MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
V.N. Karazin Kharkiv National University
Name of the higher education institution

EDUCATIONAL PROGRAMME

GENETICS

Second level of higher education

Specialty 091 Biology

Branch of knowledge 09 Biology

Qualification: Master of Biology. Geneticist.

APPROVED BY SCIENTIFIC COUNCIL OF V.N. KARAZIN KHARKIV NATIONAL UNIVERSITY

Head of Scientific Council

_____ /V. S. Bakirov/

(protocol № __ from "___"_____ 2017)

Educational Programme is implemented from _____2017

Rector_____ /V.S. Bakirov/

(order № __ from "___"_____ 2017)

Kharkiv 2017.

Developed by working group of:

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1. The profile of the Educational Programme in 091 Biology specialty with Specialization in Genetics

1 – General information	
Full name of Higher Education Institution and Structural Unit	V. N. Karazin Kharkiv National University School of Biology
Higher Education Level and qualification name	Second (master) level of Higher Education Qualification: Master of Biology. Geneticist.
Official name of the Educational Programme	Educational (professional) programme «Genetics»
Type of Diploma and Curriculum volume	Master's diploma, single, 90 ECTS credits, period of study - 1 year and 4 months
Accreditation	Accredited by Ministry of Education and Science of Ukraine for the Second (master) level, НД № 2189559 from 18 .09.2017 to 01.07.2023.
Cycle/Level	National Qualification Framework of Ukraine – level 8, FQ-EHEA – second cycle, EQF-LLL – level 7
Preconditions	Bachelor's/ Specialist`s / Master`s degree. Applicants should have a legal education document. Selection is carried out on a competitive basis according to the University's rules of admission.
Language(s) of teaching	English
Period of validity of the Programme	Till 2023
Internet address of permanent hosting of curriculum description	http://start.karazin.ua/i/programs http://biology.karazin.ua/index-eng.html
2 – Scope of the Educational Programme	
Formation of the personality of a specialist able to solve complex non-standard tasks and practical, innovative and research problems in the field of biology, genetics and adjacent sciences, possessing knowledge and skills of studying and analysis of biological systems states, their management, of environment monitoring and evaluation, in particular with the genetics methods, for further achievements application in the economy and in the social service. Experienced in modern educational technologies.	
3 - Description of the Educational Programme	
Subject area (branch of knowledge, specialty, specialization)	Branch of knowledge 09-Biology Specialty 091 – Biology Specialization: Genetics Innovative approaches to the solution of theoretical and experimental issues in the field of biology and adjacent sciences, with an advanced bias in genetics.
Orientation of Educational Programme	Educational and professional programme for the master's degree: - acquisition of knowledge, skills and understanding of appropriate and effective ways of scientific and technical information collection, analysis and systematization in the field of work, in particular biological and genetic; - acquisition of knowledge, skills and understanding of the implementation of purposeful sequence of actions for systems or their components synthesis, for the development of documentation necessary for the implementation and usage of objects and processes, taking into account the laws of wildlife and structural and functional features of genetic systems; - acquisition of knowledge, skills and understanding of appropriate and effective ways of streamlining the structure and constituent

