MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE
" Igor Sikorsky Kyiv Polytechnic Institute"

APPROVED
Academic Council of KPI. Igor Sikorsky
(Minutes № ___ from ___ _____ 2020)
Chairman of the Academic Council
_____ Mykhailo ILCHENKO

APPLIED MECHANICS

EDUCATIONAL AND SCIENTIFIC PROGRAM
third level of higher education
in specialty 131 Applied Mechanics

areas of knowledge 13 Mechanical engineering
Qualification: Doctor of Philosophy in Mechanical Engineering,
specializing in applied mechanics

Putted into effect by the
Rector's Order
of Igor Sikorsky KPI
from 17.09.2020 № 1/282

Kyiv - 2020

PREAMBLE

DEVELOPED by the project team:

Group leader: Bobyr Mykola Ivanovych, Doctor of Technical Sciences, Professor, Director of the Mechanical Engineering Institute of the National Technical University of Ukraine " Igor Sikorsky Kyiv Polytechnic Institute"

Group members:

- Salenko Alexander Fedorovich, Doctor of Technical Sciences, Professor, Professor of the Department of Machine Design;
- Pyskunov Sergii Olegovich, Doctor of Technical Sciences, Professor, Head of Department of Dynamics of Strength of Machines Materials and Strength of Materials;
- Okhrimenko Alexander Anatoliyovych, Doctor of Technical Sciences, Associate Professor, Professor of the Department of Machine Design;
- Gondlyakh Oleksandr Volodymyrovych, Doctor of Technical Sciences, Professor, Acting Head of the Department of Chemical, Polymer and Silicate Engineering
- Kvasnytsky Viktor Vyacheslavovich, Doctor of Technical Sciences, Professor, Head of the Department of Welding Production.

AGREED:

Scientific and methodical commission of Igor Sikorsky KPI, of spatiality 131 Applied Mechanics
Chairman of the SMCU 131_____ Mykola BOBYR

(Minutes № _2_ from "_02_" ____09____ 2020)

Methodical council of KPI named after Igor Sikorsky

Chairman of the Methodical Council _____ Yuriy YAKYMENKO

(Minutes № _1_ from "_03_" ____09___ 2020)

INCLUDED:

1. PROFILE OF THE EDUCATIONAL PROGRAM in specialty 131 Applied Mechanics

1 – General information	
Full name of the higher education institution and institute/faculty	National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Institute of Mechanical Engineering
Higher education degree and title of qualification in the original language	Doctor of Philosophy, Doctor of Philosophy in Applied Mechanics
The official name of the educational program	Applied mechanics
Type of diploma and scope of the educational program	PhD diploma, 45 credits, training period 4 years
Availability of accreditation	The program is not accredited. It is planned to submit the program for accreditation by the National Agency for Quality Assurance in Higher Education in 2021
Cycle/level of higher education	National qualifications framework of Ukraine – 9 level QF-EHEA – Third Cycle EQF-LLL – 8 level
Background	Master's degree
Language (s) of instruction	Ukrainian
Term of the educational program	Until the next accreditation
Internet address of the permanent placement of the educational program	osvita.kpi.ua mmi.kpi.ua,
2 – The purpose of the educational program	
Training of highly qualified specialists capable of solving complex scientific problems and scientific and technical problems in the field of applied mechanics and mechanical engineering in the conditions of sustainable innovative scientific and technical development of society and formation of high adaptability of higher education seekers in the conditions of labor market transformation through interaction with employers and other stakeholders. To contribute sustainable development society through the internationalization and integration of education, the latest research and innovation. Create conditions for comprehensive professional, intellectual, social and creative personality development at the highest levels of excellence in education and science environment.	
3 – Characteristics of the educational program	
Subject area	- object of activity: structures, machines, equipment, mechanical, in particular biomechanical and mechatronic, systems and complexes, processes of their design, manufacture, research and operation; - objectives of studying: professional activity in the field of scientific research, higher education, design, production and operation of technical systems, machines and equipment, robotic means and complexes, development of technologies of machine-building productions;

	- theoretical content of the subject area: laws of mechanics and their applications, theoretical principles of design, analysis and optimization of structures and technologies of machine production, organization and research of mechanical properties of materials, dynamics of machines and processes, behavior of liquids and gases, machine parts and structures, modeling and forecasting of operational properties of technical systems; - methods, techniques and technologies: analytical and numerical methods of calculation and analysis of machines and structures, mathematical and computer modeling and simulation of machines and mechanisms, methods and techniques of scientific theoretical and experimental research; information technology in research, design and production; - tools and equipment: machines, tools, technological and control devices, control and measuring information systems, hardware and software of research, machine and robotic systems.
Orientation of the educational program	Educational and scientific The structure of the program provides modern mastery of the own research methodology, scientific activity, the applicant's ability to identify and solve complex problems in the field of knowledge of applied mechanics and mechanical engineering, the solution of which is key to sustainable development and require new technologies.
The main focus of the educational program	Special education in the field of applied mechanics and mechanical engineering with the possibility of acquiring competencies for further scientific and teaching careers. Keywords: applied mechanics, mechanical engineering
Features of the educational program	Implementation of the program suppose the involvement of professionals - practitioners, industry experts, representatives of employers: some special courses in applied mechanics and mechanical engineering can be taught in English
4 – Suitability of graduates for employment and further study	
Suitability for employment	Production and technological activities: development of technical specification for design, manufacture, evaluation of technical and economic efficiency of design, examination of technical documentation in the field of applied mechanics and mechanical engineering.

