

Module name:	<b>Basics of Gene and Cell Biotechnology</b>
Semester(s) in which the discipline is taught	3
Module responsible for:	Khamrayeva Nafisa Tirkashevna, Doctor of Philosophy (PhD) in Biological Sciences, Associate Professor
Language:	Uzbek
Educational connection with the plan:	GHBT06
Work load:	Total workload: 180 hours Contact hours Lectures 30 hours Practical sessions 30 hours Self-study 120 hours
Credit points:	6
of submitting the exam terms:	subject to at least 100 points on the exam access given to the masters must collect 50 points.
Recommended conditions:	this module of undergraduate masters "Gene and cell biotechnology" module is based on taking the knowledge of studying.
Expected learning outcomes:	Know: Expected Learning Outcomes: Knowledge: Understand the goals, objectives, subject matter, and methods of the course. Acquire modern concepts of raw materials, products, and transgenic organisms that meet human needs in food, pharmaceuticals, medicine, and industry by manipulating genes. Skills: Be familiar with modern approaches and innovative technologies used in teaching and research in gene and cell biotechnology. Understand the requirements of contemporary education, the consistency of microbiology tools and methods, effective use of teaching resources, and skills in processing and delivering educational information. Purpose of the Course: The purpose of teaching gene and cell biotechnology is to introduce students to the achievements of cell and gene engineering, the structure and function of chromosomes as the material basis of heredity, and to develop knowledge and skills related to cell components, proteins, nucleic acids, gene structure, transgenic genes, transgenic plants and animals, and hybridoma production.
Ingredients:	<ol style="list-style-type: none"> <li>1. Gene and cell biotechnology. Subject, purpose, and tasks of gene and cell biotechnology.</li> <li>2. Culture of living organisms' cells.</li> <li>3. Production of monoclonal and polyclonal antibodies.</li> <li>4. Obtaining protoplasts.</li> <li>5. Creation of artificial cells in higher plants.</li> <li>6. Hybridoma technology.</li> <li>7. Protein production using cell engineering.</li> <li>8. Plant propagation through cloning.</li> <li>9. Nuclear and cytoplasmic genes. Plasmids. Prokaryotic genome.</li> <li>10. Enzymes involved in gene isolation.</li> <li>11. Vectors used in genetic engineering.</li> <li>12. Recombinant DNA technology.</li> <li>13. Genetically modified plants.</li> </ol>

	<p>14. Genetically modified animals.</p> <p>15. Structure of prokaryotic and eukaryotic genomes.</p>
form Exam:	comprehensive examination including: written work in gene and cell biotechnology
Technical/multimedia:	Multimedia proyektor, the interactive device, computer technique.
Literature:	<p>1. Davranov Q.D. Industrial Microbiology. Tashkent. Science and Technology, 2013.</p> <p>2. Davronov Q. Biotechnology: scientific, practical, and methodological foundations. Tashkent. "Patent-press" 2008</p> <p>3. Valikhanov M.N., Dolimova S.N., Umarova G.B., Mirkhamidova P. Biochemistry and Molecular Biology (Part 2: Molecular Biology). Tashkent, "Navruz", 2015.</p> <p>4. Konichev A.S., Sebastyanova G.A. Molecular Biology. M.: "AKADEMA", 2012.</p> <p>5. Shchelkunov S.N. Genetic Engineering. Novosibirsk. "Siberian University Publishing", 2004.</p> <p>6. Timoshenko, Zhmurko V.V., Timoshenko V.V. Genetic Engineering of Plants. Textbook. Kharkov, 2013.</p> <p><b>Additional Literature:</b></p> <p>1. Vechtkanov E.M., Sorokina I.A. Basics of Cell Engineering. Rostov-on-Don. SFU, 2012.</p> <p>2. Kolman Ya., Rom L.G. "Visual Biochemistry". – M.: "Mir", 2008</p> <p>3. Lehninger. "Fundamentals of Biochemistry". – M.: "Mir", 2015. Volumes 1, 2, 3</p> <p>4. Zhuravleva G.A., Moskalenko S.E., Anronov E.E., Matveeva T.V., Andreeva E.A. Genetic Engineering in Biotechnology. Textbook. St. Petersburg, Eco-Vector, 2017. 135 pages</p> <p>5. Schmid R. Visual Biotechnology. Moscow. Binom. Knowledge Laboratory. 2015. 324 pages</p> <p>6. Richard A. Harvey, Denise R. Ferrier. Biochemistry. Lippincott Williams and Wilkins. China. 2011.</p>
Scope of assessment criteria and procedure	<p><b>CURRENT CONTROL</b></p> <p><b>Purpose:</b> Determining and assessing the master's level of knowledge, practical skills, and competencies on course topics.</p> <p><b>Instructions:</b> The master's activity in daily classes is assessed through the master's mastery of course topics, as well as constructively interpreting and analyzing the educational material, developing module-specific skills, acquiring practical skills (in terms of quality and the specified number) and competencies, solving problem situations aimed at applying professional practical skills, working in a team, preparing presentations, etc.</p> <p><b>Current control form:</b></p> <p>Activity in lessons</p> <p>Preparing educational materials</p> <p>Working with sources within the subject</p> <p>Using educational technologies</p> <p>Working in a team</p> <p>Preparing presentations</p> <p>Working with projects</p>