	elements interaction of biological, in particular genetic systems, to increase the efficiency of resources and time use.
Main focus of Educational Programme and specialization	In-depth education in the "Biology" specialty with the specialization in "Genetics". In-depth, fundamental, specialized and practical training of masters in the field of biology: to provide students with the knowledge, skills and understanding in the field of biology with an in-depth specialization in genetics that will enable them to carry out their professional work on their own; the formation of specific professional competencies of the biologist with the specialization of geneticist through the implementation of individual educational trajectories, the enhancement of interdisciplinary and integrative education and the possibility of transformation of individual units in accordance with the structure of the employer's requests; preparation for successful mastering of programs for researchers, developers, teachers, scientific managers. Key words: biology, genetics, teaching of disciplines in high school.
Distinctive features of Educational Programme	Integration of professional training in the field of biology and genetics with innovative, research and project activities. A unit of psychological and pedagogical disciplines is taught. On-line learning technologies are used. Requires special experimental research practice. The master's diploma project should contain an experimental part and be accompanied by an analysis of the data obtained.
4 – Employability and further education	
Employability	Professional activity in the field of biology, agriculture, medicine, biotechnology, nature protection and rational nature management. Research Associate, lecturer in Higher education institution.
Further education	Study at the third educational (scientific) level of higher education (8 level of NQF, the third cycle of FQ-EHEA and the eighth level of EQF-LLL). Acquiring additional qualifications in other specialties in the system of postgraduate education.
5 – Teaching and assessment	
Teaching and learning	Approach: student-centered; problem-oriented learning Lectures are problematic, using analysis, synthesis, comparison, simulation, analogy, dialectics, abstraction, specification, systemic, historical and logic approaches. Laboratory and practical lessons are carried out in small groups, include methods of experimental research, statistical processing of experimental data, information and communication technologies. Educational and methodological support of independent work is carried out through the use of elements of on-line learning: electronic lectures, methodical guidelines and tasks. Accent is made on personal self-development promoting the formation of need and readiness to continue the self-education along lifetime.
Assessment	Types of control: by levels: self-control, control at the level of the teacher, control at the level of the head of the department, control at the dean's office level, control at the level of the administration, state control; by the term: operational (incoming, current, intermediate, final) and delayed. Forms of control: oral and written surveys, tests, presentation of scientific work, defense of master's diploma project; credits, exams. Assessment of students' educational achievements is carried out as exam at

	four levels (excellent, good, satisfactory, unsatisfactory) or as credit at two-level (passed / not passes) national scale; 100-points system.
6 – Programme Competences	
Integral competence	Ability to solve complex tasks and problems in the field of biological sciences, in particular in genetics and on the boundary between subject areas, which involve research and / or innovative activity and are characterized by uncertainty of conditions and requirements.
General competences (GC)	- competences defined by the specialty standard of higher education: GC1. Ability to search and analyze information using various sources, including the results of one`s research. GC2. Ability to generate new ideas (creativity). GC3. Ability for professional communication, at the international level also. GC4. Ability to perform professional functions and to carry out the research at the appropriate level in the field of biological sciences and within the boundaries of subject areas. GC5. Ability to act in compliance with the moral and ethical norms of professional activity and the need for intellectual honesty. GC6. The ability to make decisions in complex and unpredictable conditions requiring new approaches and forecasting. GC7. Ability to abstract thinking, analysis and synthesis of information in the field of biology and on the boundary of subject areas. GC8 Ability to develop projects and to manage them, to conduct patent searches and to draw up patent documentation. GC9. Ability to use modern information technologies and to analyze information in the field of biology and on the boundary of subject areas. GC10. Ability to act socially and consciously. - competences defined by the higher educational institution: GC11 Flexible thinking. The acquisition of a flexible way of thinking that allows to understand and to solve tasks and problems, while maintaining a critical attitude towards sustainable scientific concepts. GC12. Innovative capabilities. Ability to perform initiative, including in situations of risk, and to assume full responsibility; the ability to find solutions in non-standard situations. GC13. Popularization skills. Ability to hold an oral presentation and write an understandable article on the results of the research, as well as on modern concepts in genetics for the general public (not specialists). GC14 Ethics attitude. Achieving the necessary knowledge and understanding of the genetics role in society to work adequately on future professions and taking into account the influence of one`s professional activities on social problems.
Professional competences of specialty (PC)	- competences defined by the specialty standard of higher education: PC1. Ability to deepen theoretical and methodological knowledge in the field of biological sciences and on the boundary of subject areas PC2. Ability to apply knowledge in professional activities, taking into account the latest achievements, including for research work. PC3. Ability to use knowledge and practical skills in the field of biological sciences and within the boundaries of subject areas to perform professional tasks, including for studying different levels of organization of living organisms, biological phenomena and processes.

