MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KYIV NATIONAL UNIVERSITY
TECHNOLOGIES AND DESIGN

APPROVED BY THE SCIENTIFIC COUNCIL
Chairman of the Academic Council of KNUTD

_____ Ivan GRISHCHENKO

(Minutes of "___" ___ 2021 №__)

EDUCATIONAL AND SCIENTIFIC PROGRAM

INDUSTRIAL MECHANICAL ENGINEERING

Third level of higher education (educational and scientific)

Degree of higher education doctor of philosophy

Field of knowledge 13 Mechanical engineering

Specialty 133 Industrial Engineering

Qualification Doctor of Philosophy in Industrial Engineering

Kyiv 2021

LETTER OF APPROVAL

Educational and scientific program

INDUSTRIAL MECHANICAL ENGINEERING

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Vice-rector for scientific and pedagogical activities (educational activities)

_____ _____ Oksana Morgulets
(date) (signature)

Approved by the Academic Council of the Faculty of Mechatronics and Computer Technology

Protocol from "____" _____ 20___ № _____

Dean of the Facultymechatronics and computer technology

_____ _____ Volodymyr PAVLENKO
(date) (signature)

Head of the Department of Doctoral and Postgraduate Studies

_____ _____ Svetlana Arabuli
(date) (signature)

Discussed and recommended at the meeting of the Department of Applied Mechanics and Machines

Protocol from "____" _____ 20___ № ____

Head of Departmentapplied mechanics and machines

_____ _____ Aleksander MANOILENKO
(date) (signature)

Guarantor of the educational program

_____ _____ Igor PANASIUK
(date) (signature)

Put into effect by the order of KNUTD from "___" _____ 20__ year № ___.

PREFACE

DEVELOPED: Kyiv National University of Technology and Design

DEVELOPERS:

Guarantor of the educational and scientific program Panasiuk Igor Vasyliovych, Doctor of Technical Sciences, Professor, Director of Institute of Engineering and Information Technologies, Kyiv National University of Technology and Design

Members of the working group:

Chuprynka Viktor Ivanovych, Doctor of Technical Sciences, Professor, Professor of Computer Science, Kyiv National University of Technology and Design

Koshel Sergey Alexandrovich, Candidate of Technical Sciences, Associate Professor, Associate Professor of the Department of Applied Mechanics and Machines, Kyiv National University of Technology and Design

Kulish Yana Mykolayivna,graduate student of the Department of Applied Mechanics and Machines of Kyiv National University and Design.

REVIEWS OF EXTERNAL STAKEHOLDERS:

1) Selivonchyk IS, General Director of MTK LGC, Ph.D .;
2) Trunov DA director of Technopolis Engineering Company;
3) Ivanova LI Director of DANA-FASHION LGC;
4) Egorov VV, Director of Legpromengineering LGC, Ph.D .;
5) Korchak VP, director of PJSC "TexTemp".

1.Profile of the educational and scientific program Industrial Engineering

1 - General information	
Full name of the institution of higher education and structural unit	Kyiv National University of Technology and Design. Department of Applied Mechanics and Machines.
Degree of higher education and qualification in the original language	Level of higher education - the third (educational and scientific). Degree of higher education - Doctor of Philosophy. Field of knowledge - 13 Mechanical Engineering. Specialty - 133 Industrial Engineering.
Type of diploma and scope of educational program	Doctor of Philosophy, single, 48 ECTS credits.
Availability of accreditation	-
Cycle / level	The National Qualifications Framework of Ukraine is the eighth level
Prerequisites	Master's degree or educational qualification level of a specialist.
Language (s) of instruction	Ukrainian
Term of the educational program	-
Internet address of the permanent post of the description of the educational program	http://knutd.edu.ua/ekts/
2 - The purpose of the educational program	
Training of highly qualified, competitive, integrated into the European and world scientific and educational space specialist in PhD in mechanical engineering in 133 Industrial Engineering, aimed at developing philosophical and linguistic competencies, developing universal research skills, which are sufficient for research and further professional and scientific activities capable of independent research, scientific and organizational, pedagogical, organizational and practical activities in the field of light industry engineering, as well as teaching in higher education. The main objectives of the program are: improving skills to identify professional problems, extract the necessary information, manipulate information from the specialty, generate new ideas, find ways to solve pressing problems of scientific and professional nature and predict their consequences aimed at quality implementation of original dissertation research; that will give the chance to work successfully on a specialty in the field of education and science, branches of mechanical engineering of the equipment of light industry.	
3 - Characteristics of the educational program	
Subject area	The program is designed as an optimal combination of academic and professional requirements. The program is focused on the formation of applicants' competencies for acquiring in-depth knowledge of the specialty, general scientific (philosophical) competencies, acquiring universal research skills and presenting their own research results orally and in writing, in particular, in a foreign language. systems engineering with the use of computer-integrated design and multivariate modeling technologies, creation of new innovative equipment for light industry and improvement of the current analysis of their operation and operation, which includes research and innovation activities in the field of mechanical engineering.

