KAZAKH NATIONAL UNIVERSITY AL-FARABY

PROGRAM
entrance examinations for applicants to doctoral studies
by specialty
«8D05210- NATURAL AND TECHNOGENIC RISKS»

2020

The program is made in accordance with the Educational program in the specialty "**«NATURAL-TECHNOGENIC RISKS».** The program is made by doctor of science, prof., Koshim A. G., prof. Bekseitova R. T.

The program is considered at the meeting of the Department of cartography and Geoinformatics of the faculty of geography and nature management
Protocol No. 39 dated _16 June 2020

Head of Department _____ Kasymkanova H. M.

Approved at the meeting of the method Bureau of the faculty of geography and environmental management
Protocol no. _8_ of __19 June 2020

The Chairman of the methodical Bureau _____ O.Zh.Sagymbay

Approved at the meeting of the Academic Council of the faculty
Protocol No. 8 of June 19, 2020

Dean of the faculty of geography
and environmental management _____ Salnikov V. G.

Academic Secretary _____ Abdreeva Sh.T.

Academic Committee Meeting
Minutes No._6__ of June 22, 2020

<div align="center">**CONTENT**</div>

<div align="center">**THE PROGRAM ENROLLED ON THE BASIS OF STATE EDUCATIONAL STANDARDS ON SPECIALTIES "GEOGRAPHY", "ECOLOGY", "HYDROLOGY", "METEOROLOGY", "CARTOGRAPHY»**</div>

1. The purpose and objectives of the entrance exam in the specialty "Natural and technogenic risks."

The purpose of the entrance exam is to identify undergraduates degree of theoretical training. During the examination, candidates must demonstrate a good level of knowledge on all major topics of geographical science: physical, economic, social and political geography, Geoecology, geomorphology and cartography. Candidates must also possess the skills to work with digital maps.

The objective of the program is a comprehensive assessment of knowledge in the main compulsory disciplines of the magistracy to identify their abilities to research work. The entrance exam includes sections on geology, seismology, glaciology, cartography, management of natural and man-made risks and monitoring of natural and man-made systems, studied under the master's program. The form of the entrance examination is a combined written and oral examination. Examiners write down their answers to the questions of the examination ticket on the answer sheets, answer the examination Committee orally. In case of appeal, the basis for consideration is written records in the answer sheet.

2. Requirements for the level of training of persons entering the doctoral PhD

The applicant must have a document of the state sample of the corresponding level of higher basic education (master's degree) in the direction (specialties).

Previous minimum level of education of persons entering the PhD doctoral-master's degree: 7M05203 – Geography; 7M05209 - Geoecology and environmental management; 7M05206-Hydrology; 7M05207-Meteorology; 7M05211-Ecology; 7M07303 - Cartography.
The applicant must have the following competencies:

- to build a systematic understanding of the methods of study, information support of research in the field of geographical science for integration into the inter-sectoral scientific space;

- to find methodological and technological solutions to the scientific problem in new and unfamiliar contexts for the integration of geography in the interdisciplinary sphere of scientific production;

- to be ready to take independent decisions in case of difficult emergency situations and to convince the opponents o the correctness of the adopted methods of addressing the causes.

3. Prerequisites of the educational program:
 – **SPGS 5206** "Modern problems of Geology and seismology" - 5 credits,
 – **APGOK 5208** "Actual problems of mountain glaciation of Kazakhstan" -5 credits.
 – **UPTR 6308** "Managing natural and technological risks" – 5 credits
 – **MORG6309** "Monitoring and evaluation of regional geosystems" - 5 credits

4. List of examination topics

<div align="center">**Discipline "Modern problems of Geology and seismology»**</div>

The importance of Geology and seismology for human economic activity. Geological component of the environment - Geoecology or ecogeology. The task of theoretical Geology is to create a theory of the origin and development of the Earth. Plate-tectonic paradigm, theory of

mantle jets, deep geodynamics of the Earth. Global geodynamic models taking into account convective and advective heat and mass transfer, reduction of endogenous activity, openness of the Earth system. Influence of space and anthropogenic factors on the activity and dynamics of seismic processes. Earthquakes and their consequences. Spatial modeling of geodynamic processes – as a method of studying and predicting the dangers associated with the formation and use of natural and technogenic systems.