	PC4. Skills of reasoned discussion and communication in the field of biological sciences and on the boundary between subject areas. PC5. Ability to analyze the paths of development of modern biology. PC6. Understanding the need of biodiversity preservation, the environment protection and rational nature management. PC7. Ability to make decisions on important problems of biology and on the boundary between subject areas on the basis of understanding of modern scientific facts, concepts, theories, principles and methods. PC8. Ability to plan and to carry out scientific research in the field of biology and on the boundary of subject areas, to manage its informational, methodological, material support, to interpret data and make conclusions, to prepare the results of scientific works for promulgation. PC9. Knowledge of the basic contemporary provisions of fundamental sciences in relation to the origin, development, structure and processes of living organisms, the ability to apply them for the formation of ideological position. - competences defined by the higher educational institution: PC10. In-depth knowledge and understanding: the ability to use the laws and principles of genetics combined with the required higher level mathematical tools to describe the biological systems and processes that take place, including the actions of factors of different nature. PC11. Problem solving. The ability to formulate, analyze and synthesize scientific problems at an abstract level by decomposing them into components that can be explored separately in their more or less important aspects. PC12. Modeling. Ability to build appropriate models of biological systems (especially their genetic constituents) and processes, to explore them for new findings and to deepen understanding of nature. PC13. Computer skills. The ability to develop an algorithm of action that can be implemented in a computer model, the ability to use existing computer programs and to implement new ones. PC14. Communication skills. Ability to communicate with colleagues in the field of genetics on scientific achievements at both the general level and at the level of specialists, the ability to make oral and written reports, discuss scientific topics in native and English languages. PC15. Research skills. Ability to formulate (performing presentations or reports) new hypotheses and scientific tasks in the field of genetics, to choose the right directions and appropriate methods for their solution, taking into account the available resources. PC16. Ability to study. Ability to take on newly discovered knowledge in the field of genetics and to integrate it with existing ones. Ability to orient professionally in a certain narrow area of genetics, which lies outside the chosen specialization. Striving for self-education and self-improvement. PC17. Application of specialized knowledge. Ability to use effectively in practice various theories in the field of study, in science management and in business administration. PC18. Teaching skills. Ability to apply the foundations of pedagogy and psychology in the educational process in higher education institutions. PC19. Mentoring and Leadership Skills. Ability to be the mentor of junior colleagues in improving research and teaching skills.
7 – Programme Learning Outcomes (LO)	
	- program learning outcomes defined by the specialty higher education standard: LO1. To communicate in dialogue mode with colleagues and target

	audience in Ukrainian and foreign languages. LO2. To use libraries, information databases, on-line resources to find the necessary information. LO3. To find ways for quick and efficient problem solution, to generate ideas using the knowledge and skills acquired. LO4. To present the results of scientific work in writing (as a report, scientific publications, etc.) and orally (as reports and project defense) using modern technologies, to debate correctly. LO5. To determine one`s contribution to the work, to carry out coordinated work on the result, taking into account public, state and industrial interests. LO6. To know the basic rules of biological ethics, biosafety, bio-protection, basic approaches to risk assessment using the latest biological, biotechnological and medical-biological methods and technologies. LO7. To be consistent with the standards of academic integrity during training and research activities in order to ensure confidence in the results of scientific work, to know the main legal categories and the peculiarities of using the results of intellectual activity. LO8. To be able to identify potentially hazardous production processes that can make a threat of emergencies and to be consistent with the safety rules of life. LO9. To know the features of the development of modern biological science, the main methodological principles of scientific research, methodological and methodical tools for conducting research. LO10. To be able to model the basic research processes in order to choose research methods, hardware support or to develop new techniques. LO11. To be able to carry out statistical analysis and generalization of experimental data obtained with the application of software and modern information technologies used in the field of biology. LO12. To demonstrate knowledge about the basic patterns of formation, quantitative assessment and strategies for the conservation of biological diversity, of increase in the productivity and sustainability of agrocenoses and natural ecosystems. LO13. To know and to analyze the principles of structural and functional organization, mechanisms of regulation and adaptation of organisms. LO14. To use innovative approaches for specific biological tasks solutions. LO15. To know the basic requirements of the current legislation of Ukraine regarding the use of biological resources. To use regulatory and legal documents and normative and technical documentation in the field of scientific activity. LO16. To know the principles of developing an algorithm and conducting exploratory research on the specialization of genetics. - program learning outcomes identified by the higher education institution: LO17. Knowledge of fundamental natural sciences, mathematics and information technologies to the extent necessary for planning and conducting scientific research in the field of genetics and adjacent sciences.