	Compulsory subjects - 75%, of which - compulsory subjects of professional training - 44%, general training - 34%, knowledge of a foreign language - 22%; disciplines of free choice of the applicant, providing professional training - 25%are selected from the general university catalog in accordance with the approved procedure at the University.	
Orientation of the educational program	Educational and scientific for the preparation of a doctor of philosophy.	
The main focus of the educational program	Emphasis is placed on the formation and development of professional competencies in the field of mechanical engineering; study of theoretical and methodological provisions, organizational and practical tools; research and innovation.	
Features of the educational program	The program is based on innovative project results, taking into account the current state of equipment in the light and textile industries (including clothing, knitwear, footwear, training, etc.), within which further professional and scientific activities are possible. Emphasis is placed on the scientific organization of analytical and research project process, the use of methods aimed at overcoming scientific engineering problems, the development of professional self-improvement, creative thinking and the search for non-standard scientific solutions.	
4 - Suitability of graduates for employment and further study		
Suitability for employment	The graduate is suitable for employment in enterprises, organizations operating in the field of mechanical engineering, as well as in scientific institutions and institutions of higher education. Professional activity of the applicant on research, development, improvement of machines and equipment for the manufacture of textiles, garments. Able to perform professional work as a mechanical engineer, research engineer, design engineer, technological engineer, head of department, scientific and scientific-pedagogical worker.	
Further training	Lifelong learning to improve professional, scientific and other activities. The possibility of continuing education at the scientific level higher education (doctor of sciences).	
5 - Teaching and assessment		
Teaching and learning	Student-centered and problem-oriented learning, learning through pedagogical practice and self-study are used. The system of teaching methods is based on the principles of purposefulness, binary - active direct participation of research and teaching staff and students of higher education. Forms of organization of the educational process: lecture, seminar, practical, laboratory classes, practical training, independent work, consultation, development of professional projects (works).	
Evaluation	Exams, tests, tests, presentations, reports.	
6 - Program competencies		
Integral competence(IR)	Ability to produce new ideas, solve complex problems in a particular field of professional and / or research and innovation, apply the methodology of scientific and pedagogical activities, as well as conduct their own research, the results of which have scientific novelty, theoretical and practical significance.	
General competence (GC)	GC1	Ability to abstract thinking, analysis and synthesis.
	GC2	Ability to develop and manage projects.
	GC3	Ability to generate new ideas (creativity).
	GC4	Formation of a systemic scientific / artistic worldview, professional

		ethics and general cultural outlook.
	GC5	Ability to communicate in a foreign language.
	GC 6	Ability to use information and communication technologies.
	GC 7	Ability to work in an international context.
Special (professional) competencies (PC)	PC1	Ability to carry out scientific and pedagogical activities.
	PC2	Ability to plan and solve problems of own professional and personal development. Possession of the culture of scientific research, including the use of the latest information and communication technologies.
	PC3	Ability to understand the philosophical and ideological principles of scientific and technical analysis and engineering. Possession of methods of analysis of engineering and technical solutions in the field of light industry engineering, modern trends and patterns of development of research and development in the context of globalization and internationalization.
	PC4	Ability to generalize information and the ability to present it with emphasis on critical evaluation of a number of options. Scientific and technical assessment of the novelty of the results of research on technologies and equipment of light industry.
	PC5	Ability to analytical and experimental scientific and technical activities. Ability to apply theoretical knowledge and design skills to master the theory of design, design methods and research of light industry facilities.
	PC6	Ability to initiate and perform scientific and project research. Ability to organize and conduct system-structural analysis of the process of designing various technological processes in the light industry and equipment for their implementation.
	PC7	Ability to apply the skills of analytical experimental and associative scientific and technical work in generating fundamentally new project ideas in the field of industrial engineering, light industry equipment and technological processes.
	PC8	Ability to use modern information and communication technologies. Ability to navigate in scientific and technical issues in the field of mechanical engineering, to adequately use a variety of scientific and technical sources, to apply modern principles and approaches in solving scientific and technical problems, to form their own innovative proposals.
	PC9	Ability to analyze and synthesize. Skills of creative analytical work. Creativity, ability to think systematically.
	PC10	Ability to make decisions. Knowledge of the principles of system design within the socio-cultural and subject environment and in the context of modern engineering culture.
	PC11	Ability to adapt to new situations. Ability to use sources of activation of creative search, inclusion in the work of conscious and subconscious intuitive and logical connections, associations, non-standard solutions.

