepreneurship	GFI2A_W08, GFI2A_W11, GFI2A_W14

## Skills

CEU symbol	Learning outcomes for qualifications including engineering competence	KEU references
<b>P7S_UW_A_Inz_01</b>	ability to plan and carry out experiments, including measurements and computer simulations as well as to interpret the obtained results and draw conclusions out of them. When identifying and formulating the specification of engineering problems and solving them, being able to: - use analytical, simulation and experimental methods; - recognize their systemic and non-technical aspects, including ethical connotations; - conduct a preliminary economic assessment of the proposed solutions and planned engineering activities; - perform a critical analysis of the functioning of existing technical solutions to further evaluate them;	GFI2A_U03, GFI2A_U04, GFI2A_U05, GFI2A_U06, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U10, GFI2A_U11, GFI2A_U12, GFI2A_U13, GFI2A_U14
<b>P7S_UW_A_Inz_02</b>	ability to design solutions in compliance with the given specification as well as being able to: create simple devices, facilities and systems typical for the study major or implement processes using skillfully chosen methods, techniques, tools and materials	GFI2A_U05, GFI2A_U06, GFI2A_U07, GFI2A_U08, GFI2A_U10

## Directional outcomes coverage matrix

Major: Geophysics

Specialty: Applied geophysics

2021/2022/S/III/GGIOS/GFI/AG

Subject	Code	Semestr	GFI2A_W01	GFI2A_W02	GFI2A_W03	GFI2A_W04	GFI2A_W05	GFI2A_W06	GFI2A_W07	GFI2A_W08	GFI2A_W09	GFI2A_W10	GFI2A_W11	GFI2A_W12	GFI2A_W13	GFI2A_W14	GFI2A_U01	GFI2A_U02	GFI2A_U03	GFI2A_U04	GFI2A_U05	GFI2A_U06	GFI2A_U07	GFI2A_U08	GFI2A_U09	GFI2A_U10	GFI2A_U11	GFI2A_U12	GFI2A_U13	GFI2A_U14	GFI2A_U15	GFI2A_U16	GFI2A_U17	GFI2A_U18	GFI2A_U19	GFI2A_U20	GFI2A_K01	GFI2A_K02	GFI2A_K03	GFI2A_K04					
Application of Python programming in Earth sciences	GGIOSGFIAGS.IIi1K.5b4b4e905a7b57f63af5444fe12620b4.21	1		x							x	x					x		x			x						x								x									
Geoelectrical methods in structural and deposit research	GGIOSGFIAGS.IIi1S.c9f99c5555baef65d4b76dc1492276e7.21	1	x	x			x	x		x							x							x															x						
Processing of Seismic Data	GGIOSGFIAGS.IIi1S.2505c9abe5d83509c14ca12ac7644eec.21	1						x			x	x								x										x												x			
Advanced Statistical Methods	GGIOSGFIAGS.IIi1P.d3f2ea4eb1f723fe508048b40ced5c40.21	1	x	x				x				x					x		x							x			x												x			x	
Diploma Training	GGIOSGFIAGS.IIi1K.f00878b72b1aae627be56073cdece963.21	1				x	x	x	x	x	x			x				x	x	x	x			x	x	x	x			x				x									x		
Modelling in Geophysics	GGIOSGFIAGS.IIi1S.5b9b7bc344a77d37b0fcb1fa1f3f6c0f.21	1		x			x	x		x	x	x						x	x	x								x									x							x	
Law in mining and geology	GGIOSGFIAGS.IIi1K.b70c5f0e622ae7f8d4d2587664568c3e.21	1												x		x	x													x	x													x	
Structural imaging	BGFIAGS.IIi1S.9cea7176d0540dd03f18d72d7844c162.21	1			x	x		x	x			x							x								x	x	x													x	x	x	x
Legal protection of intellectual property	BGFIAGS.IIi2HS.29c1249065989336fe628a51d062e438.21	2														x		x																										x	
Engineering seismic	BGFIAGS.IIi2S.6421c8b81bc80e13c729a5b3b3f90db2.21	2	x				x	x		x								x							x																			x	
Seismology And Mining Seismometry	BGFIAGS.IIi2S.e8cecf245425236318fd72ba46eef64a.21	2	x								x			x																															x

Subject	Code	Semestr	GF12A_W01	GF12A_W02	GF12A_W03	GF12A_W04	GF12A_W05	GF12A_W06	GF12A_W07	GF12A_W08	GF12A_W09	GF12A_W10	GF12A_W11	GF12A_W12	GF12A_W13	GF12A_W14	GF12A_U01	GF12A_U02	GF12A_U03	GF12A_U04	GF12A_U05	GF12A_U06	GF12A_U07	GF12A_U08	GF12A_U09	GF12A_U10	GF12A_U11	GF12A_U12	GF12A_U13	GF12A_U14	GF12A_U15	GF12A_U16	GF12A_U17	GF12A_U18	GF12A_U19	GF12A_U20	GF12A_K01	GF12A_K02	GF12A_K03	GF12A_K04					
Geophysical analyzes in environmetal protection	BGFIAGS.IIi2S.21a4813832bd3e2500262bacd0318358.21	2	x	x	x			x	x	x	x	x	x					x	x	x	x	x	x	x	x			x	x					x											
Rock Physics	BGFIAGS.IIi2S.3d62937f2de9ff980c5ec416268a1a7d.21	2	x	x	x	x	x	x	x		x	x					x	x	x	x		x						x									x								
Processing And Interpretation Of Well Logging Data	BGFIAGS.IIi2S.45877798cce584fb3e8faf3e7a6b648e.21	2						x			x	x																	x		x								x		x				
Potential methods	BGFIAGS.IIi2S.0e7771d37f7a40e321a91f6903cac111.21	2	x	x	x	x		x	x	x	x		x						x	x			x		x	x					x						x			x					
Engineering geoelectric	BGFIAGS.IIi2S.1945a7b0e07858810012ca27fb7f9609.21	2	x				x	x		x							x				x						x	x									x	x			x				
Comprehensive interpretation of geophysical data	BGFIAGS.IIi4S.642d1b833cf1c0c3da2e249f75bdc39a.21	3		x		x	x	x				x					x	x	x			x			x		x	x			x											x			
Economic aspects of geophysical research	BGFIAGS.IIi4HS.a29105fd78d1b47d108c885a9561c496.21	3						x	x	x							x			x		x																		x					
Geophysical monitoring	GGiOSGFIAGS.IIi4S.0f09ca40fccdc8bb921d496074b0491.21	3	x				x	x	x	x							x			x					x	x	x	x												x					
Elective module from AGH UST International Courses Base	GGiOSGFIAGS.IIi4HS.fc7f72fd29a2ee7426a9bfd038504983.21	3																																											
Geological interpretation of geophysical measurement	BGFIAGS.IIi4S.b9db2da406be2fed9ff4a00fc3050141.21	3					x		x	x	x	x								x																						x			
Reservoir Geophysics	GGiOSGFIAGS.IIi4S.2dc8074d4181264ea986969d339cd0af.21	3				x	x		x			x						x		x					x		x														x				
Diploma Thesis	GGiOSGFIAGS.IIi4K.020527eb79105d40153428d063969161.21	3	x			x	x	x	x	x	x			x					x	x	x	x	x	x	x	x	x		x	x										x		x			
Diploma Seminar	BGFIAGS.IIi4K.113e607328fe3b1feac36d5c37a13bcd.21	3											x		x	x		x							x		x	x					x	x			x				x		x		
Sum (obligatory):			9	8	4	6	8	14	6	8	10	9	5	2	3	2	8	7	10	6	5	6	4	5	8	5	7	7	3	6	2	1	4	1	3	5	9	3	5	11					
Sum (elective):			1	0	0	1	3	2	4	3	1	2	0	0	0	1	1	1	0	4	0	1	0	1	2	1	2	0	0	0	0	0	0	0	0	0	0	3	1	0	0				

Subject	Code	Semestr	GF12A_W01	GF12A_W02	GF12A_W03	GF12A_W04	GF12A_W05	GF12A_W06	GF12A_W07	GF12A_W08	GF12A_W09	GF12A_W10	GF12A_W11	GF12A_W12	GF12A_W13	GF12A_W14	GF12A_U01	GF12A_U02	GF12A_U03	GF12A_U04	GF12A_U05	GF12A_U06	GF12A_U07	GF12A_U08	GF12A_U09	GF12A_U10	GF12A_U11	GF12A_U12	GF12A_U13	GF12A_U14	GF12A_U15	GF12A_U16	GF12A_U17	GF12A_U18	GF12A_U19	GF12A_U20	GF12A_K01	GF12A_K02	GF12A_K03	GF12A_K04
Sum:			10	8	4	7	11	16	10	11	11	11	5	2	3	3	9	8	10	10	5	7	4	6	10	6	9	7	3	6	2	1	4	1	3	5	12	4	5	11