	LO18. To apply pedagogical technologies at the level sufficient for realization of developed programs of educational disciplines on specialization in higher educational institutions. LO19. To demonstrate and to use integral modern ideas about the principles of structural and functional organization of biological systems of different systematic affiliation and level of organization, their phylogeny and ontogenesis, mechanisms of regulation and adaptation depending on environment conditions; LO20. To demonstrate and to use deep knowledge about the laws of heredity and variability at different levels of organization of life, the link between genetics and other sciences and the place of genetics in human activity; in-depth insights on genome structure of different groups of organisms, the structure and functioning of the chromosomes, genetic structure of populations, genetic engineering technologies. LO21. To possess methods, techniques and procedures of classical and molecular genetic analysis, to carry out effective selection of methods in accordance with the set professional tasks. LO22. To be able to provide professional advice in the field of biology. LO23. To understand the basic principles of the functioning of the international scientific community: the principles of reviewing manuscripts of publications, measuring scientific indices, organizing international cooperation, finding funding and submitting grant applications and the principles for their selection. LO24. To be able to make decisions independently and responsibly in complex and unpredictable conditions that need forecast, based on analysis and synthesis, taking into account critical remarks and on the basis of a creative approach.
8 – Resource supply of Programme realization	
Staff	Guarantor of the educational program: Lubov O. Atramentova – the Head of Genetics and Cytology Department of the School of Biology of V.N. Karazin Kharkiv National University, DrSci, Professor. Scientific and pedagogical staff with academic degrees as well as highly skilled specialists is involved in the Programme realization. All scientific-pedagogical workers regularly raise their own professional level, including by studying abroad.
Material and technical support	Educational buildings; thematic cabinets; specialized laboratories (Laboratory of cell culture and animal tissue culture, Laboratory of Cell Biochemistry and Molecular Genetics, Laboratory of Bioinformatics, Cytogenetic laboratory, Developmental genetics laboratory, Laboratory of microbiology and microbiological box, Laboratory for diagnostics of plant diseases); live collections: Drosophila Stocks Collection (National heritage of Ukraine); Algaetheke - a collection of samples of algae; a collection of silkworm breeds; Herbaria: Scientific Herbarium of the CWU (National Heritage of Ukraine); Scientific Mycological Herbarium CWU-Myc; computer classes; wireless access points to the Internet. Certain lessons are held on the base of the Botanical garden and the Museum of Nature. Field studies can be carried out in natural biotopes. There is an opportunity to perform qualification works both on the basis of the university and on the basis of specialized laboratories in the partner institutions (under the terms of the contract). Students are provided by places in dormitories. There is a sports hall,

