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**Study of master's degree students on sustainable innovative development**

New approaches for study of master's degree students on Sustainable Development in Al-Farabi Kazakh National University are considered. Methodology based on scientific developments of International University of Nature, Society and Man "Dubna". Educational and Methodical complexes of disciplines for Individual Educational Trajectory "Project management of Sustainable Innovative development" have been developed for specialty 6M060804 – Ecology.

**Keywords:** master's degree program, individual educational trajectory, curriculum, Structural and logical scheme of the study program, sustainable innovative development, ecology.

Т.Л. Тәжібаева, Е.Ф. Шамаева, С.Е. Полякова

**Инновациялық тұрақты даму бойынша магистранттарды дайындау**

Әл-Фараби атынағы Қазақ ұлттық университетінің магистратурасында тұрақты даму бойынша мамандарды дайындау үшін, «Дубна» халықаралық табиғат, қоғам және адам университетінде ғылыми-әдістемесіне негізделген жаңа тәсілдер қарастырылды. 6M060804 – экология мамандығы бойынша жеке білім траекториясы «Тұрақты инновациялық дамудың жобалық басқаруы» оқу-әдістемелік кешені дайындалды.

**Түйін сөздер:** магистрлік бағдарлама, жеке білім траекториясы, оқу жоспары, құрылымды-логикалық сызбанұсқа білім бағдарламалары, тұрақты инновациялық даму, экология.

Т.Л. Тәжібаева, Е.Ф. Шамаева, С.Е. Полякова

**Подготовка магистрантов по устойчивому инновационному развитию**

Рассматриваются новые подходы для подготовки специалистов по устойчивому развитию в магистратуре Казахского национального университета имени аль-Фараби, основанные на научно-методологических разработках Международного университета природы, общества и человека «Дубна». Разработан учебно-методический комплекс индивидуальной образовательной траектории «Проектное управление устойчивым инновационным развитием» по специальности 6M060804 – экология.

**Ключевые слова:** магистерская программа, индивидуальная образовательная траектория, учебный план, структурно-логическая схема образовательной программы, устойчивое инновационное развитие, экология.

Knowledge based – society is an important part of Sustainable Development. In this regard, relevant training on the new format of environmental specialists for the applying of innovations in various areas of industry and the service technology is very actual. Professionals need to be highly skilled, creative managers, whose activities are «focused on results» [1-3].

The particular importance is the training of professionals for the effective implementation acquires Global Energy Strategy for Sustainable Development in the XXI century and major initiative "Green Bridge" put forward by the President of the Republic of Kazakhstan N.A. Nazarbayev [4]. At the International Conference on Sustainable Development "Rio +20" in 2012 the Al-Farabi Kazakh National



University (Al-Farabi KazNU) had a special section "Green Bridge through generations" related to study in the field of Sustainable Innovative Development and based on global experience of leading scientific schools [5].

New approaches and tools are using for this purpose within the framework of a joint research project with scientists from International University of Nature, Society and Man "Dubna" (Moscow, Russia). They have significant scientific results and practical experience for implementation to study programs for such professionals. Research works of P.G.Kuznetsov, O.L.Kuznetsov, B.E. Bolshakov and other scientists laid the foundation for postgraduate programs on Sustainable Innovative Development [6-8].

According to the concepts of Scientific School of "Dubna" University Sustainable Development is considered on the basis of general laws of nature. For the first time the universal principle of the synthesis of diverse natural, technical and social science is formulated in the system of LT-indexes (LT-synthesis principle). The use of LT - the principle in physics, chemistry, biology, ecology, technology, economics and humanities creates a theoretical, scientific and methodological basis for training on Sustainable Development. Modern specialists must be able to adequately assess and predict Sustainable

Development of Mankind in the interaction with Nature, that is, in the "Nature-Society-Man." Currently there are developed new courses for master's degree program that incorporates elements of G.Krohn tensor analysis, methodology and projection technology, monitoring and evaluation of innovations for Sustainable Development, questions of Regional Sustainable Development/

Study of Master's degree students on Sustainable Innovative Development in Al-Farabi KazNU is realized at the Department of Energy & Ecology, Faculty of Geography and Natural Management. The fundamentals of the master's degree program on Sustainable Innovative Development are prepared on the multidisciplinary level [9]. We have identified professional competencies for Master's Training aimed at meeting the needs of various sectors of the economy and industry of the Republic of Kazakhstan [10].