## Characteristics matrix of learning outcomes in relation to modules

Major: Geophysics

Speciality: Applied geophysics

2021/2022/S/III/GGIOS/GFI/AG

Subject	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A_Inz	P6S_WG_A_Inz	P7S_WK_A	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UW_A_Inz_02	P7S_UU_A	P7S_UK_A	P7S_UO_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Application of Python programming in Earth sciences	GGIOSGFIAGS.Ili1K.5b4b4e905a7b57f63af5444fe12620b4.21	1	x			x		x	x	x			x			
Geoelectrical methods in structural and deposit research	GGIOSGFIAGS.Ili1S.c9f99c5555baef65d4b76dc1492276e7.21	1	x	x	x			x	x	x				x		
Processing of Seismic Data	GGIOSGFIAGS.Ili1S.2505c9abe5d83509c14ca12ac7644eec.21	1	x	x		x		x	x		x					x
Advanced Statistical Methods	GGIOSGFIAGS.Ili1P.d3f2ea4eb1f723fe508048b40ced5c40.21	1	x	x				x	x			x		x		x
Diploma Training	GGIOSGFIAGS.Ili1K.f00878b72b1aae627be56073cdece963.21	1	x	x	x	x	x	x	x	x	x	x	x			x
Modelling in Geophysics	GGIOSGFIAGS.Ili1S.5b9b7bc344a77d37b0fcb1fa1f3f6c0f.21	1	x	x	x	x		x	x		x		x	x		x
Law in mining and geology	GGIOSGFIAGS.Ili1K.b70c5f0e622ae7f8d4d2587664568c3e.21	1			x	x	x		x		x		x			
Structural imaging	BGFIAGS.Ili1S.9cea7176d0540dd03f18d72d7844c162.21	1	x	x				x	x	x				x	x	x
Legal protection of intellectual property	BGFIAGS.Ili2HS.29c1249065989336fe628a51d062e438.21	2				x	x	x							x	
Engineering seismic	BGFIAGS.Ili2S.6421c8b81bc80e13c729a5b3b3f90db2.21	2	x	x	x			x	x	x				x		
Seismology And Mining Seismometry	BGFIAGS.Ili2S.e8cecf245425236318fd72ba46eef64a.21	2	x		x	x	x	x	x	x						x
Geophysical analyzes in environmetal protection	BGFIAGS.Ili2S.21a4813832bd3e2500262bacd0318358.21	2	x	x	x	x	x	x	x	x		x				

Subject	Code	Semestr	P7S_WG_A	P7S_WG_A_Inz	P7S_WK_A_Inz	P6S_WG_A_Inz	P7S_WK_A	P7S_UW_A	P7S_UW_A_Inz_01	P7S_UW_A_Inz_02	P7S_UU_A	P7S_UK_A	P7S_UO_A	P7S_KK_A	P7S_KO_A	P7S_KR_A
Rock Physics	BGFIAGS.IIi2S.3d62937f2de9ff980c5ec416268a1a7d.21	2	x	x		x		x	x	x	x			x		
Processing And Interpretation Of Well Logging Data	BGFIAGS.IIi2S.45877798cce584fb3e8faf3e7a6b648e.21	2	x	x		x		x	x		x				x	x
Potential methods	BGFIAGS.IIi2S.0e7771d37f7a40e321a91f6903cac111.21	2	x	x	x	x	x	x	x	x	x			x		x
Engineering geoelectric	BGFIAGS.IIi2S.1945a7b0e07858810012ca27fb7f9609.21	2	x	x	x			x	x	x				x	x	x
Comprehensive interpretation of geophysical data	BGFIAGS.IIi4S.642d1b833cf1c0c3da2e249f75bdc39a.21	3	x	x				x	x	x	x	x	x			x
Economic aspects of geophysical research	BGFIAGS.IIi4HS.a29105fd78d1b47d108c885a9561c496.21	3	x	x	x		x	x	x	x				x		
Geophysical monitoring	GGiOSGFIAGS.IIi4S.0f09ca40fccdc8bb921d496074b0491.21	3	x	x	x			x	x	x				x		
Elective module from AGH UST International Courses Base	GGiOSGFIAGS.IIi4HS.fc7f72fd29a2ee7426a9bfd038504983.21	3														
Geological interpretation of geophysical measurement	BGFIAGS.IIi4S.b9db2da406be2fed9ff4a00fc3050141.21	3	x	x	x	x		x	x						x	
Reservoir Geophysics	GGiOSGFIAGS.IIi4S.2dc8074d4181264ea986969d339cd0af.21	3	x	x				x	x					x		
Diploma Thesis	GGiOSGFIAGS.IIi4K.020527eb79105d40153428d063969161.21	3	x	x	x	x	x	x	x	x	x	x	x		x	
Diploma Seminar	BGFIAGS.IIi4K.113e607328fe3b1feac36d5c37a13bcd.21	3			x	x	x	x	x		x	x	x	x	x	x
Sum (obligatory):			16	14	11	13	8	18	18	12	10	6	7	9	6	11
Sum (elective):			4	4	3	1	1	4	4	2	0	0	0	3	1	0
Sum:			20	18	14	14	9	22	22	14	10	6	7	12	7	11



## Matrix of directional learning outcomes with related forms of classes and the method of testing

Major: Geophysics

Speciality: Applied geophysics

2021/2022/S/III/GGIOS/GFI/AG

Name of the module	Activity	Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module	KEU references
Application of Python programming in Earth sciences	Laboratory classes	Execution of exercises, Execution of a project, Test, Involvement in teamwork	GFI2A_W02, GFI2A_W09, GFI2A_W10, GFI2A_U03, GFI2A_U06, GFI2A_U12, GFI2A_U01, GFI2A_U20
Geoelectrical methods in structural and deposit research	Lecture, Laboratory classes	Activity during classes, Participation in a discussion, Test, Project, Activity during classes, Participation in a discussion, Test, Project	GFI2A_W05, GFI2A_W06, GFI2A_W08, GFI2A_W01, GFI2A_W02, GFI2A_U01, GFI2A_U08, GFI2A_K01
Processing of Seismic Data	Lecture, Laboratory classes	Activity during classes, Participation in a discussion, Examination, Case study, Test results, Oral answer, Activity during classes, Participation in a discussion, Execution of a project, Test, Report, Oral answer	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U03, GFI2A_U14, GFI2A_K04
Advanced Statistical Methods	Lecture, Laboratory classes	Examination, Execution of exercises, Execution of a project	GFI2A_W01, GFI2A_W02, GFI2A_W10, GFI2A_U01, GFI2A_U03, GFI2A_U12, GFI2A_W06, GFI2A_U09, GFI2A_U15, GFI2A_K01, GFI2A_K04
Diploma Training	Thesis-internship programme	Work done within the framework of a practical placement	GFI2A_W04, GFI2A_W05, GFI2A_W08, GFI2A_U04, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U13, GFI2A_W06, GFI2A_W09, GFI2A_U03, GFI2A_W07, GFI2A_U02, GFI2A_U05, GFI2A_U10, GFI2A_W12, GFI2A_U17, GFI2A_U20, GFI2A_K04
Modelling in Geophysics	Laboratory classes	Test	GFI2A_W02, GFI2A_U02, GFI2A_U19, GFI2A_W05, GFI2A_W09, GFI2A_U03, GFI2A_K04, GFI2A_W06, GFI2A_W08, GFI2A_U04, GFI2A_W10, GFI2A_U11, GFI2A_K01
Law in mining and geology	Lecture	Participation in a discussion, Test	GFI2A_W11, GFI2A_W14, GFI2A_W13, GFI2A_U13, GFI2A_U14, GFI2A_U20

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
Structural imaging	Laboratory classes	Activity during classes, Examination	GFI2A_W03, GFI2A_W04, GFI2A_W06, GFI2A_W07, GFI2A_U02, GFI2A_U09, GFI2A_U10, GFI2A_U11, GFI2A_W10, GFI2A_K01, GFI2A_K02, GFI2A_K03, GFI2A_K04
Legal protection of intellectual property	Lecture	Execution of a project, Test results	GFI2A_W13, GFI2A_U01, GFI2A_K03
Engineering seismic	Lecture, Workshop classes	Project, Scientific paper, Participation in a discussion, Project, Scientific paper	GFI2A_W01, GFI2A_W05, GFI2A_W06, GFI2A_W08, GFI2A_U01, GFI2A_U08, GFI2A_K01
Seismology And Mining Seismometry	Lecture, Laboratory classes	Participation in a discussion, Execution of laboratory classes, Test, Participation in a discussion, Execution of laboratory classes, Test	GFI2A_W01, GFI2A_W09, GFI2A_W11, GFI2A_U05, GFI2A_U06, GFI2A_K04
Geophysical analyzes in environmental protection	Auditorium classes	Test	GFI2A_W08, GFI2A_U04, GFI2A_U05, GFI2A_W06, GFI2A_W07, GFI2A_W09, GFI2A_W10, GFI2A_W01, GFI2A_W02, GFI2A_W03, GFI2A_W11, GFI2A_U06, GFI2A_U07, GFI2A_U08, GFI2A_U02, GFI2A_U03, GFI2A_U09, GFI2A_U11, GFI2A_U12, GFI2A_U17
Rock Physics	Lecture, Laboratory classes	Activity during classes, Participation in a discussion, Execution of a project, Test, Examination, Report, Activity during classes, Execution of a project, Test, Examination, Report, Report on completion of a practical placement	GFI2A_W04, GFI2A_W05, GFI2A_W07, GFI2A_W09, GFI2A_W10, GFI2A_W02, GFI2A_W01, GFI2A_W03, GFI2A_W06, GFI2A_U01, GFI2A_U02, GFI2A_U04, GFI2A_U14, GFI2A_U03, GFI2A_U06, GFI2A_U11, GFI2A_K01
Processing And Interpretation Of Well Logging Data	Laboratory classes	Execution of laboratory classes, Test	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U14, GFI2A_U12, GFI2A_K03, GFI2A_K04
Potential methods	Lecture, Laboratory classes	Activity during classes, Execution of a project, Execution of laboratory classes, Test, Project, Examination, Test results, Activity during classes, Execution of a project, Execution of laboratory classes, Test, Project, Examination, Test results	GFI2A_W01, GFI2A_W02, GFI2A_W07, GFI2A_W04, GFI2A_W06, GFI2A_W09, GFI2A_W08, GFI2A_W03, GFI2A_W11, GFI2A_U03, GFI2A_U07, GFI2A_U14, GFI2A_U09, GFI2A_U04, GFI2A_U10, GFI2A_K01, GFI2A_K04
Engineering geoelectric	Lecture, Workshop classes	Participation in a discussion, Project, Activity during classes, Participation in a discussion, Project, Involvement in teamwork	GFI2A_W01, GFI2A_W05, GFI2A_W06, GFI2A_W08, GFI2A_U01, GFI2A_U05, GFI2A_U10, GFI2A_U11, GFI2A_K02, GFI2A_K04, GFI2A_K01