	sports grounds, various sports sections and cultural centers. The points of nutrition offer a quality menu, including the Halal Certificate.
Information, teaching and methodological support	The official website of VN Karazin Kharkiv National University: http://www.univer.kharkov.ua/; wireless access to the Internet; unlimited internet access; scientific library, virtual learning environment Moodle; corporate mail; training and work plans; curricula of the educational process; educational-methodical complexes of disciplines; educational and work programs of disciplines; didactic materials for students self- and individual work by disciplines; practice courses programs; methodical instructions for the implementation of individual tasks, control and diploma projects; criteria for assessing the level of training; packages of complex control works, online course support (elements of online courses).
9 – Academic mobility	
National Credit Mobility	Applicants of higher education can realize the right to academic mobility in higher educational institutions and scientific institutions of Ukraine on the basis of agreements and on their own initiative on the basis of an individual invitation.
International Credit Mobility	Erasmus Mundus, DAAD German Academic Exchange Program, Fulbright Fellowship Program, Open Society Institute Programs (Washington), etc, as well as individual invitations from higher education institutions and research institutions outside of Ukraine.
Teaching foreign applicants	Foreign citizens study on a paid basis (on a contract basis) at the expense of individuals and legal entities. Rest requirements are regulated by Rules of Admission of the University. Teaching is in English.

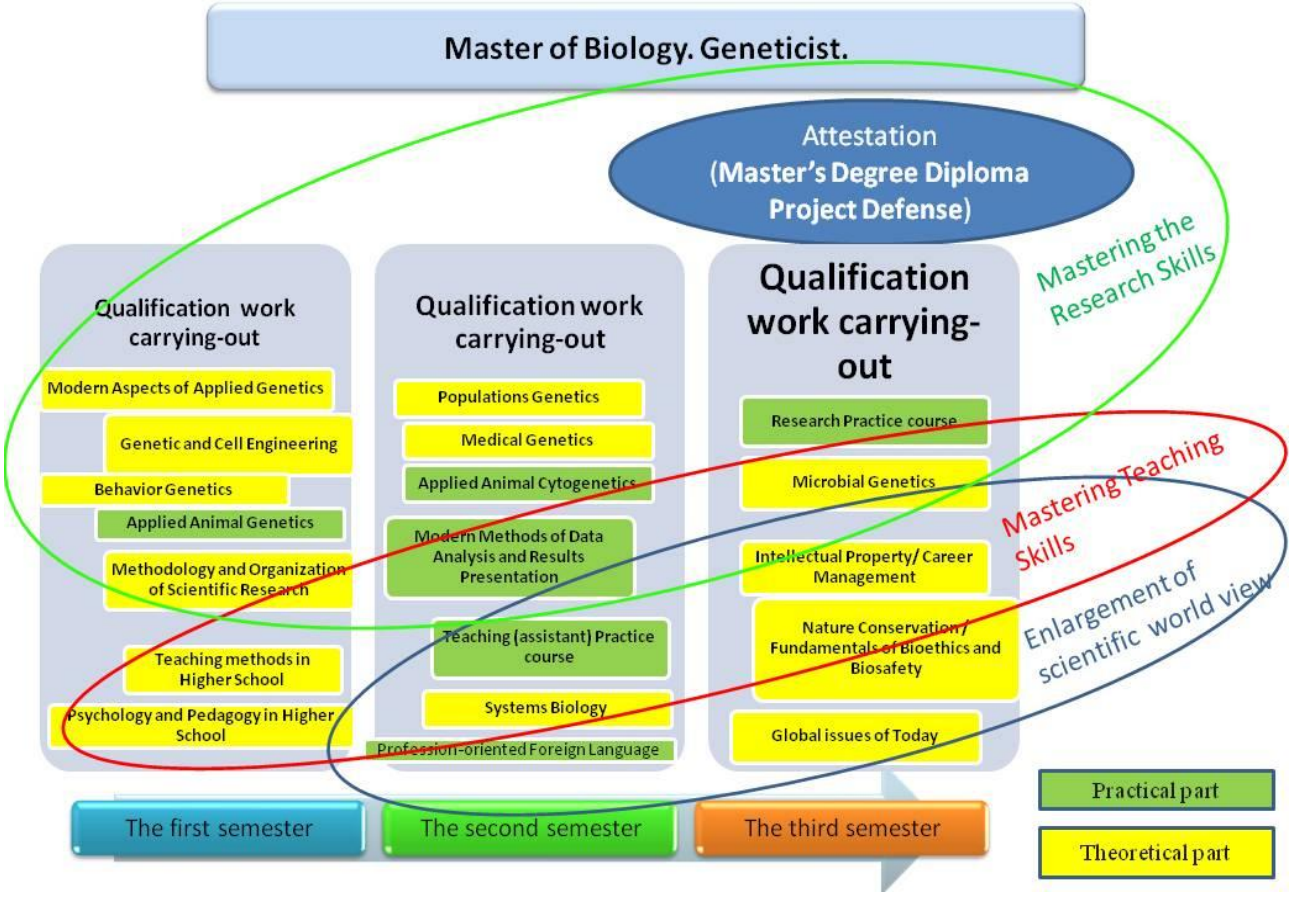
2. The list of components of the Educational Programme and their logical consistency

