



## **TITLE OF THE Curricula/Module**

**WEB -TECHNOLOGIES (AGRO SDI, GEOPORTALS,  
GEOSERVICES, GEOANALYTICAL SYSTEMS)**

**NKSU /Kazakhstan**

**2021**

## 1. Discipline passport

### 1.1 The scope of the discipline in credits and academic hours. form of control

Table 1

Total		Distribution of hours by occupation					Preparing and passing the exam	Control form, form of conducting
Loans	Clock	Lectures	Practical	laboratory / studio	IWST	IWS		
5	150	30	30	-	15	60	15	Exam, WF

### 1.2 Objective of the discipline and expected learning outcomes

**Purpose of the discipline:** formation of students' professional knowledge about modern methods, systems and technologies for obtaining, processing and interpreting remote sensing data. Mastering the theoretical and practical foundations for the use of remote sensing data for information support for land monitoring. The development of the discipline is aimed at acquiring knowledge about the physical foundations of the production of aerial and space surveys, the geometric properties of images, technologies for photogrammetric processing and decoding of images, and the acquisition of skills in using remote sensing data.

#### **Expected learning outcomes:**

**1.3** Demonstrate knowledge, abilities, skills in the field of mastering the basics of organizing and conducting scientific research in the field of remote sensing data processing and the main areas of scientific research in the Republic of Kazakhstan and abroad.

#### **1.4 Политика курса**

- ✓ strictly observe the Rules of Academic Integrity of M. Kozybaev NKSU: there is no place for plagiarism, cheating and other forms of deception;
- ✓ not be late for classes;
- ✓ not to miss classes, in case of absence due to illness, provide a certificate;
- ✓ come to classes in business attire;
- ✓ actively participate in the educational process;
- ✓ independently and on time to do homework;
- ✓ be tolerant, open and friendly to fellow students, teachers and employees of the North Kazakhstan State University named after M. Kozybaeva;
- ✓ promote teamwork and participate in discussions;
- ✓ be punctual and obligatory (late arrivals, absences, behavior in the classroom, late submission of work, absence from the exam);
- ✓ comply with the code of honor of the student of the North Kazakhstan University named after M. Kozybaeva.

### 1.5 Prerequisites

*Optics*

### 1.6 Post-requisites

*No*

## 2. Classroom lessons, their content and volume in hours

Table 2

№ weeks	Type of educational activity	Themes and content of training sessions	Number of hours	Forms and methods of teaching
<b>Module 1: Basic definitions, purposes and development prospects of portals</b>				
1	<b>lecture</b>	Subject 1.1: Definition, purpose and classification GIP	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 1.1: Portal software evolution.	<b>2</b>	<i>Information-receptive, partly search.</i>
2	<b>lecture</b>	Subject 1.2: Corporate and regional portals with an appropriate set of spatial and space data.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 1.2: 4D models for representing spatial data.	<b>2</b>	<i>Information-receptive, partly search.</i>
3	<b>lecture</b>	Subject 1.3: Typical GIP for spatial data infrastructure.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 1.3: Geoinformation portals SDI of foreign countries.	<b>2</b>	<i>Information-receptive, partly search.</i>
<b>Module 2: Development of a geoportal for access to spatial data and metadata</b>				
4	<b>lecture</b>	Subject 2.1: Use of a single digital cartographic base (and a single database) for various thematic sections.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 2.1: Metadata management subsystems.	<b>2</b>	<i>Information-receptive, partly search.</i>
5	<b>lecture</b>	Subject 2.2: Regional geoportal software architecture	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 2.2: Client-side user interface.	<b>2</b>	<i>Information-receptive, partly search.</i>
6	<b>lecture</b>	Subject 2.3: Information support and thematic services of the regional geoportal.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 2.3: Geoportal development technology based on open source software products.	<b>2</b>	<i>Information-receptive, partly search.</i>
<b>Module 3: Main groups of geoportals</b>				
7	<b>lecture</b>	Subject 3.1: General reference geoportals with metadata catalogs of the GIR infrastructure of the appropriate level.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 3.1: Google Maps.	<b>2</b>	<i>Information-receptive, partly search.</i>
8	<b>lecture</b>	Subject 3.2: Cadastral geoportals that provide access to public data of certain species cadastres with elements of e-government. Specialized sectoral geoportals by types of profile sets of State Duma and specialized services for their on-line use (ecological, tourist, etc.).	<b>2</b>	<i>Informational and illustrative, verbal.</i>