<b>Name of the module</b>	<b>Activity</b>	<b>Method of verification and assessment of learning outcomes achieved by the student in individual forms of classes and activities for the entire module</b>	<b>KEU references</b>
Comprehensive interpretation of geophysical data	Laboratory classes	Activity during classes, Participation in a discussion, Execution of a project, Project, Involvement in teamwork	GFI2A_W06, GFI2A_W10, GFI2A_U03, GFI2A_U09, GFI2A_U11, GFI2A_W02, GFI2A_W04, GFI2A_U01, GFI2A_U17, GFI2A_W05, GFI2A_U14, GFI2A_U02, GFI2A_U06, GFI2A_U12, GFI2A_U20, GFI2A_K04
Economic aspects of geophysical research	Lecture, Workshop classes	Activity during classes, Examination, Activity during classes, Case study	GFI2A_W14, GFI2A_W06, GFI2A_W07, GFI2A_W08, GFI2A_U04, GFI2A_U06, GFI2A_K01
Geophysical monitoring	Lecture, Laboratory classes	Participation in a discussion, Project, Participation in a discussion, Test, Project	GFI2A_W01, GFI2A_W05, GFI2A_W06, GFI2A_W07, GFI2A_W08, GFI2A_U01, GFI2A_U04, GFI2A_U08, GFI2A_U09, GFI2A_U10, GFI2A_U11, GFI2A_K01
Elective module from AGH UST International Courses Base	Lecture		
Geological interpretation of geophysical measurement	Workshop classes	Activity during classes, Case study	GFI2A_W07, GFI2A_W08, GFI2A_W09, GFI2A_W10, GFI2A_W05, GFI2A_U04, GFI2A_K02
Reservoir Geophysics	Lecture, Project classes	Participation in a discussion, Execution of exercises, Scientific paper, Participation in a discussion, Execution of exercises, Scientific paper	GFI2A_W04, GFI2A_W05, GFI2A_W07, GFI2A_W10, GFI2A_U09, GFI2A_U02, GFI2A_U04, GFI2A_U11, GFI2A_K01
Diploma Thesis	Diploma Thesis	Diploma thesis preparation	GFI2A_W01, GFI2A_W04, GFI2A_W05, GFI2A_W06, GFI2A_W07, GFI2A_W08, GFI2A_W09, GFI2A_U03, GFI2A_U04, GFI2A_U05, GFI2A_U06, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U10, GFI2A_U13, GFI2A_U12, GFI2A_U17, GFI2A_U18, GFI2A_W12, GFI2A_U19, GFI2A_U20, GFI2A_K02, GFI2A_K03
Diploma Seminar	Seminars	Activity during classes, Participation in a discussion, Scientific paper, Diploma thesis preparation, Presentation	GFI2A_W13, GFI2A_W11, GFI2A_W14, GFI2A_U09, GFI2A_U11, GFI2A_U16, GFI2A_U02, GFI2A_U12, GFI2A_U15, GFI2A_U19, GFI2A_K04, GFI2A_K01, GFI2A_K03

## Study plans

Major name: Geophysics

## Semester 1

### Path: Applied Geophysics

Subject	Number of hours	ECTS points	Form of verification	
Application of Python programming in Earth sciences	Laboratory classes: 45	3,0	Assessment	0
Geoelectrical methods in structural and deposit research	Lecture: 30 Laboratory classes: 45	5,0	Exam	0
Processing of Seismic Data	Lecture: 30 Laboratory classes: 60	5,0	Exam	0
Advanced Statistical Methods	Lecture: 30 Laboratory classes: 60	5,0	Exam	0
Diploma Training	Thesis-internship programme: 0	2,0	Assessment	0
Modelling in Geophysics	Laboratory classes: 60	5,0	Assessment	0
Law in mining and geology	Lecture: 30	2,0	Assessment	0
Structural imaging	Laboratory classes: 60	3,0	Assessment	0
<b>Sum</b>	<b>450</b>	<b>30,0</b>		

## Semester 2

### Path: Applied Geophysics

Subject	Number of hours	ECTS points	Form of verification	
Legal protection of intellectual property	Lecture: 30	2,0	Assessment	0
Engineering seismic	Lecture: 15 Workshop classes: 45	4,0	Assessment	0
Seismology And Mining Seismometry	Lecture: 15 Laboratory classes: 30	4,0	Assessment	0
Geophysical analyzes in environmental protection	Auditorium classes: 30	2,0	Exam	0

Subject	Number of hours	ECTS points	Form of verification	
Rock Physics	Lecture: 15 Laboratory classes: 45	4,0	Exam	O
Processing And Interpretation Of Well Logging Data	Laboratory classes: 60	5,0	Exam	O
Potential methods	Lecture: 30 Laboratory classes: 60	5,0	Exam	O
Engineering geoelectric	Lecture: 15 Workshop classes: 45	4,0	Assessment	O
<b>Sum</b>	<b>435</b>	<b>30,0</b>		

## Semester 3

### Path: Applied Geophysics

Subject	Number of hours	ECTS points	Form of verification	
Comprehensive interpretation of geophysical data	Laboratory classes: 60	3,0	Assessment	O
Diploma Thesis	Diploma Thesis: 0	20,0	Assessment	O
Diploma Seminar	Seminars: 30	1,0	Assessment	O
Elective block: The subject of foreign language		2,0	Assessment	O
The rules for selecting groups/modules: Select one item from the offered modules.				
Economic aspects of geophysical research	Lecture: 15 Workshop classes: 15	2,0	Assessment	W
Geological interpretation of geophysical measurement	Workshop classes: 30	2,0	Assessment	W
Elective Block, III semester of Applied Geophysics		2,0	Assessment	O
The rules for selecting groups/modules: Select one item from the offered modules.				
Geophysical monitoring	Lecture: 15 Laboratory classes: 30	2,0	Assessment	W
Reservoir Geophysics	Lecture: 15 Project classes: 30	2,0	Assessment	W
Elective Block (humanistic), III semester of Applied Geophysics		2,0	Assessment	O
The rules for selecting groups/modules: Select one item from the offered modules.				
Elective module from AGH UST International Courses Base	Lecture: 30	2,0	Assessment	O
<b>Sum</b>	<b>195</b>	<b>30,0</b>		

*O - Obligatory*  
*W - Elective*

## ECTS credits calculations

Major: Geophysics

Specialty: Applied geophysics

### The total number of ECTS credits the student needs to obtain in the form of:

classes conducted with the direct participation of academic teachers or other persons conducting classes	68
core science classes relevant to a given major	51
practical classes, developing practical skills, including laboratory, design, practical and workshop classes	45
classes subject to choice by the student (in the amount of not less than 30% of the number of ECTS points necessary to obtain qualifications corresponding to the level of education)	6
classes in the field of humanities or social sciences - in the case of fields of study assigned to disciplines within fields other than humanities or social sciences, respectively	6
foreign language classes	5
apprenticeships	0
classes related to the academic activity conducted at the University in the discipline or disciplines to which the field of study is assigned, in the amount greater than 50% of the number of ECTS points required to complete studies at a given level, taking into account the participation of students in classes preparing to conduct scientific activity or participate in this activity (applies only to studies with a general academic profile)	63
classes shaping practical skills in the amount greater than 50% of the number of ECTS points required to complete studies at a given level (applies only to studies with a practical profile)	0







# Application of Python programming in Earth sciences

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1K.5b4b4e905a7b57f63af5444fe12620b4.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Core Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Assessment  <b>Activities and hours</b> Laboratory classes: 45	<b>Number of ECTS points</b> 3.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna i rozumie metody matematyczne opisu i przetwarzania danych numerycznych	GFI2A_W02, GFI2A_W09, GFI2A_W10	Test
W2	Zna narzędzia informatyczne do przetwarzania danych numerycznych	GFI2A_W10	Execution of exercises
<b>Skills - Student can:</b>			
U1	Posiada umiejętność zastosowania technik badawczych z zakresu metod numerycznych	GFI2A_U03, GFI2A_U06, GFI2A_U12	Execution of exercises

U2	Uzupełnia wiedzę, potrafi pozyskiwać informacje z literatury oraz źródeł elektronicznych wyciągać wnioski i formułować opinie	GFI2A_U01	Execution of exercises
<b>Social competences - Student is ready to:</b>			
K1	Ma świadomość odpowiedzialności za wspólnie realizowane zadania, związane z pracą zespołową	GFI2A_U20	Execution of exercises, Execution of a project, Involvement in teamwork

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	45
Realization of independently performed tasks	45
<b>Student workload</b>	<b>Hours</b> 90
<b>Workload involving teacher</b>	<b>Hours</b> 45

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, W2, U1, U2, K1	According to the subjects given, the subject introduces the student to issues related to the use of Python in software for the interpretation of geophysical data and seismic data, e.g. Techlog, Hampson-Russell.