5. List of recommended literature

5.1 Basic literature:
1. Добровольский, В.В. Геология: Учеб. для вузов. – М.: ВЛАДОС, 2006.- 320 с.
2. Жарков В.Н. Внутреннее строение Земли и планет. – М.: Наука, 1982.
3. Зоненшайн Л.П., Кузьмин М.И. Палеогеодинамика. М., Наука, 1993. 192 с.
4. Лобковский Л.И., Никишин А.М., Хаин В.Е. Современные проблемы геотектоники и геодинамики. М.: Научный мир, 2004. 611 с.
5. Хаин В.Е., Ломизе М.Г. Геотектоника с основами геодинамики. М.: КДУ, 2005. 560 с.
6. Аки К., Ричардс П. Количественная сейсмология. Пер. с англ. / М.: Мир. 1983.
7. Арефьев С.С. Эпицентральные сейсмологические исследования. М. Академкнига, 2003, 376с.
8. Завьялов А.Д. Среднесрочный прогноз землетрясений: основы, методика, реализация / М. Наука. 2006.
9. Ивакин Б.И. Методы моделирования сейсмических волновых явлений М. Наука. 1969.
10. Костров Б.В. Механика очага тектонического землетрясения М. Наука. 1975.
11. Моги К. Предсказание землетрясений. Пер. с англ. М.: МИР. 1988. – 382 с.
12. Сейсмическое районирование территории СССР. Методические основы и региональное описание карты 1978 г. М.: Наука, 1980. 307 с.

5.2 Additional literature:
1. Артюшков Е.В. Физическая тектоника. – М.: Наука, 1993
2. Белоусов В.В. Геотектоника. – М.: Изд-во МГУ, 1997.
3. Гзовский М.В. Основы тектонофизики. М.: Наука. 1975
4. Короновский Н.В, Демина Л.И. Магматизм - как индикатор геодинамических обстановок. — Книжный дом "Университет" Москва, 2011. — С. 232.
5. Проблемы глобальной геодинамики / под ред. Д.В. Рундквиста. – М.: ГЕОС, 2000.

Discipline "Actual problems of mountain glaciation of Kazakhstan»

Conditions of formation of the Nival-glacial zone of mountain systems of Kazakhstan. Types of glaciers and snowfields of Kazakhstan and the nature of their spatial distribution. Current state and dynamics of the glacial-Nival zone of Kazakhstan. Climatic and anthropogenic component of the state and dynamics of mountain glaciers and snowfields in Kazakhstan. Snowfalls and avalanches. Cartographic modeling of the Nival-glacial zone as a basis for monitoring the status and dynamics of glaciers and snowfields.

5.3 Basic literature:
1. Қазақ университеті, 2003. - 112с.
2. Вилесов Е.Н., Уваров В.Н. Эволюция современного оледенения Заилийского Алатау в XX веке. - Алматы: Қазақ университеті, 2001. - 252 с.
3. Бадд У.Ф. Динамика масс льда. Л., Гидрометеоиздат, 1975.
4. Дюргеров М.Б. Мониторинг баланса массы горных ледников. М., Наука, 1993.
5. Долгушин Л.Д., Осипова Г.Б. Пульсирующие ледники. Л., Гидрометеоиздат, 1982.
6. Калесник С.В. Очерки гляциологии. М., Географгиз, 1963.

7. Патерсон У.С.Б. Физика ледников. Пер. с англ. Изд-во "Мир", 1984 (2-е изд.).

5.4 Additional literature:

1. Вилесов Е.Н., Уваров В.Н. Мониторинг оледенения Северного Тянь-Шаня во второй половине XX века // Международная конференция «Мониторинг криосферы», 20-23 апр. 1999 г. - Пущино, 1999. - С.69-70
2. Вилесов Е.Н., Морозова В.И. Динамика современного оледенения бассейна р. Казан, Джунгарский Алатау // Вестник КазГУ Сер. географическая. - 2000. - №2(11). - С.3-9.
3. Вилесов Е.Н., Уваров В.Н., Ударцев С.В. Использование ГИС-технологий для изучения ледниковых систем //докл. к междунар. конф. - Алматы, 2000. - С.204-208.
4. Вилесов Е.Н. Деградация оледенения гор Южной Джунгарии во второй половине XX века // XIII Гляциологический симпозиум «Сокращение гляциосферы: факты и анализ»: тез. докл. - СПб., 2004. - С.51-52.
5. Будыко М.И. Климат в прошлом и будущем. Л, Гидрометеоиздат, 1980.
6. Кренке А.Н. Массообмен в ледниковых системах на территории СССР. Л., Гидрометеоиздат, 1982.
7. Оледенение Северной и Центральной Евразии в современную эпоху (под ред. .М.Котлякова). М., «Наука», 2006.
8. Тушинский Г.К. Ледники, снежники, лавины Советского Союза. М., Географгиз, 1968.

Discipline "Management of natural and technogenic risks»

Natural, natural - technogenic and technogenic danger and risk – the essence and basic concepts. Factors, conditions and types of formation of natural and technogenic risks. Dust storm. Floods and flooding are their environmental consequences. Landslides, landslides and their impact on the terrain. Sat down and their consequences.

Principles of mapping of natural and technogenic hazards and risks. Economic damage and environmental insurance. Assessment of natural and technogenic hazards and risks according to remote sensing data. Methods of assessment mapping of different types of risks and hazards. Fundamentals and potential of natural and technogenic risk management capabilities.