	<b>practical</b>	Subject 3.2: Google Earth.	<b>2</b>	<i>Information-receptive, partly search.</i>
9	<b>lecture</b>	Subject 3.3: Geoportals for access to digital satellite images and other ERS materials. Complex international geoportals for monitoring individual projects.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 3.3: Yandex maps.	<b>2</b>	<i>Information-receptive, partly search.</i>
10	<b>Module 4: Геосервисы</b>			
	<b>lecture</b>	Subject 4.1: Types of geoservices.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 4.1: Maps-For-Free.	<b>2</b>	<i>Information-receptive, partly search.</i>
11	<b>lecture</b>	Subject 4.2: Geoprocessing web services.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 4.2: Geoportal of Roscosmos.	<b>2</b>	<i>Information-receptive, partly search.</i>
12	<b>lecture</b>	Subject 4.3: Средства разработки т сервисов.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 4.3 DigitalGlobe.	<b>2</b>	<i>Information-receptive, partly search.</i>
13	<b>Module: Геоаналитические системы</b>			
	<b>lecture</b>	Subject 5.1: Data models in GIS.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 5.1: Космоснимки.	<b>2</b>	<i>Information-receptive, partly search..</i>
14	<b>lecture</b>	Subject 5.2: Organization and processing of information in GIS.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 5.2: Navitel.	<b>2</b>	<i>Information-receptive, partly search...</i>
15	<b>lecture</b>	Subject 5.3: Spatial data organization models.	<b>2</b>	<i>Informational and illustrative, verbal.</i>
	<b>practical</b>	Subject 5.3: Public cadastral map (Rosreestr map).	<b>2</b>	<i>Information-receptive, partly search..</i>
<b>Total hours by classroom type</b>	<b>Lectures</b>		<b>30</b>	
	<b>Practical</b>		<b>30</b>	

### 3. Student's independent work

#### 3.1. Tasks for independent work of the student

Table 3

№ SIW	Module name	The task SIW	Form of control	Duration of execution in		Deadline
				weeks	hours	
SIW 1	Module 1: Basic definitions, purposes and development prospects of portals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	1 sunday
SIW 2	Module 1: Basic definitions, purposes and development prospects of portals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	2 sunday
SIW 3	Module 1: Basic definitions, purposes and development prospects of portals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	3 sunday
SIW 4	Module 2: Development of a geoportal for access to spatial data and metadata	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	4 sunday
SIW 5	Module 2: Development of a geoportal for access to spatial data and metadata	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	5 sunday
SIW 6	Module 2: Development of a geoportal for access to spatial data and metadata	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	6 sunday
SIW 7	Module 3: Main groups of geoportals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	7 sunday
SIW 8	Module 3: Main groups of geoportals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	8 sunday
SIW 9	Module 3: Main groups of geoportals	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	1	4	9 sunday

<b>SIW 10</b>	<b>Module 4: Geoservices</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	10 sunday
<b>SIW 11</b>	<b>Module 4: Geoservices</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	11 sunday
<b>SIW 12</b>	<b>Module 4: Geoservices</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	12 sunday
<b>SIW 13</b>	<b>Module 5: Geoanalytical systems</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	13 sunday
<b>SIW 4</b>	<b>Module 5: Geoanalytical systems</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	14 sunday
<b>SIW 15</b>	<b>Module 5: Geoanalytical systems</b>	Prepare for <i>physical dictation</i> on lecture topics	physical dictation	<b>1</b>	<b>4</b>	15 sunday
<b>TOTAL HOURS</b>					<b>60</b>	

### **3.2. Independent work of a student under the guidance of a teacher**

For independent work of a student under the guidance of a teacher, 15 academic hours are allocated.

Within the framework of the SIWS hours, consultations are held on certain sections of the discipline in order to improve the quality of mastering programs, on doing homework, term papers, semester and control papers, reports and other types of SIW assignments, current and midterm controls.

#### **3.2.1 Consultation schedule**

Consultations are held individually in accordance with the schedule of independent work of students under the guidance of a teacher. The schedule is on the stand of the Department of Physics

#### **3.2.2 The rights and obligations of students to SIWS.**

1. To actively perceive the teacher's information received during the period of the introductory lessons on the academic discipline.

2. Independently, on the basis of the teacher's recommendations, study teaching aids, literary sources, do homework, control and coursework, etc.

3. Analyze and systematize your difficult situations, identify the reasons for difficulties in understanding and assimilating educational material, performing other educational activities. To be able to translate unsolvable difficulties into a system of questions for the teacher (to rank them, arrange, formalize), to build their own versions of answers to these questions.