# Goelectrical methods in structural and deposit research

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1S.c9f99c5555baef65d4b76dc1492276e7.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Exam  <b>Activities and hours</b> Lecture: 30 Laboratory classes: 45	<b>Number of ECTS points</b> 5.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	The student knows the most important problems in the field of goelectrical methods, understands the relation of the goelectric knowledge with geology and is able to interpret the results of goelectrical inversion and carry out geological analysis of results of goelectrical interpretation.	GFI2A_W05, GFI2A_W06, GFI2A_W08	Activity during classes, Test
W2	Student knows and understands the physical phenomena of EM methods.	GFI2A_W01, GFI2A_W02	Activity during classes
<b>Skills - Student can:</b>			

U1	Student knows techniques of analysis of measurement data. Student is able to apply methods of interpretation.	GFI2A_U01, GFI2A_U08	Activity during classes, Test, Project
<b>Social competences - Student is ready to:</b>			
K1	Student understands the need for revision of knowledge in the field of geoelectric.	GFI2A_K01	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Laboratory classes	45
Preparation for classes	30
Preparation of project, presentation, essay, report	20
<b>Student workload</b>	<b>Hours</b> 125
<b>Workload involving teacher</b>	<b>Hours</b> 75

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, W2, U1	The student has the ability to independently perform geophysical and geological interpretation of electromagnetic data
Lecture	W1, W2, K1	



# Processing of Seismic Data

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1S.2505c9abe5d83509c14ca12ac7644eec.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> Yes
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<b>Period</b> Semester 1	<b>Examination</b> Exam  <b>Activities and hours</b> Lecture: 30 Laboratory classes: 60	<b>Number of ECTS points</b> 5.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Has knowledge of modern geophysical techniques and specialized software	GF12A_W06	Activity during classes, Execution of a project, Examination, Case study, Test results, Oral answer
W2	Knows the methodology and specialized tools for processing of acquired data by using specialized computing tools	GF12A_W09, GF12A_W10	Activity during classes, Execution of a project, Examination, Case study, Test results, Oral answer

W3	Understands the principles and methodology of the analysis of seismic data using specialized software	GFI2A_W09, GFI2A_W10	Activity during classes, Participation in a discussion, Execution of a project, Examination, Case study, Test results, Oral answer
<b>Skills - Student can:</b>			
U1	Efficiently uses modern seismic processing programs	GFI2A_U03	Activity during classes, Execution of a project, Test, Oral answer
U2	Can individually design and construct the basic seismic processing sequence.	GFI2A_U03, GFI2A_U14	Activity during classes, Execution of a project, Test, Case study, Oral answer
<b>Social competences - Student is ready to:</b>			
K1	Is ready to work wherever basic skills and knowledge of seismic processing are required, particularly in geophysical companies	GFI2A_K04	Activity during classes, Participation in a discussion, Execution of a project, Examination, Report, Oral answer

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Laboratory classes	60
Preparation for classes	5
Realization of independently performed tasks	5
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	40
<b>Student workload</b>	<b>Hours</b> 147
<b>Workload involving teacher</b>	<b>Hours</b> 90

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
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Lecture	W1, W2, K1	Subject prepares to work with specialized seismic data processing program, advanced workflow construction and choice of proper parameters.
Laboratory classes	W2, W3, U1, U2, K1	



## Advanced Statistical Methods

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1P.d3f2ea4eb1f723fe508048b40ced5c40.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Foundation Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Exam  <b>Activities and hours</b> Lecture: 30 Laboratory classes: 60	<b>Number of ECTS points</b> 5.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Rozumie i potrafi zastosować w naukach o Ziemi wybrane metody statystyczne	GFI2A_W01, GFI2A_W02, GFI2A_W10	Execution of exercises, Execution of a project, Examination
<b>Skills - Student can:</b>			
U1	Zna i potrafi przeprowadzić analizę wariancji i regresji	GFI2A_W02, GFI2A_U01, GFI2A_U03	Execution of exercises, Execution of a project
U2	Zna metody wielowymiarowe analizy danych i potrafi je zastosować dla danych geofizycznych	GFI2A_W01, GFI2A_W02, GFI2A_W10, GFI2A_U12	Execution of exercises, Execution of a project



U3	Zna i potrafi korzystać z specjalistycznego oprogramowania do analiz statystycznych	GFI2A_W02, GFI2A_W06, GFI2A_U09, GFI2A_U15	Execution of exercises, Execution of a project
<b>Social competences - Student is ready to:</b>			
K1	Potrafi w sposób kompetentny i odpowiedzialny określić ważności i kolejność wykonywanych zadań w realizowanym projekcie oraz dokonywać prawidłowego wnioskowania	GFI2A_K01, GFI2A_K04	Execution of exercises, Execution of a project

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Laboratory classes	60
Preparation for classes	12
Realization of independently performed tasks	13
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	15
<b>Student workload</b>	<b>Hours</b> 137
<b>Workload involving teacher</b>	<b>Hours</b> 90

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, U1, U2	The analysis of variance: the two-way analysis, two-way interactions. Testing individual hypotheses – post-hoc comparisons, introduction to complex designs, the analysis of covariance and multivariate analysis of variance. The multiple regression. Nonlinear estimation. Principal components analysis. Cluster analysis. Overview of other multivariate methods: discriminant function analysis, factor analysis. Artificial Neural Networks. Time Series analysis.
Laboratory classes	W1, U1, U2, U3, K1	



## Diploma Training

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1K.f00878b72b1aae627be56073cdece963.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Core Modules  <b>Subject related to scientific research</b> No  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Assessment  <b>Activities and hours</b> Thesis-internship programme: 0	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna zastosowanie metod geofizycznych dla różnych dziedzin gospodarki i potrafi je zastosować.	GFI2A_W04, GFI2A_W05, GFI2A_W08, GFI2A_U04, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U13	Work done within the framework of a practical placement
<b>Skills - Student can:</b>			
U1	Posiada wiedzę o współczesnych technikach geofizycznych i oprogramowaniu specjalistycznych i potrafi go wykorzystać w analizie danych geofizycznych.	GFI2A_W06, GFI2A_W09, GFI2A_U03, GFI2A_U09	Work done within the framework of a practical placement

U2	Posiada wiedzę z zakresu projektowania, wykonania i analizy złożonego zadania inżynierskiego i umie ją zastosować w praktyce.	GFI2A_W07, GFI2A_W08, GFI2A_U02, GFI2A_U05, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U10	Work done within the framework of a practical placement
<b>Social competences - Student is ready to:</b>			
K1	Potrafi pracować w zespole w sposób odpowiedzialny. Wie jak opracować i zrealizować zaplanowany harmonogram prac. Potrafi przygotować dokumentację dotyczącą rozwiązywanego zadania inżynierskiego.	GFI2A_W12, GFI2A_U17, GFI2A_U20, GFI2A_K04	Work done within the framework of a practical placement

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Realization of independently performed tasks	60
<b>Student workload</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Thesis-internship programme	W1, U1, U2, K1	-



## Modelling in Geophysics

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1S.5b9b7bc344a77d37b0fcb1fa1f3f6c0f.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Assessment  <b>Activities and hours</b> Laboratory classes: 60	<b>Number of ECTS points</b> 5.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Has knowledge of conceptual basics various numerical modeling techniques used in geophysics, geomechanics.	GFI2A_W02, GFI2A_U02, GFI2A_U19	Test
<b>Skills - Student can:</b>			
U1	Is able to transform a continuous geological model into a discrete numerical model; has knowledge about the selection of appropriate initial and boundary conditions for the numerical solution of selected problems in the field of Earth sciences.	GFI2A_W05, GFI2A_W09, GFI2A_U03, GFI2A_K04	Test

U2	Can handle selected computer programs used to model the physical processes occurring in the rock mass.	GFI2A_W06, GFI2A_U03	Test
U3	Is able to carry out numerical modeling for the solution of selected problems in the field of specific issues of Earth sciences.	GFI2A_W08, GFI2A_U04	Test
<b>Social competences - Student is ready to:</b>			
K1	Has knowledge about the use of synthetic results to increase the interpretation of measurement data.	GFI2A_W10, GFI2A_U11, GFI2A_K01	Test

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	60
Preparation for classes	20
Realization of independently performed tasks	45
<b>Student workload</b>	<b>Hours</b> 125
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, U1, U2, U3, K1	Modeling in geophysics covers the issues of modeling in seismic, well logging, petrophysics and geomechanics. Students use modern computer programs for modeling.



## Law in mining and geology

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1K.b70c5f0e622ae7f8d4d2587664568c3e.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Core Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 30	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna zakres stosowania przepisów prawa geologicznego i górniczego	GFI2A_W11, GFI2A_W14	Test
<b>Skills - Student can:</b>			
U1	Umie powiązać przepisy PG z przepisami innych ustaw wskazanych w ustawie PGG	GFI2A_W13, GFI2A_W14, GFI2A_U13	Participation in a discussion, Test
U2	Potrafi sformułować tok procedur prawnych zmierzających do udokumentowania i zagospodarowania złoża	GFI2A_W14, GFI2A_U13, GFI2A_U14	Test
<b>Social competences - Student is ready to:</b>			

K1	Jest świadomy odpowiedzialności prawnej za realizowane przez siebie zadania i swoich współpracowników	GFI2A_U20	Participation in a discussion
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### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Realization of independently performed tasks	18
Examination or Final test	2
<b>Student workload</b>	<b>Hours</b> 50
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, U1, U2, K1	-



# Structural imaging

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi1S.9cea7176d0540dd03f18d72d7844c162.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 1	<b>Examination</b> Assessment  <b>Activities and hours</b> Laboratory classes: 60	<b>Number of ECTS points</b> 3.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student uses geophysical software and can create interpretational objects needed for structural interpretation	GF12A_W03, GF12A_W04, GF12A_W06, GF12A_W07	Activity during classes
<b>Skills - Student can:</b>			
U1	Student can perform structural interpretation with the use of geophysical and geological data	GF12A_U02, GF12A_U09, GF12A_U10, GF12A_U11	Activity during classes
<b>Social competences - Student is ready to:</b>			
K1	Student can indicate seismic signatures of the chosen structural scenario	GF12A_W10	Examination



K2	Student can plan the steps of the tasks in order to minimise the time needed for completing the project	GFI2A_K01, GFI2A_K02, GFI2A_K03, GFI2A_K04	Activity during classes
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### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	60
Preparation for classes	5
Realization of independently performed tasks	10
Preparation of project, presentation, essay, report	10
<b>Student workload</b>	<b>Hours</b> 85
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, U1, K1, K2	Classes prepare a student for structural interpretation of a seismic image. During classes, students will use geological knowledge for structural interpretation of seismic data. Structural interpretation will be conducted in Petrel or Decision Space Geosciences.