## **INTERMEDIATE CONTROL**

**Purpose:** Assessing the master's knowledge and practical skills and level of mastery of lecture material after completing the relevant section of the course.

**Form and procedure of intermediate control:** Midterm examination is held during the semester during the training sessions after the completion of the relevant module of the curriculum of the subject. Midterm examination is held once in written form within the framework of this subject. Midterm examination questions cover all topics of the subject.

### **Independent learning:**

**Purpose:** Independent learning is aimed at fully covering the content of this course, expanding the theoretical knowledge acquired, and establishing independent learning activities for masters.

**Form and procedure of independent education:** Independent work assignments are completed in the form of an educational project, presentation, case study, problem solving, information search, digest, colloquium, essay, article, abstract, etc.

Completed assignments for independent study are placed in the electronic system and checked based on the anti-plagiarism program and evaluated by the subject teacher.

In this case, the uniqueness of the completed assignment should not be less than 60%, otherwise the assignment will not be accepted for assessment.

The number of independent work assignments, depending on the nature of the subject, should not be less than 3 for one subject (module).

Independent work assignments account for 60% of the points allocated for current and intermediate control.

Independent learning task 1: Preparation of project work based on independent learning topics

Independent learning task 2: Preparing sample video lessons based on specialized subject topics.

Independent learning task 3: Preparation of open lesson plans in specialized subjects using interactive methods.

Independent learning task 4: Analysis of educational normative documents for specialized subjects and preparation of presentations.

## **FINAL CONTROL**

**Purpose:** The final examination is held at the end of the semester to determine the level of mastery of the master's theoretical knowledge and practical skills in the relevant subject. The final examination is held at a specified time according to the examination schedule created by the Registrar's Office on the electronic platform.

**Requirements:** The master must have passed the current control, intermediate control and independent learning assignments by the deadline for the final control type in the relevant subject.

A master who has not passed the current control, intermediate control and independent learning assignments, as well as who has received a score in the range of "0-29.9" for these assignments and control types, is not included in the final control type.

Also, a master who has missed 25 percent or more of the classroom hours allocated to a subject without a reason is excluded from this subject and is not included in the final control type and is considered not to have mastered the relevant credits in this subject.

	<p>A master who has not passed or was not included in the final control type and has received a score in the range of "0-29.9" for this type of control is considered to be an academic debtor.</p> <p><b>Final control form:</b> The final examination in this subject will be conducted in written form.</p> <p>If the final examination is conducted in written form, the requirements for assessment must also be reflected.</p>					
Criteria for assessing master knowledge	<b>5 stars</b>	<b>100 points</b>		<b>Evaluation criteria</b>		
	5	90-100	Excellent	When a master is considered to be able to make independent conclusions and decisions, think creatively, observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject (subject), and have an idea about the subject (subject)		
	4	70-89,9	Good	When the master is considered to be able to observe independently, apply the knowledge he has gained in practice, understand, know, express, and narrate the essence of the subject (subject), and has an idea about the subject (subject)		
	3	60-69,9	Satisfactory	When the master is found to be able to apply the knowledge he has gained in practice, understands, knows, can express, and narrate the essence of the subject (subject), and has an idea about the subject (subject)		
	2	0-59,9	Unsatisfactory	When it is determined that the master has not mastered the science program, does not understand the essence of the science (subject), and does not have an idea about the science (subject)		
Course evaluation criteria and procedure	<b>Control type</b>		<b>Total points allocated</b>	<b>Control (task) form</b>	<b>Distribution of points</b>	<b>Qualifying score</b>
	<b>Current control</b>		30 points	System tasks	20 points (divided by the number of tasks)	18 points
				Master activity (in seminars, practical, laboratory classes)	10 points	
	<b>Intermediate control</b>		20 points	Supervision: Written work	10 points	12 points
				System tasks	10 points (divided by the number of	

				tasks)		
	<b>Final inspection</b>	50 points	Written assignment (5 questions)	50 points (10 points per question)	30 points	
	<i>* <b>Note:</b> 60% of the points allocated for current and intermediate control are allocated to independent work assignments. Independent work assignments are evaluated as system assignments through the electronic platform.</i>					