New Curriculum for specialty 6M060804 - Ecology with the study program "Project management of Sustainable Innovative Development" has been developed. Duration of Study is 2 years, the training form - full-time. Curriculum has been completed on three languages - Kazakh, Russian and English.

Structural and logical scheme of study program with General and Subject competencies is attached to the Curriculum (fig.1).

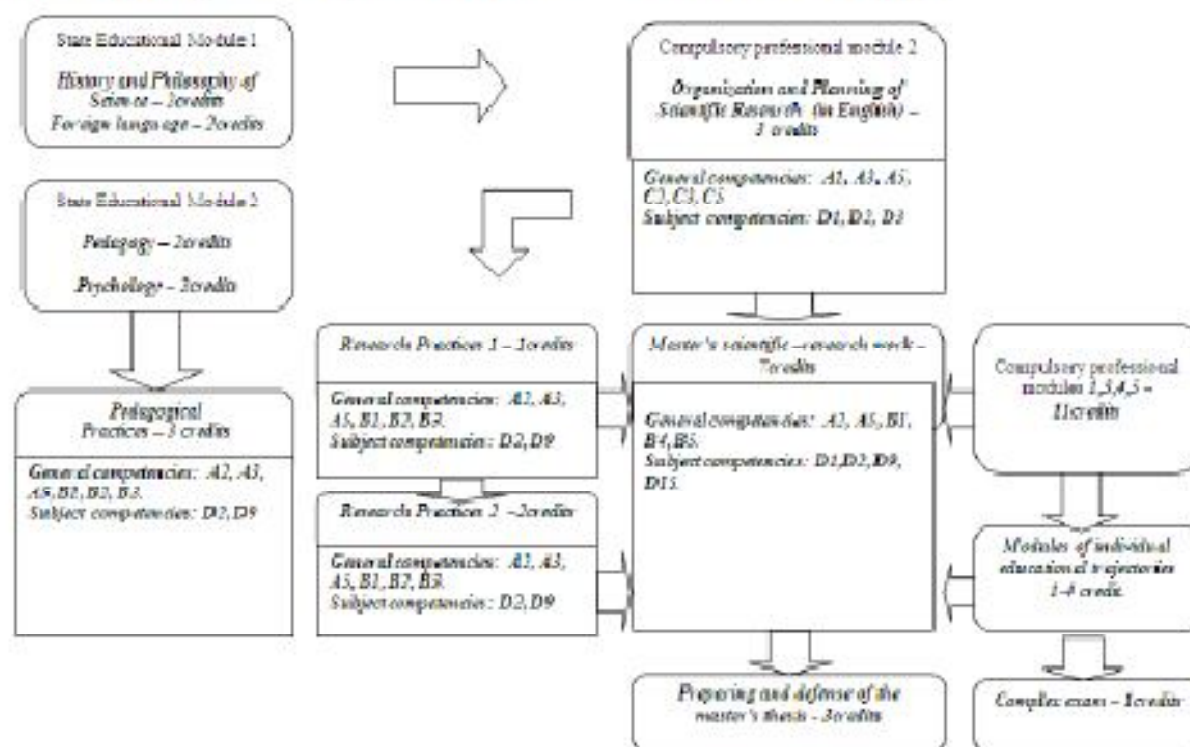


Figure 1 - Structural and logical scheme of the study program

Compulsory component includes theoretical training in the amount of 42 credits (63 ECTS); II. Additional types of study consist of 13 credits (19,5 ECTS); III. Final assessment includes 4 credits (6 ECTS).