4. Contact a teacher for advice on performing independent work (IWS), their delivery and protection, as well as for additional information on the material covered and all other emerging questions about the course being taught.

5. The student has the right not to be present in the classroom according to the schedule of consultations if the completion of assignments SIW does not cause him any difficulties. A visit to the SROP is mandatory during current and midterm controls.

#### 4. Evaluation rules. Evaluation tools and evaluation criteria for the types of controls.

##### 4.1. Evaluation rules.

- To assess the educational achievements of students, a point-rating letter system for assessing accounting is used with their transfer to the traditional rating scale.

##### Point-rating letter system for assessing the accounting of educational achievements of students with their transfer to the traditional scale of assessments and ECTS

Letter system score	Digital equivalent	Points (% content)	Assessment according to the traditional system
A	4	95-100	Excellent
A-	3,67	90-94	
B+	3,33	85-89	well
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	satisfactorily
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	
FX	0,5	25-49	unsatisfactory
F	0	0-24	

- In the course of current and midterm control of academic performance, educational achievements are assessed on a 100 point scale for each completed task or answer (response in current classes, midterm control, homework, independent work, etc.).

- The rating of the admission rating is determined by the arithmetic mean of the grades for the current and midterm controls received during the academic period.

- The final grade for the discipline includes assessments of the admission rating and final control. The assessment of the admission rating is 60% of the final assessment of knowledge in the discipline, and the assessment of the exam is 40% of the final assessment of knowledge in the discipline.

##### 4.2. Evaluation tools and evaluation criteria by type of control

Control type, duration	Evaluation tool	Evaluation criteria	Max score
Current control 1, 1 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 2, 2 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 3, 3 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50



	<b>Total</b>		<b>100</b>
Current control 4, 4 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 5, 5 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 6, 6 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 7, 7 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 8, 8 week <b>Midterm control 1, 8 weeks</b>	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 9, 9 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 10, 10 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 11, 11 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 12, 12 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50

		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 13, 13 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 14, 14 week	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
Current control 15, 15 week; <b>Midterm control 2, 15 weeks</b>	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
	physical dictation	Accurate and Logically Correct Statement of Basic Definitions	50
		All formulas are written	50
	<b>Total</b>		<b>100</b>
	<b>Final control, session</b>	<b>Exam (the task 1)</b>	Accurate and Logically Correct Statement of Basic Definitions
All definitions, formulas are written			<b>40</b>
A connection has been established between the studied and previously studied material on the discipline, as well as with the material of other subjects.			<b>20</b>
<b>Total</b>			<b>100</b>
<b>Exam (the task 2)</b>		The equation is correctly written, the formula	<b>50</b>
		Laws, theorems, equations are explained in detail	<b>50</b>
<b>Total</b>			<b>100</b>
<b>Exam (the task 3)</b>		The equation is correctly written, the formula	<b>50</b>
		Laws, theorems, equations are explained in detail	<b>50</b>
<b>TOTAL</b>			<b>100</b>

### 5. Teacher requirements

- 1) Turn off your mobile phone during classes.
- 2) Without fail, "work off" missed classes.
- 3) During the SIWS, the student can consult with the teacher, consult with the senior in the group on specific issues or work in tandem with any student of the group.

### 6. Map of educational and methodological provision of the discipline

### 6.1. List of references

Table 5

№	Название, год и место издания
Основная литература	
1.	Грузинов В.С., Потапов И.В. Сбор видеоданных об объектах местности в сети интернет М. 2012
2.	Б. Роде. «Облачные вычисления в сервисах компании DigitalGlobe», Геоматика, 2016.
3.	Берлянт А.М. Геоинформационное картографирование. – М.: 1997. -64 с.
4.	Зейлер М. Моделирование нашего мира (руководство ESRI по проектированию базы геоданных). – М.: МГУ, 2001. – 255 с.
Дополнительная литература	
5.	Сайт ГИС-Ассоциации, <a href="http://gisa.ru/">http://gisa.ru/</a>
6.	Электронная библиотека ГАГУ, <a href="http://e-lib.gasu.ru/">http://e-lib.gasu.ru/</a>
7.	Геоинформационные системы, <a href="http://www.dataplus.ru/">http://www.dataplus.ru/</a>

### 6.3. Методическое обеспечение дисциплины

Таблица 6

№	Name	Location (department, library, electronic library)
3.	УМКД по дисциплине «Веб-технологии (Агро SDI, Геопорталы, Геосервисы, Геоаналитические системы)»	Library, Electronic library, department "Physics" 311/5