2.1. The list of components of the Educational Programme (EP)

Code	Components of the Educational Programme (educational disciplines, course projects (work), practice courses, qualification work)	Amount of ECTS credits	Form of final assessment
1	2	3	4
Obligatory components of EP			
OC 1.	Profession-oriented Foreign Language	4	Credit
OC 2.	Psychology and Pedagogy in Higher School	3	Credit
OC 3.	Global issues of Today	3	Credit
OC 4	Systems Biology	5	Exam
OC 5	Modern Aspects of Applied Genetics	5	Exam
OC 6	Methodology and Organization of Scientific Research	4	Exam
OC 7	Teaching methods in Higher School	4	Credit
OC 8	Modern Methods of Data Analysis and Results Presentation	4	Credit
OC 9	Teaching (assistant) Practice course	7	Credit
OC 10	Research Practice course	6	Credit
OC 11	Master's Degree Diploma Project	12	Defense
Total amount of ECTS credits for obligatory components:		**57**	
Elective components of EP*			
Elective block 1			
EB 1.1.	Intellectual Property / Career Management ***	3	Credit
EB 1.2.	Nature Conservation / Fundamentals of Bioethics and Biosafety ***	3	Credit
Elective block 2			
EB 2.1.	Genetic and Cell Engineering / Protein Nucleic Interactions ***/ Developmental Genetics**	4	Exam
EB 2.2.	Behavior Genetics/ Genomics ***/ Mutagenesis**	3	Exam
Elective block 3			
EB 3.1.	Medical Genetics with the Bases of Medical-Genetic Counseling / Organization of Modern Medical-Genetic Laboratory and the bases of patenting *** / Molecular Genetics**	4	Exam
EB 3.2.	Populations Genetics / Ecology Genetics***/ Human Genetics**	4	Exam
EB 3.3.	Microbial Genetics / Epigenetics***/ Human Cytogenetics**	3	Exam
EB 3.4.	Applied Animal Genetics / Applied Mutations Analysis**	4	Credit
EB 3.5.	Applied Animal Cytogenetics / Applied Genetic Analysis**	5	Credit
Total amount of ECTS credits for elective components:		33	
Curriculum volume:		90	

*In every Elective component the student can choose free between disciplines matched by ***. Disciplines matched by ** are also offered to the students whose Bachelor's Degree wasn`t obtained in V. N. Karazin Kharkiv National University (School of Biology, specialization at Genetics and Cytology Department)

2.2. Logic diagram of EP structure



3. Form of certification of graduates

Attestation of graduates of the Educational Programme Genetics in specialty 091 Biology is carried out in the form of defense of the qualifying Master's Research Project and results in awarding a Master's degree (with certified document of the government-approved format) with the qualification: Master of Biology. Geneticist.

