SILLABUS

of discipline «Genetically engineering»

preparation direction of specialty «5B070100 - Biotecnology» for bachelor course

3– course, 6 - semester, credit number – 3

# Almaty, 2016

## Standard of study program has composed by Al Faraby Kazakh National University

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## Annotation

Study of methodical case on discipline «Genetically engineering» of preparation direction of specialty «540850 - biology» for bachelor course has to create by corresponding of GOSO-RK request. The discipline to give for student information about genetic engineering technology use and control methods and negative effects on genome inside country also, but and adjoining country, which is used of genetically resources and biotechnology methods by request of convention in accordingly of country law. Main aims are using of modern biotechnology methods to conservation and sustainable genetically resources of biodiversity components Republic of Kazakhstan and to take economical issue, to improving of nature using strategy, law aspects and financial system. It is the issue the role of genetically engineering technology into Kazakhstan to genetically and biologically resources conservation global strategy.

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By professional preparation bachelor of biotechnology must be:

**Have theoretical performance:** about main problems and advances of modern biology and genetics; gene and chromosomal engineering new methods

**to know:** the principles of measurement systems and their using; basic standards of document preparation; international standards of genetically engineering management; main problems and advances of modern biotechnology; the research methods, which used in chromosomal and gene engineering now ability; real mathematic and statistical methods for treat of experimental dates; the principles of quality standards and technical improving of control and safety systems of environment, the principles of effectively using nature resources,

 **to be able:** to decision of real objectives and methods elect; elect of real mathematic methods to treat of information; to able of prognozing of results of professional activity; integrate of knowledge, make conclusion inside professional activity;

**have an experience:** provide genetically researches; employed of knowledge for creative decision of biotechnology problem;

**to be comprehensive activity:** in scientific technology which used of genetically researches ; at the methods elect for assessment of genome stability; to decision of applied professional problems in biotechnology, biodiversity conservation in management decision; in problem of informatics search;

**Prerequisites.**  Actually, The discipline to give for student information about general biology and genetics, bioresource use and control methods and negative effects on genetically sustainability and diversity inside country also, but and adjoining country, which is used of genetically resources and biotechnology methods by request of convention in accordingly of country law. Main aims are to protection of genetically and biologically resources, conservation and sustainable using of biodiversity components Republic of Kazakhstan and to take economical issue, to improving of nature using strategy, law aspects and financial system.

 **Adjacent disciplines:**

«General ecology, «General genetics», «Human genetics and sustainable development of society», «Biological diversity of plants, animals», «Ecologically genetics education and viewpoint».

**DISCIPLINE OF CONTENT AND STRUCTURE**

|  |  |  |  |
| --- | --- | --- | --- |
| weeks | Title of lecture | hours | balls |
| **Мodule 1 History, study methods and modern advances of genetically engineering**  |
| 1 | Lecture 1. History, study methods of genetically engineering | 1 |  |
| Seminar 1. To view of chromosomal and gene engineering methods. (morphological, cytogenetically and molecular-genetically) | 2 |  |
| 1 HSW |  |  |
| 2 | Lecture 2. Theoretical issue of fundamental aspects of genetically engineering technology: (chromosomal - gene engineering methods). | 1 |  |
| Seminar 2. To view of creation genetically engineering. | 2 |  |
| HSW 2 |  |  |
| 3 | Lecture 3. Modern genetically methods of selection.  | 1 |  |
| Seminar 3. View of cell engineering experimental issue basic to plants and animals selection. | 2 |  |
| HSW 3 |  |  |
| **Module 2** Genetically evaluable of organisms by chromosomal and gene engineering. |  |
| 4 | Lecture 4. Genetically basic of hereditary and in hereditary evaluable. Individual and groups evaluable.  | 1 |  |
| Seminar 4. View the methods of changing and addition of separate chromosome and gene analyses.  | 2 |  |
| HSW 4 |  |  |
| 5 | Lecture 5. Principles and methodology of the introduction of additional chromosome and getting new forms and supplemented line. | 1 |  |
| Seminar 5. Consider the introduction of instructional techniques into the genome of a particular species or varieties of any additional pairs of chromosomes of another species. | 2 |  |
| HSW 5 |  |  |
| 6 | Lecture 6. Changing dynamics of ecosystems. | 1 |  |
| Seminar 6. The role of genetic engineering methods in coherent and incoherent evolution. | 2 |  |
| HSW 6 |  |  |
| 7 | Lecture 7. Monitoring studies on the stability of biological systems as a result of the application of engineering technology. | 1 |  |
| Seminar 7. Selections principles in evolutionary theory. Biocenotically crises and their causes, as a result of genetic engineering. | 2 |  |
| HSW 7 |  |  |
|  |  |  |
| **1 midterm** |  | **30** |
| **Module №3.The role of genetically engineering modern advances for sustainable development of natural populations genome (plants, animals, human) and ecosystem in general.**

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| --- | --- | --- | --- |
| 8 | Lecture №8. Species, as a main carrier of evolution by Vernandstys theory and its influence on modern technology`s sustainability. | 1 |  |
| Seminar №8. Factors and driving forces of speciation in modern conditions, application of genetic engineering methods. | 2 |  |
| 9 | Lecture №9. Systems community as a elementary carrier of evolution process. | 1 |  |
| Seminar №9. Influence of community to the evolution. Modification of internal and external environmental factors on community and society. | 2 |  |
| Students independent work – 9 SIW |  |  |
| 10 | Lecture №10. Internal and external factors of historical climatic change and they’s role in organic evolution. | 1 |  |
| Seminar №10. Climate, climatic and environmental change mechanisms, models of biologically systems sustainable development. | 2 |  |
| Students independent work  |  |  |
| 11 | Lecture №11. Genetic engineering – artificial change of necessary organisms (bacteria, animals, plants) to another species | 1 |  |
| Seminar №11. To consider the methods and ways of genes change (transgenic) | 2 |  |
| Students independent work  |  |  |
| 12 | Lecture №12. Principles of separation from bacteria, animals or plants genes for change or artificial synthesis of necessary genes. | 1 |  |
| Seminar №12. To consider the methods of creation the special genetic constructions (vectors), in which separated genes will introduce in another genes.  | 2 |  |
| Students independent work –  |  |  |
| 13 | Lecture №13. Transgenic plants and animals which changed in genetic operations. | 1 |  |
| Seminar №13. To get acquainted with genes – promoters, terminators, and genes reporters, wich change the genes. | 2 |  |
| Students independent work  |  |  |
| 14 | Lecture №14. Ti – plasmids of Acrobacterium tumefasiens ground bacteria, which carry the gene of protein – toxic and introduction in plant cells (ONA of plants). | 1 |
|  | Seminar №14. Use of to create the form of useful agricultural plants, sustainable for harmful insects | 2 |  |
| Students independent work  |  |  |
| 15 | Lecture №15. New methods of selection chimerical or transgenic animals and role of genes in cell differentiation and regulation of interaction between cells in process of development. | 1 |  |
| Seminar №15.To carry out the review of experimental methods of obtain into bally extraordinary animals, which one father and mother, but more than one quantify of parents. (chimerical animals) | 2 |  |
| Students independent work  |  |  |

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|  | **2 midterm**  |  | **30** |
| **Exam** |  | **40** |
|  | **Total** |  | **100** |
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**LITERATURE**

**Basic:**

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 **Resource of internet**

* + Electronic handbook. Режим доступа: <http://books4study.biz/c16>
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