5.5 Basic literature::

1. Чернова Г.В.. Управление рисками: учебное пособие .— М. : Проспект, 2009 .— 158 с.
2. Алымов В.Т.. Техногенный риск: Анализ и оценка : учебное пособие для вузов— М.: Академкнига, 2004 .— 118 с.
3. Кунин В. А. Управление рисками промышленного предпринимательства (теория, методология, практика). — СПб.: Изд-во Санкт-Петербургской академии управления и экономики, 2011. — 184 с.; ил.
4. Малкин В.С. Надежность технических систем и техногенный риск : учебное пособие для вузов.— Ростов-на-Дону : Феникс, 2010 .— 433 с.
5. Тихомиров Н.П. Методы анализа и управления эколого-экономическими рисками : Учеб. пособие для вузов.— М.: ЮНИТИ, 2003 .— 350 с.
6. Башкин В.Н.. Экологические риски: расчет, управление, страхование : учебное пособие.— М. : Высш. шк 2007 .— 358 с.,

5.6 Additional literature:

1. Предупреждение и ликвидация чрезвычайных ситуаций. Учебное пособие. Под ред. Ю. Л. Воробьева, М.: 2009 г.
2. Мастрюков Б.С. Безопасность в ЧС. «Академия», 2009 г.
3. Мастрюков Б.С. Безопасность в ЧС в природно-техногенной сфере. Прогнозирование последствий. «Академия», 2011 г.

4. Северцев Н.А. Системный анализ и моделирование безопасности: учебное пособие для вузов.— М. : Высш. шк., 2006 .— 462 с.
5. Гуськов А.В. Надежность технических систем и техногенный риск: учебник;— Новосибирск: Изд-во НГТУ, 2007 .— 426с.
6. Фомичев А.Н. Риск-менеджмент : учебное пособие - М.: Дашков и К, 2004 .— 291 с.
7. Анализ и оценка риска производственной деятельности : учебное пособие для вузов.— М.: Высш. шк., 2007 .— 327 с.

Discipline "Monitoring and evaluation of regional geosystems»

Theoretical and methodological basis for monitoring the ecological state of regional geosystems. The essence, principles, basic concepts, objects, content, methods and organization of the study of regional geosystems. Innovative methods of monitoring the ecological state of regional geosystems. Preparation of multiscale geoecological assessment and forecast maps of regional geosystems. Applied aspects of research and evaluation of regional geosystems - regulation of their condition and assessment of resource potential, optimization of the environment, development of monitoring programs of geosystems in the area of influence of large engineering structures (nuclear power plants, reservoirs, etc.). Aerospace monitoring. The concept of remote sensing. The use of aircraft for monitoring of regional geosystems. Unmanned aerial vehicles and their application in environmental monitoring. Space monitoring.

5.7 Basic literature:

1. Дмитриенко, В. П. Экологический мониторинг техносферы: учебное пособие. - СПб.: 2012. - 368 с.
2. Экологический мониторинг: учебное пособие для преподавателей, студентов, учащихся / Под ред. Т. Я. Ашихмина. - М : Академический проект, 2008. - 416 с.
3. Дмитриенко, В. П. Экологический мониторинг техносферы: учебное пособие. - СПб.: 2012. - 368 с.

5.8 Additional literature:

1. Околелова А.А., Егорова Г.С. Экологический мониторинг: учебное пособие для студентов высших учебных заведений Волгоград: ВолгГТУ, 2014
2. Экологический мониторинг: учебное пособие для вузов. Старый Оскол: ТНТ, 2014. – 232 с.
3. Экологический мониторинг и экологическая экспертиза: учебное пособие / под ред. М. Г. Ясовеева. – Москва; Минск: Инфра-М Новое знание, 2013. – 303 с.

6. Knowledge assessment scale

Score by letter system	Digital equivalent of points	Percentage	Score according to the traditional system
A	4,0	95-100	Perfectly
A-	3,67	90-94	
B+	3,33	85-89	Good
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	Satisfactory
C	2,0	65-69	
C-	1,67	60-64	
D+	1,33	55-59	
D-	1,0	50-54	
F	0	0-49	Unsatisfactory

During the examination, the following criteria for assessing knowledge are established:

Assessment "excellent" – in-depth comprehensive knowledge of all program material, understanding of the nature and relationship of the processes and phenomena under consideration, solid knowledge of the main provisions of the disciplines: logically consistent, meaningful, complete correct and specific answers to all questions of the examination card and additional questions of the members of the examination Committee; use to the extent necessary in the answers to questions of the materials of all recommended literature.

Evaluation "good" – a solid and fairly complete knowledge of all the software material, the correct understanding of the nature and relationship of the processes and phenomena; consistent, correct, specific answers to the questions with the free elimination of comments on individual issues.

Assessment "satisfactory" – a solid knowledge and understanding of the main issues of the program, correct and specific, without gross errors answers to questions in the elimination of inaccuracies and minor errors in the coverage of certain provisions in the leading questions of the examiners, the answers to the questions of the main recommended literature is not used enough.

A rating of "poor" is the wrong answer to at least one of the main issues of gross error in the response, misunderstanding of the nature of the stated issues; uncertain and imprecise answers to additional questions.