Compulsory component combines of 3 units (blocks): Stare Educational Modules (8 credits), Compulsory Professional Modules (14 credits) and Modules of Individual Educational Trajectories (20 credits).

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Additional types of study consist of 13 credits (19,5 ECTS); III. Final assessment includes 4 credits (6 ECTS).

Compulsory component combines of 3 units (blocks): Stare Educational Modules (8 credits), Compulsory Professional Modules (14 credits) and Modules of Individual Educational Trajectories (20 credits).

The content of Individual Educational Trajectory "Project management of Sustainable Innovative Development" is shown in Table 1.

**Table 1** - Individual Educational Trajectory "Project management of Sustainable Innovative Development"

| Module code | Module name                                                             | Discipline code | Discipline name                                                                                          | Credits L+P+Lb | Sem |
|-------------|-------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------|----------------|-----|
| MIET 1      | History, Geography and world-outlook of Sustainable Development         | IGUR 5301       | History and Geography of Sustainable Development                                                         | 2<br>1+1+0     | 2   |
|             |                                                                         | MCIUR 5302      | World-outlook, values and ideals of Sustainable Development                                              | 2<br>1+1+0     | 2   |
| MIET 2      | Scientific Basics of Sustainable Development                            | TMPURSEES 6303  | Theory and Methodology of Sustainable Development Projection for Social, Economic and Ecological Systems | 3<br>2+1+0     | 3   |
|             |                                                                         | SPNU 6304       | Modern Problems of Scientific Management of Sustainable Development                                      | 2<br>1+1+0     | 3   |
| MIET 3      | Management for Sustainable Development                                  | TPURSEES 6305   | Project Technology of Sustainable Development for Social, Economic and Ecological Systems                | 3<br>2+1+0     | 3   |
|             |                                                                         | MPFUR 6306      | Mechanism of project financing of Sustainable Development                                                | 3<br>2+1+0     | 3   |
| MIET 4      | Sustainable Innovative Development in Regions, Branches and Enterprises | PROUR 6307      | Regional and Branch projection of Sustainable Innovative Development                                     | 3<br>2+1+0     | 3   |
|             |                                                                         | SESDP 6308      | Scientific expertise of Sustainable Development projects.                                                | 2<br>1+1+0     | 3   |

There are developed Educational and Methodical complexes of main professional disciplines, which consist of syllabus, lecture notes, guidelines for conducting practical classes and Individual student's works (ISW). All materials will be posted in the Web-System «Univer» of Al-Farabi KazNU - <http://univer.kaznu.kz>.

[univer.kaznu.kz](http://univer.kaznu.kz).

Below we present the fragment of study course's catalog on Individual Educational Trajectory "Project management of Sustainable Innovative development" for specialty 6M060804 - Ecology (table 2).

**Table 2** – Brief description of some study courses on Individual Educational Trajectory "Project management of Sustainable Innovative Development"

|                       |                                                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|
| Module name :         | HISTORY, GEOGRAPHY AND WORLD-OUTLOOK OF SUSTAINABLE DEVELOPMENT                                                      |
| Department:           | Energy & Ecology                                                                                                     |
| Module labor content: | 4                                                                                                                    |
| Discipline 1:         | History and Geography of Sustainable Development                                                                     |
| Lecturer:             | Bolshakov B.E., Doctor of Science (Technical), Professor<br>Salmikov V. G., Doctor of Science (Geography), Professor |