7 - Program learning outcomes	
Knowledge and understanding:	
PLO 1	Know the basics of forecasting the development of promising areas of industrial engineering.
PLO 2	Know the typologies and methods of organizing scientific and engineering projects.

PLO 3	Understand the synthesis of design solutionsbased on the implementation of the results of the pre-project analysis.
PLO 4	Understandmodern ideas about aesthetic and technical requirements of light industry equipment.
PLO 5	Understandidea of the subject-spatial environment as a scientific and technical system; structure, types of elements and connections in this system.
PLO 6	To know the philosophical and ideological principles, current trends, directions and patterns of development of domestic science in the context of globalization and internationalization.
Application of knowledge and understanding (skills):	
PLO 7	Have the skills to analyze and be effectiveuse of techniques and tools of research development, engineering and technical completed task.
PLO 8	Have the skills toimplementation of technological analysis based on the study of materials for the presentation of scientific results.
PLO 9	Be able to control compliance with the chosen technology of implementation of the scientific result.
PLO 10	Be able to substantiate the theoretical feasibility and practical effectiveness of the implementation of the results of project analysis in the development of engineering and technical tasks for the design of technological processes and equipment for their implementation.
PLO 11	Be able to develop a scientific concept of the research process, due to the technical task.
PLO 12	Be able to have scientific and practical methods of implementing information in the field of mechanical engineering.
PLO 13	Be able to master modern systems and technologies of scientific research.
PLO 14	Be able to have progressive methods and techniques of design that take into account psychological characteristics.
PLO 15	Have the skills toorganization of research and methodological analysis of research results.
PLO 16	To be able to select and apply various types of scientific methods of information processing, to carry out processing and analytical interpretation of information, to generalize results of research of project activity.
PLO 17	Be able to apply an integrated approach in solving conceptual design problems.
PLO 18	Be able to navigate the current trends and needs of society in order to use them in the field of mechanical engineering.
PLO 19	Be able to formulate a scientific problem in the field of mechanical engineering, working hypotheses of the research problem, which involves a deep rethinking of existing and the creation of new holistic knowledge and / or professional practice.
PLO 20	Be able to use modern methods and technologies of scientific communication in a foreign language in the specialty.
Formation of judgments:	
PLO 21	Have the skills togeneralization of information and the ability to present it with emphasis on critical assessment.
PLO 22	Be able to clearly communicate complex ideas and argue them.
PLO 23	Understand responsibility for one's own decisions and results of professional activity.
PLO 24	To communicate freely on professional issues in state and foreign languages orally and in writing, to discuss the results of professional activities with specialists and non-specialists, to argue their position on issues of discussion.

8 - Resource support for program implementation	
Staffing	All scientific and pedagogical workers who provide the educational program on qualification, correspond to a profile and a direction of the educational components which are taught; have the necessary experience of pedagogical work and experience of practical work. In the process of organizing training, professionals with experience in research / management / innovation / creative work and / or work in the specialty are involved.
Logistics	Logistics allows to fully ensure the educational process throughout the training cycle of the educational program. The condition of the premises is certified by sanitary and technical passports that comply with current regulations.
Information and educational and methodological support	The program is fully provided with an educational and methodological complex of all components of the educational program, the availability of which is presented in the modular environment of the educational process of the University.
9 - Academic mobility	
National credit mobility	Provides for the possibility of academic mobility in some components of the educational program, providing the acquisition of general and / or professional competencies.
International credit mobility	The program develops prospects for participation and internships in research projects and academic mobility programs abroad. The mobility of graduate students is organized on the basis of a partnership agreement on cooperation with foreign universities on participation in international educational programs, which provide an opportunity to: gain additional knowledge in related fields of science; to improve the level of foreign language proficiency.
Training of foreign applicants for higher education	Training of foreign applicants for higher education is carried out according to accredited educational programs.