***Qualification Project should meet the requirements**:*

• should provide the solution of a theoretical or practical problem with the application of fundamental provisions and methods of systems analysis, characterized by complexity and uncertainty of the conditions;
• should contain an analysis of the current state of the solved problem, the working hypothesis;
• should describe the methods applied and the results obtained;
• should contain analysis and theoretical substantiation (discussion) of the research results;
• must be written in scientific style, in English;
• must be tested for plagiarism;
• the abstract of the work should be published in the web-site of the higher educational institution.

4. Correspondence matrix of Educational Programme competences and components

	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6	OC 7	OC 8	OC 9	OC 10	OC 11	EB 1.1	EB 1.2	EB 2.1	EB 2.2	EB 3.1	EB 3.2	EB 3.3	EB 3.4	EB 3.5
GC 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
GC 2									●	●	●	●		●					●	
GC 3	●				●	●		●			●	●	●	●	●	●	●	●	●	●
GC 4					●	●	●	●	●	●	●		●	●	●	●	●	●	●	●
GC 5						●		●				●	●						●	●
GC 6	●	●	●	●	●				●	●	●								●	●
GC 7				●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
GC 8						●		●		●	●	●	●	●						
GC 9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
GC 10	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
GC 11					●	●				●	●			●	●	●	●	●		
GC 12		●			●	●				●	●	●		●	●	●	●	●	●	●
GC 13					●			●	●		●			●	●	●	●	●	●	●
GC 14		●	●		●	●	●							●	●	●	●	●	●	●
PC 1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PC 2									●	●	●								●	●
PC 3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PC 4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PC 5				●	●	●	●													
PC 6					●								●	●	●	●	●	●	●	●
PC 7		●	●		●	●			●	●	●	●	●	●	●	●	●	●	●	●
PC 8	●		●	●	●	●		●		●	●	●	●	●	●	●	●	●	●	●
PC 9				●	●									●	●	●	●	●		
PC 10					●			●		●	●			●	●	●	●	●	●	●
PC 11				●	●	●				●	●			●	●	●	●	●	●	●
PC 12				●	●	●				●	●			●	●	●	●	●	●	●
PC 13				●	●	●		●		●	●			●	●	●	●	●	●	●
PC 14	●			●	●	●		●		●	●			●	●	●	●	●	●	●
PC 15					●	●		●		●	●			●	●	●	●	●	●	●
PC 16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PC 17		●			●		●		●					●	●	●	●	●	●	●
PC 18		●			●		●		●					●	●	●	●	●	●	●
PC 19		●			●		●		●					●	●	●	●	●	●	●

5. Matrix of implementation of Educational Programme learning outcomes (LO) by corresponding components

	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6	OC 7	OC 8	OC 9	OC 10	OC 11	EB 1.1	EB 1.2	EB 2.1	EB 2.2	EB 3.1	EB 3.2	EB 3.3	EB 3.4	EB 3.5
LO 1	•	•				•		•	•	•	•			•	•	•	•	•		
LO 2		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 3	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 4								•		•	•			•	•	•	•	•	•	•
LO 5			•		•	•		•		•	•	•	•						•	•
LO 6					•	•		•					•						•	•
LO 7		•				•	•	•		•	•	•								
LO 8			•			•		•		•	•			•	•	•	•	•	•	•
LO 9					•	•		•		•				•	•	•	•	•	•	•
LO 10				•	•	•		•		•	•			•	•	•	•	•	•	•
LO 11						•		•		•	•								•	•
LO 12			•										•						•	
LO 13				•	•					•			•	•	•	•	•	•	•	•
LO 14	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 15			•										•							
LO 16					•	•		•		•	•		•	•	•	•	•	•	•	•
LO 17	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 18		•					•		•											
LO 19	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 20				•	•	•		•		•	•		•	•	•	•	•	•	•	•
LO 21				•	•	•		•		•	•		•	•	•	•	•	•	•	•
LO 22	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
LO 23			•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•
LO 24	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•