## Legal protection of intellectual property

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2HS.29c1249065989336fe628a51d062e438.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Humanities and Social Sciences Modules  <b>Subject related to scientific research</b> No  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 30	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Wie, jakie są zasady przechodzenia majątkowych praw autorskich i praw do wynalazków ramach stosunku pracy, zasady nabywania i zbywania dóbr intelektualnych, udzielania i negocjowania licencji	GF12A_W13	Test results

W2	Wie, jakie dobra intelektualne należą do domeny publicznej, są więc ogólnodostępne, jakie zaś należą do domeny prywatnej i są chronione przez prawo autorskie/ prawo własności przemysłowej/know how. Zna podstawowe formy i zasady ochrony dóbr intelektualnych: utworów, rozwiązań, oznaczeń, know how	GFI2A_W13	Test results
W3	Potrafi monitorować zmiany zachodzące w prawie ochrony własności intelektualnej	GFI2A_W13	Test results
W4	Potrafi skutecznie zabezpieczyć prawnie swoje utwory/rozwiązania/know how.	GFI2A_W13	Test results
<b>Skills - Student can:</b>			
U1	Umie korzystać z chronionych dóbr intelektualnych w sposób nienaruszający praw ochronnych. Wie, jakie są konsekwencje prawne naruszenia cudzych praw autorskich i praw pochodnych /patentowych/wzoru użytkowego, przemysłowego/oznaczeń/know how.	GFI2A_U01	Test results
<b>Social competences - Student is ready to:</b>			
K1	Potrafi napisać podstawowe umowy z zakresu zarządzania własnością intelektualną	GFI2A_K03	Execution of a project

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Preparation for classes	10
Realization of independently performed tasks	10
<b>Student workload</b>	<b>Hours</b> 50
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2, W3, W4, U1, K1	Legal protection of intellectual property



## Engineering seismic

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.6421c8b81bc80e13c729a5b3b3f90db2.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> Yes
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<b>Period</b> Semester 2	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Workshop classes: 45	<b>Number of ECTS points</b> 4.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student zna i rozumie zjawiska fizyczne wykorzystywane w geofizyce inżynierskiej	GF12A_W01	Scientific paper
W2	Student zna najważniejsze problemy z dziedziny geofizyki inżynierskiej, rozumie powiązanie tej wiedzy z geologią i potrafi analizować wyniki badań geofizyczno-inżynierskich	GF12A_W05, GF12A_W06, GF12A_W08	Project, Scientific paper
<b>Skills - Student can:</b>			

U1	Student potrafi zastosować podstawowe metody badawcze i wykonywać pomiary w zakresie geofizyki inżynierskiej	GFI2A_U01, GFI2A_U08	Participation in a discussion
<b>Social competences - Student is ready to:</b>			
K1	Student rozumie potrzebę stałego aktualizowania wiedzy w zakresie geofizyki inżynierskiej	GFI2A_K01	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Workshop classes	45
Preparation for classes	30
Preparation of project, presentation, essay, report	30
<b>Student workload</b>	<b>Hours</b> 120
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2, U1, K1	Applications of seismic methods in engineering problems – an individual practical project of investigations.
Workshop classes	W1, W2, U1, K1	



## Seismology And Mining Seismometry

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.e8cecf245425236318fd72ba46eef64a.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Laboratory classes: 30	<b>Number of ECTS points</b> 4.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student knows and understands the mathematical and statistical methods needed for the description of seismology	GFI2A_W01	Test
W2	Student knows and understands mathematical, statistical and computational rules needed for processing and interpretation of seismological data.	GFI2A_W09, GFI2A_W11	Test
<b>Skills - Student can:</b>			

U1	Student can use specific software needed for processing and interpretation of seismological data.	GFI2A_U05	Execution of laboratory classes
U2	Student knows the methodology of seismology application to engineering problems	GFI2A_U06	Execution of laboratory classes
<b>Social competences - Student is ready to:</b>			
K1	Knows influence of seismic hazard on environment and society and knows the risk connected with seismic hazard assessment.	GFI2A_K04	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Laboratory classes	30
Preparation for classes	30
Realization of independently performed tasks	20
Examination or Final test	2
Preparation of project, presentation, essay, report	10
<b>Student workload</b>	<b>Hours</b> 107
<b>Workload involving teacher</b>	<b>Hours</b> 45

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, W2, U1, U2, K1	Advanced problems of seismology and mining seismology will be introduced during the course.
Lecture	W1, W2, U1, K1	



# Geophysical analyzes in environmental protection

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.21a4813832bd3e2500262bacd0318358.2 1  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Exam  <b>Activities and hours</b> Auditorium classes: 30	<b>Number of ECTS points</b> 2.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student knows the principles of operation of measuring devices, is able to read their operating instructions correctly and with understanding, can apply them to solve a complex engineering task.	GF12A_W08, GF12A_U04, GF12A_U05	Test
W2	Student knows and understands advanced techniques of designing, acquisition, processing and interpretation of geophysical data.	GF12A_W06, GF12A_W07, GF12A_W08, GF12A_W09, GF12A_W10	Test



W3	Student has a knowledge of geophysical methods in environmental monitoring, student knows the possibilities of its application to the solution of an engineering task.	GF12A_W01, GF12A_W02, GF12A_W03, GF12A_W07, GF12A_W11, GF12A_U06, GF12A_U07, GF12A_U08	Test
<b>Skills - Student can:</b>			
U1	Student knows the rules and can independently perform data visualization, describe in a syntactic way, present and discuss the results of the complex engineering task he has developed.	GF12A_U02, GF12A_U03, GF12A_U07, GF12A_U09, GF12A_U11, GF12A_U12, GF12A_U17	Test

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Auditorium classes	30
Preparation for classes	10
Realization of independently performed tasks	5
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	3
<b>Student workload</b>	<b>Hours</b> 55
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Auditorium classes	W1, W2, W3, U1	The module aims to familiarize students with the geophysical methods in connection with natural environment and their application in environmental protection.



# Rock Physics

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.3d62937f2de9ff980c5ec416268a1a7d.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Exam  <b>Activities and hours</b> Lecture: 15 Laboratory classes: 45	<b>Number of ECTS points</b> 4.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna i rozumie definicję sejsmiki petrograficznej w zakresie poszukiwania węglowodorów. Wie na czym polega planowanie prac poszukiwawczych oraz działań w zakresie złożowej dla złóż konwencjonalnych i niekonwencjonalnych.	GF12A_W04, GF12A_W05, GF12A_W07, GF12A_W09, GF12A_W10	Activity during classes, Execution of a project, Examination
W2	Wie na czym polegają i potrafi zaplanować kompleksowe badania łączące wyniki geologii strukturalnej, geofizyki otworowej i sejsmiki w celu rozpoznawania różnego typu pułapek dla węglowodorów	GF12A_W02, GF12A_W04, GF12A_W05, GF12A_W07, GF12A_W09, GF12A_W10	Activity during classes, Execution of a project

W3	Zna specjalistyczne oprogramowanie do przetwarzania i interpretacji danych sejsmicznych i geofizyki otworowej.	GFI2A_W01, GFI2A_W02, GFI2A_W03, GFI2A_W04, GFI2A_W05, GFI2A_W06, GFI2A_W07, GFI2A_W09, GFI2A_W10	Activity during classes, Report
W4	The student knows the methods for determining the upper and lower bounds of elastic moduli that describe the two- and multiphase formations as well as the theoretical models describing the elastic properties multiphase materials.	GFI2A_W03, GFI2A_W04	Activity during classes, Execution of a project, Test, Examination
<b>Skills - Student can:</b>			
U1	Zna i rozumie wpływ parametrów petrofizycznych na prędkości fal P i S oraz gęstość. Potrafi wykorzystać empiryczne zależności pomiędzy prędkością fali podłużnej i poprzecznej, gęstością, porowatością, litologią oraz nasyceniem przestrzeni porowej.	GFI2A_W06, GFI2A_W07, GFI2A_U01, GFI2A_U02, GFI2A_U04, GFI2A_U14	Activity during classes, Execution of a project, Examination
U2	Potrafi przetworzyć dane sejsmiczne oraz dane geofizyki wiertniczej dla potrzeb analiz złożowych.	GFI2A_U02, GFI2A_U03, GFI2A_U04, GFI2A_U06, GFI2A_U11	Activity during classes, Execution of a project
U3	Potrafi wykonać sejsmiczną interpretację złożową z zastosowaniem zintegrowanych metod sejsmiki i geofizyki otworowej.	GFI2A_W03, GFI2A_W04, GFI2A_W06, GFI2A_W07, GFI2A_W09, GFI2A_W10, GFI2A_U02, GFI2A_U04, GFI2A_U06, GFI2A_U11, GFI2A_U14	Activity during classes, Execution of a project
U4	The student can calculate effective elastic moduli of two- and multiphase materials using the appropriate theoretical model.	GFI2A_U01, GFI2A_U02	Report on completion of a practical placement
<b>Social competences - Student is ready to:</b>			
K1	Wykazuje potrzebę ciągłego aktualizowania wiedzy z zakresu geofizyki, nauk o Ziemi i nauk matematyczno-przyrodniczych	GFI2A_K01	Activity during classes, Participation in a discussion
K2	The student understands the need to independently search for information from different sources.	GFI2A_K01	Test

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Laboratory classes	45
Preparation for classes	12
Realization of independently performed tasks	12
Examination or Final test	1
Contact hours	5

Preparation of project, presentation, essay, report	12
Other	12
<b>Student workload</b>	<b>Hours</b> 114
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2, W3, W4, K1	Subject prepares to perform quantitative seismic reservoir characterization.
Laboratory classes	W3, W4, U1, U2, U3, U4, K2	