	Organizational and managerial activity: organization of work of executors collectives, making of executive decisions, definition of the works performance order, a choice of optimum decisions at creation of production, development of plans and programs of the organization of innovative activity. Scientific, research and teaching activities: organization and conduct of scientific research, development of physical and mathematical models of the studied objects, preparation of scientific and technical publications. According to the classifier of professions DK 003: 2010
Further studying	Opportunity to study at the second scientific level of scientific higher education (doctor of sciences).
5 – Teaching and evaluating	
Teaching and studying	Lectures, practical and seminar classes, computer workshops and laboratory; technology of blended learning, practice and excursions; performance of dissertation work.
Evaluating	Rating system of assessment, oral and written exams, testing, defense of dissertation.
6 – Program competencies	
Integral competence	Ability to solve complex problems in the field of applied mechanics, including research and innovation activity, which involves a deep rethinking of existing and the creation of new holistic knowledge and/or professional practice.
General competences (GC)	GC1. Ability to identify and solve problems. GC2. Ability to make informed (justificated) decisions. GC3. Ability to generate new ideas (creativity). GC4. Ability to develop and manage projects. GC5. Ability to work in an international context. GC6. The ability to take socially responsible and conscious actions.
Professional competencies (PC)	PC1. Ability to critically analyze, evaluate and synthesize new and complex ideas in the process of research of mechanical structures, machines, materials and production processes of mechanical engineering based on the latest knowledge in the field of mechanics and related subject areas. PC2. Ability to present and discuss the results of own scientific work, in English in particular, orally and in writing, as well as a full understanding of foreign scientific texts in the specialty. PC3. Ability to generate new ideas and skills to justify new innovative projects and promote them on the market.

	PC4. Ability to critically comprehend problems in teaching, professional and research activities according to the latest level of engineering sciences achievements and at the border of subject areas. PC5. Ability to set a problem and identify ways to solve the problem by means of applied mechanics and related subject areas, knowledge of methods for finding the optimal solution in terms of incomplete information and conflicting requirements. PC6. Ability to plan and perform experimental research, process the experiment results on the base of using of modern information technology and microprocessor technology, to interpretation the results of nature or model experiments.

7 – Program learning outcomes (LO)

It is envisaged that as a result of training, the graduate must:

LO1) to know the general theory and methods of scientific research and be able to apply them in practice for the objects study in the field of mechanical engineering.

LO2) to perform a scientific search and to determine ways to solve problems on the basis of one ‘s results analysis.

LO3) to know the theory of planning experiments and evaluating methods for the their results reliability.

LO4) to have practical skills of academic writing in English and presentation of the their scientific work results in foreign scientific publications and conference proceedings.

LO5) to read and understand foreign texts in the specialty, present and discuss their scientific work in a foreign language.

LO6) to know the procedures and to have the skills to prepare research projects for domestic and international grants and competitions.

LO7) to have the skills in preparing of application materials for the protection of intellectual property rights.

LO8) to have the skills in the use of modern computer tools and information technology in scientific activities, in particular in the performance of experimental research.

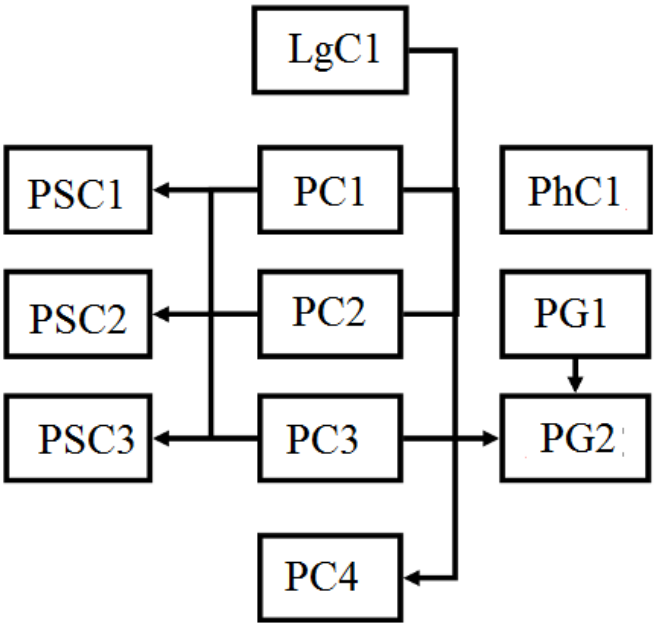
The Academic Council of a higher education institution (scientific institution) has the right to make a decision on the recognition of the competencies being acquired by a graduate student in other higher education institutions (scientific institutions) in one or more academic disciplines (to set off ECTS credits) compulsory acquirement of which is provided for in the educational and scientific program of postgraduate studies