2. List of components of educational-professional / scientific program and their logical sequence

2.1.1 List of components of the educational component of the educational-scientific program of the third (educational-scientific) level of higher education

Code	Components of the educational program (academic disciplines, semester work, practice)	Number of loans	Form of final control
1	2	3	4
Mandatory components of the educational program			
General training cycle			
OK 1	Philosophy of science and research methodology	4	exam
OK 2	Foreign language for academic purposes.	8	credit / exam
OK 3	Information and communication technologies in research	4	test
OK 4	Intellectual property and commercialization of scientific research	4	test
	Total from the cycle	**20**	
Cycle of professional training			
OK 5	Pedagogical skills in high school	4	test
OK 6	Modern devices and processes of chemical production of light industry	4	exam
OK 7	Computer modeling of mechanical systems	4	exam
OK 8	Pedagogical practice	4	test
	Total from the cycle	16	
	The total amount of required components	**36**	
Selective components of the educational program			
DFCS	Disciplines of free choice of graduate student	12	credit / exam
	The total amount of sample components	**12**	
	TOTAL VOLUME OF THE EDUCATIONAL PROGRAM	**48**	

2.1.2 Content of the scientific component of the educational-scientific program of the third (educational-scientific) level of higher education

Search for scientific sources and their study. Defining the main tasks of the dissertation. Selection of optimal theoretical and / or experimental methods for their solution. Data mining, processing and analysis of the obtained results. Correction of initial hypotheses and problems in accordance with the results of the analysis. Preparation of scientific results for publication. Approbation of scientific results at scientific conferences of different levels. Generalization of research results. The final definition of the range of problems to be considered in the dissertation, establishing the place of research in the context of the results of other authors. Formation of conclusions and recommendations. Registration of work and submission to the defense. Dissertation defense.

The main scientific results of the dissertation must be covered in at least three scientific publications that reveal the main content of the dissertation. Such scientific publications include:

– at least one article in periodical scientific publications of other states that are members of the Organization for Economic Cooperation and Development and / or the European Union, in the field of science for which the applicant's dissertation was prepared.Such publication may be equated with publication in publications included in the list of scientific professional publications of Ukraine with the assignment of category "A", or in foreign publications indexed in the Web of Science Core Collection and / or Scopus databases;

– articles in scientific journals included in the list of scientific professional publications of Ukraine with the assignment of category "B" (instead of one article may be credited monograph or section of the monograph published in co-authorship).

A scientific publication in the first to third quartiles (Q 1 - Q 3) according to the SCImago Journal and Country Rank or Journal Citation Reports classification is equivalent to two publications that are credited according to the first paragraph of this paragraph.

Scientific publications are credited on the topic of the dissertation subject to the following conditions:

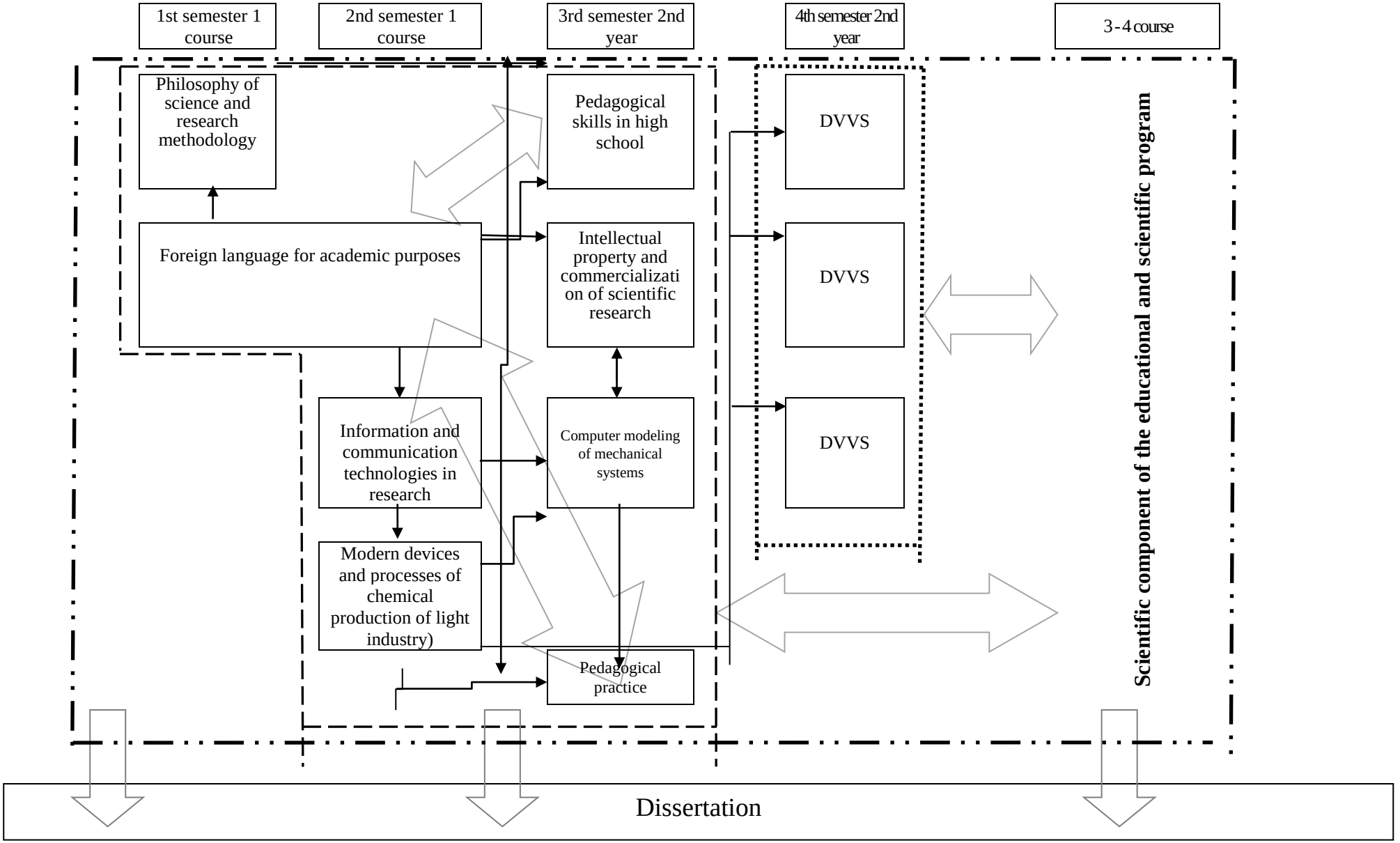
– substantiation of the obtained scientific results in accordance with the purpose of the article (task) and conclusions;

– publication of articles in scientific professional publications, which on the date of their publication are included in the list of scientific professional publications of Ukraine, approved in the manner prescribed by law;

– publication of articles in scientific periodicals of other states in the scientific field for which the applicant's dissertation was prepared, provided that the materials of the dissertation, determined by the council, are complete;

– publication of not more than one article in one issue (issue) of a scientific publication.

2.2 Structural and logical scheme of training a doctor of philosophyeducational and scientific program Industrial Engineering in specialty 133Industry engineering



3. Form of certification of applicants for higher education

Forms of certification of applicants for higher education	Attestation of the graduate of the educational program is carried out in the form of defense of the dissertation.
Document of higher education	Doctor of Philosophy with educational qualification: Doctor of Philosophy in Industrial Engineering.

4. Matrix of correspondence of program competencies to the components of the educational-scientific program

	GC 1	**GC 2**	**GC 3**	**GC 4**	**GC 5**	**GC 6**	**GC 7**	**PC 1**	**PC 2**	**PC 3**	**PC4**	**PC5**	**PC6**	**PC 7**	**PC 8**	**PC 9**	**PC 10**	**PC 11**
OK1	*	*	*	*			*	*		*							*	
OK2		*			*	*	*		*									*
OK3	*	*	*		*	*	*	*				*			*			
OK4	*	*	*	*		*	*	*					*			*		
OK5				*		*	*	*			*			*				
OK6	*	*								*	*			*		*		*
OK7	*	*				*				*		*	*		*	*		
OK8				*		*	*	*			*						*	

5. Matrix for providing program learning outcomes with relevant components of the educational and scientific program

	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**	**PLO 7**	**PLO 8**	**PLO 9**	**PLO 10**	**PLO 11**	**PLO 12**	**PLO 13**	**PLO 14**	**PLO 15**	**PLO 16**	**PLO 17**	**PLO 18**	**PLO 19**	**PLO 20**	**PLO 21**	**PLO 22**	**PLO 23**	**PLO 24**
OK1					*	*	*		*		*										*			
OK2				*						*										*		*		*
OK3	*	*				*							*	*	*		*		*	*				
OK4			*					*				*							*	*	*	*		
OK5	*	*																*				*		*
OK6	*			*		*				*						*		*			*			
OK7			*				*	*		*	*		*	*	*		*							
OK8		*	*													*		*	*		*		*	*