# Processing And Interpretation Of Well Logging Data

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.45877798cce584fb3e8faf3e7a6b648e.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Exam  <b>Activities and hours</b> Laboratory classes: 60	<b>Number of ECTS points</b> 5.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna i rozumie konieczność oraz umie zastosować sekwencję przetwarzania w geofizyce otworowej: dopasowanie głębokościowe, korekta sztucznych anomalii, właściwe dopasowanie sekcji poszczególnych profilowań, uzupełnianie brakujących sekcji profilowań, zmiana kroku próbkowania	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U14	Execution of laboratory classes, Test

W2	Zna i rozumie konieczność oraz umie zastosować poprawki na środowisko pomiarowe w geofizyce otworowej, ocenić parametry pozorne w geofizyce otworowej - wpływ otworu - średnicy i parametrów płuczki (oporności i gęstości oraz naturalnej promieniotwórczości), wpływ ciśnienia i temperatury	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U12, GFI2A_U14	Execution of laboratory classes, Test
W3	Zna modele do obliczenia parametrów petrofizycznych na podstawie wyników profilowań geofizyki otworowej	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U12, GFI2A_U14	Execution of laboratory classes, Test
W4	Zna zastosowanie wyników badań laboratoryjnych w analizie petrofizycznej oraz umie je dowiązać do profilowań geofizyki otworowej	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U12, GFI2A_U14	Execution of laboratory classes, Test
W5	Zna i rozumie przydatność oraz umie zastosować wykresy krzyżowe w celu uzyskania wstępnej informacji na temat składu mineralnego i nasycenia skał; zna i umie wykorzystać zasady normalizacji jako metody szybkiej analizy profilowań geofizyki otworowej, umie zastosować do wyznaczania stref produktywnych	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U12, GFI2A_U14	Execution of laboratory classes, Test
W6	Rozumie zasady i umie stosować przetwarzanie oraz interpretację danych geofizyki otworowej z wykorzystaniem specjalistycznego oprogramowania we wszystkich aplikacjach systemu GeoWin i systemu TechLog	GFI2A_W06, GFI2A_W09, GFI2A_W10, GFI2A_U12, GFI2A_U14	Execution of laboratory classes, Test
<b>Skills - Student can:</b>			
U1	Potrafi w sposób kompetentny i odpowiedzialny określić ważności i kolejność wykonywanych zadań w realizowanym projekcie	GFI2A_U14	Execution of laboratory classes, Test
<b>Social competences - Student is ready to:</b>			
K1	Jest przygotowany do podjęcia pracy wszędzie tam, gdzie wymagana jest znajomość zagadnień geofizyki otworowej na poziomie podstawowej wiedzy i umiejętności inżynierskich, w szczególności w przedsiębiorstwach geofizycznych i geologicznych	GFI2A_U12, GFI2A_U14, GFI2A_K03, GFI2A_K04	Execution of laboratory classes, Test

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	60
Preparation for classes	34
Realization of independently performed tasks	49
Examination or Final test	2
Contact hours	5
<b>Student workload</b>	<b>Hours</b> 150

<b>Workload involving teacher</b>	<b>Hours</b> 60
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\* hour means 45 minutes

### **Programme content that ensure achieving learning outcomes for the module**

<b>Activities</b>	<b>Subject learning outcomes</b>	<b>Programme content that ensure achieving learning outcomes for the module</b>
Laboratory classes	W1, W2, W3, W4, W5, W6, U1, K1	The module prepares for interpretation of well logs and results of laboratory measurement results on core samples in order to determine the reservoir parameters.



## Potential methods

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.0e7771d37f7a40e321a91f6903cac111.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Exam  <b>Activities and hours</b> Lecture: 30 Laboratory classes: 60	<b>Number of ECTS points</b> 5.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student has a broad knowledge of the microgravimetric method, knows the possibilities of its use for the recognition of the near-surface part of the rockmass.	GF12A_W01, GF12A_W02, GF12A_W07	Test, Project, Examination
W2	Knows and understands the principles of microgravimetric underground and borehole research, their acquisition, processing and interpretation.	GF12A_W04, GF12A_W06, GF12A_W09	Activity during classes, Execution of a project, Execution of laboratory classes, Project, Test results



W3	Student knows the possibility of using magnetometry in environmental and near-surface studies.	GFI2A_W01, GFI2A_W04, GFI2A_W08	Test, Project, Examination
W4	Student knows the methods of magneto-mineralogical research and the interrelationships between physical parameters found in the environmental magnetic studies.	GFI2A_W01, GFI2A_W06, GFI2A_W08	Test, Project, Examination
W5	Student is able to interpret the results of research with regard to data from various sources (geological, tectonic, drilling, pedological, geochemical, geophysical).	GFI2A_W02, GFI2A_W03, GFI2A_W11	Activity during classes, Project
<b>Skills - Student can:</b>			
U1	Student is able to independently design microgravimetric studies, process data and perform their interpretation.	GFI2A_U03, GFI2A_U07, GFI2A_U14	Test, Project
U2	Student is able to process data and interpret results from borehole gravimetry and mining microgravimetry.	GFI2A_U03, GFI2A_U07, GFI2A_U09	Activity during classes, Test, Project
U3	He can design environmental magnetic research taking into account the research problem and the current state of knowledge.	GFI2A_U04, GFI2A_U07, GFI2A_U10	Activity during classes, Test, Project
<b>Social competences - Student is ready to:</b>			
K1	It complements the knowledge on its own with the use of various available sources.	GFI2A_K01, GFI2A_K04	Execution of a project, Test results

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Laboratory classes	60
Preparation for classes	15
Realization of independently performed tasks	10
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	10
<b>Student workload</b>	<b>Hours</b> 132
<b>Workload involving teacher</b>	<b>Hours</b> 90

\* hour means 45 minutes

## Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, W2, W3, W4, W5, U1, U2, U3, K1	Methods of qualitative and quantitative interpretation of potential fields data for recognition of the near-surface part of the rockmass and in the mining industry. Specialist methods used in the environmental magnetism research.
Lecture	W1, W2, W4, W5, U1, U3, K1	



## Engineering geoelectric

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi2S.1945a7b0e07858810012ca27fb7f9609.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 2	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Workshop classes: 45	<b>Number of ECTS points</b> 4.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student knows and understands physical phenomena applied in engineering geoelectrics.	GF12A_W01	Project
W2	Student is familiar with the most important problems in the field of engineering geoelectrics, understands the connection of this knowledge with geology and is able to analyse the results of geophysical survey.	GF12A_W05, GF12A_W06, GF12A_W08	Project
<b>Skills - Student can:</b>			

U1	Student is able to apply basic geophysical methods and perform measurements in the field of engineering geoelectrics.	GFI2A_U01, GFI2A_U05	Project
U2	Student is able to process and interpret the results of field measurements in terms of a given engineering problem.	GFI2A_U10, GFI2A_U11	Project
<b>Social competences - Student is ready to:</b>			
K1	Student is able to work in a team. Student is responsible for his own and other team members safety.	GFI2A_K02, GFI2A_K04	Activity during classes, Involvement in teamwork
K2	Student understands the need to constantly update his knowledge in the field of engineering geoelectrics.	GFI2A_K01	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Workshop classes	45
Preparation for classes	15
Realization of independently performed tasks	15
Preparation of project, presentation, essay, report	30
<b>Student workload</b>	<b>Hours</b> 120
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2, K2	Application of geoelectrical methods in engineering problems - practical project.
Workshop classes	W2, U1, U2, K1, K2	



# Comprehensive interpretation of geophysical data

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4S.642d1b833cf1c0c3da2e249f75bdc39a.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Laboratory classes: 60	<b>Number of ECTS points</b> 3.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student posiada wiedzę o współczesnych technikach interpretacyjnych. zna przeznaczenie, budowę i możliwości systemu Petrel w zakresie kompleksowej interpretacji danych.	GF12A_W06, GF12A_W10, GF12A_U03, GF12A_U09, GF12A_U11	Participation in a discussion, Execution of a project
W2	Student rozumie na czym polega zintegrowana interpretacja danych geofizycznych oraz geologicznych. Zna podstawowe formaty danych i geodezyjne systemy odniesienia obowiązujące przy pracach interpretacyjnych, wie jakie są kolejne etapy prac interpretacyjnych. Student wie w jaki sposób prezentować wyniki badań.	GF12A_W02, GF12A_W04, GF12A_W10, GF12A_U01, GF12A_U17	Participation in a discussion, Execution of a project, Project

W3	Student wie do czego służą atrybuty sejsmiczne i wybrane zaawansowane procedury interpretacji danych sejsmicznych .	GFI2A_W02, GFI2A_W05	Participation in a discussion, Execution of a project, Project
<b>Skills - Student can:</b>			
U1	Posługuje się nowoczesnym systemem do interpretacji danych geofizycznych i geologicznych. Potrafi założyć projekt w systemie Petrel, wczytać dane geofizyczne i zintegrować z dostępnymi mapami i przekrojami geologicznymi. Potrafi użyć narzędzi systemowych w celu strukturalnej, stratygraficznej i złożowej interpretacji zapisu sejsmicznego.	GFI2A_U03, GFI2A_U11, GFI2A_U14	Participation in a discussion, Execution of a project, Project
U2	Student potrafi zintegrować wyniki swoich analiz w jeden spójny model strukturalno - petrofizyczny. Wie jak wizualizować w systemie wyniki swoich badań i eksportować je w celu wykonania sprawozdania	GFI2A_W02, GFI2A_U02, GFI2A_U03, GFI2A_U06, GFI2A_U11, GFI2A_U12, GFI2A_U14, GFI2A_U17	Project
<b>Social competences - Student is ready to:</b>			
K1	Student potrafi określić ważność i kolejność wykonywanych zadań w realizowanym projekcie i ma świadomość odpowiedzialności za wspólnie realizowane zadania, związane z pracą zespołową w grupach projektowych	GFI2A_U20, GFI2A_K04	Activity during classes, Execution of a project, Involvement in teamwork