|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Number of credits:</b>                     | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Semester:</b>                              | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Pre-requisites:</b>                        | Ecology, Ecology and Sustainable Development, Industrial Ecology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Abstract:</b>                              | <p>There are being considered a questions: emergence and formation of the concept of «sustainable development» in world politics and science; the definition and method of sustainable development projection in the «nature - society - man»; outstanding discoveries and their role in the sustainable development of society; the methodological background projection of complex social, economic and environmental systems, technology megatrends on the example of the world.</p> <p>We study the outstanding scientific discoveries and their role in the sustainable development of the world in the writings of I. Kant, G.Gegel, J. Kepler, R. Klauzius, N.Burbaki, O.Veblen, A.Lebeg, A.Einstein, N.Lobachevsky, C.Podolinsky, V.Vernadsky, E.Bauer, G.Krohn, R.Bartini, P.Kuznetsov and others.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Learning outcomes of the discipline1:</b>  | <p>As a result of the discipline master's degree student must be able to perform the following work (learning outcomes):</p> <ul style="list-style-type: none"> <li>• know the subject and method of design for sustainable development in the «nature - society - man»;</li> <li>• be able to analyze the outstanding scientific discoveries and the laws of nature for the sustainable development of society;</li> <li>• identify the methodological assumptions and possess the skills of designing the development of complex systems.</li> </ul> <p>The results of the discipline development are being determined by the ability to apply knowledge, skills and personal qualities in accordance with applied problems of professional activities, including:</p> <ul style="list-style-type: none"> <li>• independently develop new methods of research in the field of project management for sustainable development of innovative social, economic and ecological systems;</li> <li>• transfer expertise with foreign languages;</li> <li>• to evaluate the new results obtained by foreign and domestic researchers to identify the current scientific challenges in the field of sustainable energy and ecological innovation and development.</li> </ul> |
| <b>Discipline 2:</b>                          | <b>World-outlook, values and ideals of Sustainable Development</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Lecturer:</b>                              | Bolshakov B.E., Doctor of Science (Technical), Professor<br>Sainikov V. G., Doctor of Science (Geography), Professor<br>Tazhibayeva T.L., Candidate of Science (Biology), Associate Professor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Number of credits:</b>                     | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Semester:</b>                              | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Pre-requisites:</b>                        | Ecology, Ecology and Sustainable Development, Industrial Ecology                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Abstract:</b>                              | <p>The purpose of course is to give students the philosophical foundations, bridges the gap between professional knowledge in the field of regional and branch development, values aimed at the sustainable development of an innovative society.</p> <p>There are being studied: history and world-outlook of sustainable development as an integrated system of scientific knowledge about the system «nature - society - human»; philosophical, mathematical, science and human foundations for sustainable world development; sustainable development with the fundamental laws of nature; scientific knowledge about sustainable development; the position of the Research School of Sustainable Development for the conceptual projection of such a system.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Learning outcomes of the discipline 2:</b> | <p>As a result of the discipline master's degree student must be able to perform the following work (learning outcomes):</p> <ul style="list-style-type: none"> <li>• know the structure of the scientific world and scientific knowledge;</li> <li>• own philosophical, mathematical, natural science basics philosophy of sustainable development;</li> <li>• be able to solve the problem of synthesis of scientific knowledge about the system «nature - society - human».</li> </ul> <p>The results of the discipline development are being determined by the ability to apply knowledge, skills and personal qualities in accordance with applied problems of professional activities, including:</p> <ul style="list-style-type: none"> <li>• independently develop new methods of research in the field of project management for sustainable development of innovative social, economic and ecological systems;</li> <li>• change the profile of the professional activity;</li> <li>• apply the laws of conservation and development in the «nature - society - human» for the projection of sustainable development.</li> </ul>                                                                                                                             |

Pre-requisites for  
disciplines 1 & 2:

Theory and methodology of sustainable development projection for social, economic and ecological systems; Modern problems of scientific management of Sustainable Development; Project technology of sustainable development for social, economic and ecological systems; Mechanism of project financing of sustainable development; project financing mechanisms for sustainable development; Regional and branch projection of sustainable innovative development; Scientific expertise of sustainable development projects.

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