

## **Theoretical and Applied Aspects of Plant and Microorganism Genetics**

1. Lecturer: Vinnikova Olha Ivanivna, associate professor of the department of plant and microorganism physiology and biochemistry.
2. Status: optional for masters.
3. Course, semester: 2th academic year, 3th semester.
4. Number of credits – 5, general academic hours – 150, lectures – 40; seminars – 12; labs and practices – 20; self-study – 78.
5. Preliminary requirements: basics of Biochemistry, Microbiology, Genetics, Biotechnology, Molecular Biology, Plant Physiology and Biochemistry
6. Description of the course: the course "Theoretical and applied aspects of plant and Microorganism Genetics" is integrative. Within the course the methods of constructing hybrid cells by protoplast fusion are discussed. The course describes potential vectors, plant transformation methods using vectors that allow obtaining DNA with a new desirable combination of genes for crop production. Transgenic methods and detection of transgenic plants are highlighted. The main areas of biotechnology research as well as specific, significant achievements of genetic engineering in addressing important issues of the economy. Within the course the features of genetic apparatus and biological bases of variability of prokaryotes are discussed, use of all types of variation of prokaryotes for recombinant DNA technology, gene engineering and compiling genetic maps of chromosomes. Based on the theoretical data the course includes a use of modern methods for genetic engineering of microorganisms to construct microbes with programmed properties, and various areas of their use.

Sections: 1) cell engineering; 2) vectors and genetic transformation of plants; 3) Features of genetics of prokaryotes, variability of bacteria and archaea; 4) genetics of viruses; 5) genetic engineering of plants and microorganisms.

### Knowledge and skills:

- Knowledge of the genetic apparatus of plants, prokaryotes and viruses, nature and mechanisms of variability of prokaryotes, methods used to study the genome of plants, prokaryotes and viruses;
- Knowledge of methods of somatic hybridization and methods of using plant transformation vectors;
- Knowledge of methods of selection of genetically modified plants and proving them to be transgenic;
- Understanding of the nature and the ways to apply genetic engineering and manipulation using microorganisms;
- Ability to apply theoretical knowledge of genetics and genetic engineering of microorganisms in the performance of duties on the basis of biology.

7. Course organization: lectures, seminars, practices. Forms of control: tests, lab protocols, exam.
8. Language: Ukrainian.
9. Educational and methodological support: program, schedule of classes, educational and multimedia presentations, methodical complex, guidelines for practice.

### Studentbooks:

1. *Божков А.И.* Биотехнология. Фундаментальные и промышленные аспекты.-2008.-Изд-во Федорко М.Ю. 363 с.
2. *Пиневич А.В.* Микробиология: біологія прокариотів: Т. 3. – СПб: Изд-во С.-Петербур. ун-та, 2009. – 457 с.
3. *Генная инженерия растений. Лабораторное руководство*: Пер. с англ. /Под ред. Дж. Дрейпера, Р. Скотта, Ф. Армитиджа.- М.: Мир, 1991. 408 с
4. *Глик Б., Пастернак Дж.* Молекулярная биотехнология. Принципы и применение. – М.: Мир, 2002. – 589 с.
5. *Патрушев Л.И.* Искусственные генетические системы. – М.: Наука, 2004. – 176 с.
6. *Современная микробиология.* Прокариоты: в 2т. / Под ред. Й Ленгелер, Г. Древис и Г. Шлегель. – М.: Мир, 2005.
7. *Щелкунов С.Н.* Генетическая инженерия. – Новосибирск: Сиб. унив. изд-во, 2004. – 496 с.