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Laboratory classes	60
Preparation for classes	4
Realization of independently performed tasks	4
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	15
<b>Student workload</b>	<b>Hours</b> 90
<b>Workload involving teacher</b>	<b>Hours</b> 60

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Laboratory classes	W1, W2, W3, U1, U2, K1	Comprehensive interpretation of geophysical and geological data in the Petrel system





# Diploma Thesis

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4K.020527eb79105d40153428d063969161.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Core Modules  <b>Subject related to scientific research</b> No  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Diploma Thesis: 0	<b>Number of ECTS points</b> 20.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Przekazanie zaawansowanej wiedzy z zakresu nauk ścisłych i nauk o Ziemi oraz szerokiej wiedzy specjalistycznej z zakresu geofizyki ogólnej i stosowanej niezbędnej do rozwiązania zaawansowanych zadań inżynierskich geologiczno-geofizycznych.	GFI2A_W01, GFI2A_W04, GFI2A_W05, GFI2A_W06, GFI2A_W07, GFI2A_W08, GFI2A_W09	Diploma thesis preparation
<b>Skills - Student can:</b>			



U1	Nabycie umiejętności samodzielnego planowania i projektowania, optymalizacji i realizacji z wykorzystaniem aparatury pomiarowej badań geofizycznych	GFI2A_U03, GFI2A_U04, GFI2A_U05, GFI2A_U06, GFI2A_U07, GFI2A_U08, GFI2A_U09, GFI2A_U10, GFI2A_U13	Diploma thesis preparation
U2	Nabycie umiejętności przetwarzania danych oraz interpretacji geologicznej danych geofizycznych z wykorzystaniem nowoczesnych programów geofizycznych, a także nabycie umiejętności prezentacji wyników badań w sposób ścisły i syntetyczny z zastosowaniem języka naukowego i technicznego.	GFI2A_U03, GFI2A_U12, GFI2A_U17, GFI2A_U18	Diploma thesis preparation
<b>Social competences - Student is ready to:</b>			
K1	Przygotowanie studenta do: zarządzania realizacją projektu, kierowania podległymi sobie pracownikami, współpracy z przedstawicielami innych dyscyplin z uwzględnieniem uwarunkowań merytorycznych i prawno-ekonomicznych oraz z zachowaniem norm etycznych	GFI2A_W12, GFI2A_U19, GFI2A_U20, GFI2A_K02, GFI2A_K03	Diploma thesis preparation

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Realization of independently performed tasks	75
Examination or Final test	2
Contact hours	5
Preparation of project, presentation, essay, report	425
<b>Student workload</b>	<b>Hours</b> 507

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Diploma Thesis	W1, U1, U2, K1	-



## Diploma Seminar

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4K.113e607328fe3b1feac36d5c37a13bcd.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Core Modules  <b>Subject related to scientific research</b> No  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Seminars: 30	<b>Number of ECTS points</b> 1.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna i rozumie podstawowe pojęcia i zasady z zakresu ochrony własności przemysłowej i prawa autorskiego; potrafi korzystać z zasobów informacji patentowej	GFI2A_W13	Activity during classes, Participation in a discussion
W2	Ma podstawową wiedzę o trendach rozwojowych w zakresie wiedzy, techniki, technologii oraz metodyki rozwiązywania zagadnień związanych z działalnością geologiczno-górnictw	GFI2A_W11, GFI2A_W14, GFI2A_U09	Participation in a discussion, Diploma thesis preparation
<b>Skills - Student can:</b>			

U1	Potrafi pozyskiwać informacje z literatury, baz danych i innych źródeł, potrafi integrować uzyskane informacje, dokonywać ich interpretacji, a także wyciągać wnioski oraz formułować i uzasadniać opinie	GFI2A_U11, GFI2A_U16	Scientific paper, Presentation
U2	Potrafi opracować dokumentację dotyczącą realizacji zadania inżynierskiego i przygotować tekst zawierający omówienie wyników realizacji tego zadania.	GFI2A_U02, GFI2A_U12	Diploma thesis preparation
U3	Ma umiejętności językowe w zakresie nauk geologicznych zgodne z wymaganiami określonymi dla poziomu B2 Europejskiego Systemu Opisu Kształcenia Językowego	GFI2A_U15	Diploma thesis preparation
<b>Social competences - Student is ready to:</b>			
K1	Umie oszacować czas potrzebny na realizację zleconego zadania; potrafi opracować i zrealizować harmonogram prac zapewniający dotrzymanie terminów Rozumie potrzebę i zna możliwości ciągłego dokształcania się - podnoszenia kompetencji zawodowych, osobistych i społecznych	GFI2A_U19, GFI2A_K04	Activity during classes
K2	Potrafi myśleć i działać w sposób przedsiębiorczy Ma świadomość ważności zachowania się w sposób profesjonalny, przestrzegania zasad etyki zawodowej Potrafi odpowiednio określić priorytety służące realizacji określonego przez siebie lub innych zadania	GFI2A_K01, GFI2A_K03	Activity during classes

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Seminars	30
<b>Student workload</b>	<b>Hours</b> 30
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Seminars	W1, W2, U1, U2, U3, K1, K2	The diploma seminar is to provide monitoring in the field of progress in the development of graduate work by students.



## Economic aspects of geophysical research

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4HS.a29105fd78d1b47d108c885a9561c496.21  <b>Lecture languages</b> English  <b>Mandatory</b> Elective  <b>Block</b> Humanities and Social Sciences Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Workshop classes: 15	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	A student knows the basic economical aspects of geophysics	GF12A_W14	Examination
W2	A student understands the economical aspects of choosing the accurate geophysical method for a given task	GF12A_W06, GF12A_W07, GF12A_W08	Activity during classes
<b>Skills - Student can:</b>			

U1	Student can evaluate the efficiency of the geophysical method chosen for a given task	GFI2A_U04, GFI2A_U06	Case study
<b>Social competences - Student is ready to:</b>			
K1	Student can evaluate the benefits of a team work	GFI2A_K01	Activity during classes

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Workshop classes	15
Preparation for classes	5
Realization of independently performed tasks	5
Examination or Final test	2
Preparation of project, presentation, essay, report	10
<b>Student workload</b>	<b>Hours</b> 52
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2	Topics will be presented during lecture; students will be required to participate in discussions based on the current information about the geophysical market.
Workshop classes	U1, K1	



# Geological interpretation of geophysical measurement

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4S.b9db2da406be2fed9ff4a00fc3050141.21  <b>Lecture languages</b> English  <b>Mandatory</b> Elective  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Workshop classes: 30	<b>Number of ECTS points</b> 2.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student knows the geological setting of the chosen regions and understands its association with geophysical data	GF12A_W07, GF12A_W08, GF12A_W09, GF12A_W10	Activity during classes
W2	Student knows the importance of determining the accurate geophysical method for solving local geological aims	GF12A_W05	Case study
<b>Skills - Student can:</b>			
U1	Student can perform integrated interpretation of geophysical data	GF12A_U04	Activity during classes

Social competences - Student is ready to:			
K1	Student can interpret local geopolitical circumstances in the study areas	GFI2A_K02	Case study

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Workshop classes	30
Realization of independently performed tasks	30
<b>Student workload</b>	<b>Hours</b> 60
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Workshop classes	W1, W2, U1, K1	The goal of the classes is to enable a discussion about topics described during lectures. Basing on the presented information students will be able to exchange their knowledge and opinions.



## Geophysical monitoring

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4S.0f09ca40fccdc8bb921d496074b0491.21  <b>Lecture languages</b> English  <b>Mandatory</b> Elective  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Laboratory classes: 30	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Student knows and understands physical phenomena applied in geophysical monitoring.	GFI2A_W01	Project
W2	Student is familiar with the most important problems in the field of geophysical monitoring, understands the connection of this knowledge with geology and is able to analyse the results of geophysical survey.	GFI2A_W05, GFI2A_W06, GFI2A_W07, GFI2A_W08	Project
<b>Skills - Student can:</b>			



U1	Student is able to apply basic geoelectrical and seismic methods to perform measurements in the monitoring technique.	GFI2A_U01, GFI2A_U04, GFI2A_U08, GFI2A_U09	Test, Project
U2	Student is able to process and interpret the results of monitoring measurements in terms of a given research problem.	GFI2A_U08, GFI2A_U10, GFI2A_U11	Test, Project
<b>Social competences - Student is ready to:</b>			
K1	Student understands the need to constantly update his knowledge in the field of geophysical monitoring.	GFI2A_K01	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Laboratory classes	30
Preparation of project, presentation, essay, report	15
<b>Student workload</b>	<b>Hours</b> 60
<b>Workload involving teacher</b>	<b>Hours</b> 45

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
Lecture	W1, W2, K1	Student will learn techniques for monitoring the geological environment and anthropogenic objects using selected geoelectrical and seismic methods.
Laboratory classes	U1, U2, K1	



## Reservoir Geophysics

### Educational subject description sheet

#### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4S.2dc8074d4181264ea986969d339cd0af.21  <b>Lecture languages</b> English  <b>Mandatory</b> Elective  <b>Block</b> Major Modules  <b>Subject related to scientific research</b> Yes  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 15 Project classes: 30	<b>Number of ECTS points</b> 2.0
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#### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	Zna i rozumie definicję geofizyki złożowej w zakresie poszukiwania węglowodorów i wody oraz innych bogactw naturalnych; zna i rozumie różnice między geofizyką poszukiwawczą i złożową, wie na czym polega planowanie prac poszukiwawczych oraz działań w zakresie złożowej dla różnych typów złóż	GFI2A_W04, GFI2A_W05, GFI2A_W07, GFI2A_W10, GFI2A_U09	Participation in a discussion, Execution of exercises, Scientific paper

W2	Wie na czym polegają i potrafi zaplanować kompleksowe badania łączące wyniki geologii strukturalnej i sedimentologii oraz sejsmiki i geofizyki otworowej w celu rozpoznawania różnego typu pułapek dla węglowodorów i wody	GFI2A_W05, GFI2A_W07, GFI2A_W10, GFI2A_U02, GFI2A_U04, GFI2A_U09	Participation in a discussion, Execution of exercises, Scientific paper
W3	Zna zestawy pomiarowe, sposób wykonania badań i umie wykonać interpretację w zakresie geofizyki otworowej w otworach produkcyjnych	GFI2A_W05, GFI2A_W07, GFI2A_W10, GFI2A_U04, GFI2A_U09, GFI2A_U11	Participation in a discussion, Execution of exercises, Scientific paper
<b>Skills - Student can:</b>			
U1	Zna , rozumie i potrafi wykorzystać zależność między prędkością fal sprężystych z profilowania akustycznego, profilowania prędkości średnich i pionowego profilowania sejsmicznego oraz prędkością w sejsmice; umie uwzględnić wpływ niejednorodności ośrodka skalnego, dyspersji i tłumienia na prędkość fal sejsmicznych	GFI2A_W05, GFI2A_W07, GFI2A_W10, GFI2A_U02, GFI2A_U04, GFI2A_U11	Participation in a discussion, Execution of exercises, Scientific paper
<b>Social competences - Student is ready to:</b>			
K1	Wykazuje potrzebę ciągłego aktualizowania wiedzy z zakresu geofizyki, nauk o Ziemi i nauk matematyczno-przyrodniczych	GFI2A_K01	Participation in a discussion

### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	15
Project classes	30
Realization of independently performed tasks	10
Preparation of project, presentation, essay, report	5
<b>Student workload</b>	<b>Hours</b> 60
<b>Workload involving teacher</b>	<b>Hours</b> 45

\* hour means 45 minutes

### Programme content that ensure achieving learning outcomes for the module

Activities	Subject learning outcomes	Programme content that ensure achieving learning outcomes for the module
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Lecture	W1, W2, W3, U1, K1	Definition of reservoir geophysics as regards to hydrocarbon deposits and water deposits and the others, differences between reservoir geophysics and prospecting geophysics, planning geological recognition and geophysical prospecting for various deposits. Relation between structural geology, sedimentology vs. seismic and well logging ability to recognize hydrocarbon traps of different types
Project classes	W1, W2, W3, U1, K1	



# Elective module from AGH UST International Courses Base

## Educational subject description sheet

### Basic information

<b>Field of study</b> Geophysics  <b>Speciality</b> Applied Geophysics  <b>Department</b> Faculty of Geology, Geophysics and Environmental Protection  <b>Study level</b> Second-cycle (engineer) programme  <b>Study form</b> Full-time studies  <b>Education profile</b> General academic	<b>Didactic cycle</b> 2021/2022  <b>Subject code</b> BGFIAGS.IIi4HS.fc7f72fd29a2ee7426a9bfd038504983.21  <b>Lecture languages</b> English  <b>Mandatory</b> Obligatory  <b>Block</b> Humanities and Social Sciences Modules  <b>Subject related to scientific research</b> No  <b>Subject shaping practical skills</b> No
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<b>Period</b> Semester 3	<b>Examination</b> Assessment  <b>Activities and hours</b> Lecture: 30	<b>Number of ECTS points</b> 2.0
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### Subject learning outcomes

Code	Outcomes in terms of	Directional learning outcomes	Examination methods
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### Student workload

Activity form	Average amount of hours* needed to complete each activity form
Lecture	30
Realization of independently performed tasks	20

<b>Student workload</b>	<b>Hours</b> 50
<b>Workload involving teacher</b>	<b>Hours</b> 30

\* hour means 45 minutes

### **Programme content that ensure achieving learning outcomes for the module**

<b>Activities</b>	<b>Subject learning outcomes</b>	<b>Programme content that ensure achieving learning outcomes for the module</b>
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## **Detailed rules of the implementation of the study programme established by the Dean of the Faculty (the so-called Study Rules)**

Major: Geophysics

Specialty: Applied geophysics

### **Enrollment rules for the next semester**

- The student receives an entry for the next semester, if he obtained the number of ECTS points assigned to this semester in the current semester (27-33).
- Passing the semester of studies and confirmation of getting an entry for the next semester of study is made in the University's ICT system no later than one week from the beginning of the next semester of study.
- The condition for passing the last semester of studies is obtaining the credit for all obligatory modules of classes included in the plan of this semester of studies, with the exception of the diploma thesis.

### **Enrollment rules for the next semester as a part of the so-called ECTS credits debt ceiling**

If the number of ECTS points assigned to a given semester is not obtained, the student may apply for entry for the next semester of studies with the so-called "Acceptable total deficit of points". The application in this case should be submitted to the Dean of the Faculty before the beginning of the semester concerned.

### **ECTS credits debt ceiling**

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### **Organization of classes within the so-called blocks of classes (i.e. such organization of subjects or individual forms of classes that creates exceptions to the cyclical nature of classes in particular weeks of a given semester of studies)**

The electivity is carried out by selecting individual modules of classes in semesters II and III. These are modules for humanities, engineering, which allow for better adjustment of the program to the interests of students, but also allow to meet the requirements in the education of geophysical engineers.

### **Monitoring semesters**

2

### **Study rules in case of the individual organization of studies approved for a specific student**

An individual study program, including a study plan, may be awarded to the student:

- completed at least the first semester of study and obtained an average with not less than 4.25;
- a disabled person;
- being in a difficult life situation;
- participating in sports competitions at the national or international level;
- wanting to complete part of the studies at another university;
- studying in more than one field of study;
- elected to the collegial body of the University;
- a foreigner taking a Polish language course.

Individualization of the study program, including the study plan, may consist of:

- individual selection of modules of classes, methods and forms of education. In this case, the Dean appoints a guardian (IPS) from among the Faculty employees with a doctorate degree at least.
- modification of the form of credit and exams.

Individualization of the study program, including the study plan, may relate to classes within one or several semesters or the whole course of study, but it may not lead to changes in the directional learning outcomes or to extend the date of completion of studies.

## **Implementation of apprenticeships including monitoring system and completion rules**

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### **Rules of elective modules taking**

Depending on the elective module, it is activated on the basis of the minimum number of applications allowed.

### **Rules of study paths, diploma paths, specialty choice/eligibility**

During registration in the recruitment system for second-degree studies, the candidate indicates the specializations on which he would like to take up education (so-called list of preferences) from the list presented by the Dean. Specialties on this list (at least two) should be ranked by the candidate in order from the most to the least desirable. The qualification for particular specialties is based on the recruitment rate (W), which depends on the result of the entrance / directional examination and the average grade from the first-cycle studies. On this basis, ranking lists of particular specialties are created. The Dean decides on the limits of places on specialties, taking into account the possibility of diplomacy in individual cathedrals, the number of persons qualified for the second-cycle studies, declarations of candidates submitted during recruitment and the financial situation of the faculty. If, due to the lack of a sufficient number of candidates, a decision is made by the Dean not to start education in a given specialty, the candidates who indicated it in the first place will be included in the ranking lists of specializations indicated in the second place.

### **Rules related to the preparation of diploma projects and theses as well as the implementation of the degree granting**

1. The condition for obtaining a diploma of completion of the second-cycle studies at full-time studies at AGH-UST, in the field of applied geophysics, is the total fulfillment of the conditions:
  - passing all the modules of classes provided for in the curriculum,
  - preparation of the thesis (master's thesis),
  - passing the second degree (master's) diploma exam consisting of a general directional exam, presentation of the diploma thesis and discussion on it (defense of thesis),
2. The topic of the diploma thesis is selected before the end of the first semester.  
The diploma thesis is evaluated by the supervisor / supervisor of the work and the reviewer, at least one of whom holds at least the postdoctoral degree.
3. A student who has completed all the study modules provided for in the curriculum may be admitted to the general final examination.

The general second degree examination takes place in written form and includes knowledge in the field of specialization. 4 questions will be drawn from a set of 60 questions divided into 4 thematic groups (one from each group). From among randomly drawn questions, the student chooses 3 and the answers to these questions are subject to evaluation in accordance with the rules set out in the Regulations of the AGH University of Science and Technology. The exam takes place according to the schedule presented by the Dean no later than 30 days before the planned date of the exam. The schedule includes a basic deadline and one correction term. Issues and examples of questions will be made available to students no later than 30 days before the date of the general directional examination. In the case of receiving a negative assessment (the arithmetic average of the answers to questions below 50%) from the general examination at the basic and correctional dates or failing to pass this examination, the dean deletes the student from the student list.

4. Defense of diploma theses is conducted in Departments in front of committees appointed by the Faculty Dean.  
Only the diploma thesis, which was positively evaluated by the supervisor and the reviewer, registered in the dean's office no later than 5 days before the planned defense, and the contractor passed the general directional examination and submitted all the required documents can be accepted for defense.

The defense consists of the overt part, during which the author presents the work and discussion about the work and the secret part (without the participation of the student) during which the committee evaluates the presentation of the work and discussion, and then calculates the final grade of the second-degree diploma exam and places it in the diploma examination of the second degree.

### **Principles for determining the overall evaluation of graduation (the final grade)**



The overall result of graduation is calculated as a weighted average:

- a) average grade from studies, calculated in accordance with the Study Regulations (with a weight of 0.6);
- b) the final evaluation of the diploma thesis, which is the arithmetic average of the work grades issued by the promoter and reviewer, determined in accordance with the Study Regulations (with a weight of 0.2);
- c) assessment of the master thesis exam determined by the commission, which is the arithmetic average of the general examination exam and the presentation of the master thesis and answers to questions related to the work, in accordance with the Study Regulations (with a weight of 0.2), with each of these parts, the student must get a positive grade (at least 3.0).

**Other requirements related to the implementation of the study programme resulting from the AGH UST Study Regulations or other regulations in force at the University**

Entry for the diploma semester is possible after completing all the modules provided for the first and second semesters, in accordance with the regulations of the AGH-UST study.