8 – Resource support for the implementation of the program	
Staffing	In accordance with the staff requirements for ensuring the implementation of educational activities for the relevant level of higher education (Appendix 2 to the License Conditions) approved by the Resolution of the Cabinet of Ministers of Ukraine of December 30, 2015 № 1187, including the changes being made according by the Resolution of the Cabinet of Ministers of Ukraine of May 10, 2015 № 347
Material and technical support	In accordance with the technological requirements for material and technical support of educational activities of the relevant level of higher education (Appendix 4 to the Licensing Conditions), approved by the Resolution of the Cabinet of Ministers of Ukraine of December 30, 2015 № 1187, including the changes being made according by the Resolution of the Cabinet of Ministers of Ukraine of May 10, 2015 № 347
Information, educational and methodical support	In accordance with the technological requirements for educational and methodological and informational support of educational activities of the relevant level of higher education (Appendix 5 to the Licensing Conditions), approved by the Cabinet of Ministers of Ukraine dated December 30, 2015 № 1187 as amended by the Cabinet of Ministers of Ukraine №347 from May 10, 2018. Usage of the Scientific and Technical Library of Igor Sikorsky Kyiv Polytechnic Institute.
9 – Academic mobility	
National credit mobility	Based on bilateral agreements between the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and technical universities of Ukraine.
International credit mobility	Based on bilateral agreements between the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute” and educational institutions of partner countries, agreements on international academic mobility.
Studying of foreign applicants for higher education	Teaching in a foreign language or after studying the Ukrainian language course by foreign applicants.

2. LIST OF COMPONENTS OF THE EDUCATIONAL PROGRAM

Code	Components of the educational program (academic disciplines, course projects/works, practices, qualification work)	ECTS credits	Form of final control
Required (normative) components of the educational program			
Cycle of general background			
PhC1	Philosophical principles of scientific activity	6	Exam
LgC1	Foreign language for scientific activity	6	Exam
PG1	Organization of scientific and innovative activities	4	Credit
PG2	Pedagogical practice	2	Credit
Cycle of professional background			
PC1	Methods of design and calculation of machines and structures	3	Exam
PC2	Reliability of machines and structures	3,5	Exam
PC3	Machine dynamics and control processes	3	Exam
PC4	Diagnostics and quality assurance systems	2,5	Credit
Selected components of the educational program			
Cycle of professional background			
PSC1	Educational component 1 of the University-wide catalog	5	Exam
PSC2	Educational component 2 of the University-wide catalog	5	Exam
PSC3	Educational component 3 of the University-wide catalog	5	Credit
The total amount of **required components**:		30	
The total amount of **selected components**:		15	
The amount of educational components **that ensure the acquisition of competencies defined by the higher education system**		30	
TOTAL SCOPE OF THE EDUCATIONAL PROGRAM		**45 credits**	

3. STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROGRAM



4. SCIENTIFIC COMPONENT

Year of study	The content of the scientific work of the graduate student	Form of control
1 year	The choice and substantiation of the topic of own scientific research, determination of the content, terms of performance and scope of scientific works; selection and substantiation of the methodology of conducting of own research, review and analysis of existing views and approaches that have developed in modern science in the chosen field. Preparation and publication of at least 1 article (usually a review) in scientific professional publications (domestic or foreign) on the research topic; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Approval of the individual plan of the graduate student's work at the academic council of the institute/faculty, reporting on the progress of the individual graduate PhD student's plan twice a year.
2 year	Conducting of own research under the guidance of the supervisor, which involves solving research problems with a set of theoretical and empirical methods. Preparation and publication of at least 1 article in scientific professional publications (domestic or foreign) on the research topic; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the individual graduate Phd student's plan twice a year.
3 year	Analysis and generalization of the obtained results of own scientific research; substantiation of scientific novelty of the obtained results, their theoretical and/or practical significance. Preparation and publication of at least the 1 article in scientific professional publications on the research topic; participation in scientific and practical conferences (seminars) with the publication of abstracts.	Reporting on the progress of the individual graduate Phd student's plan twice a year.
4 year	Paperwork of the scientific achievements of a graduate student in the form of a dissertation, summing up the completeness of coverage of the results of the dissertation in scientific articles according to the current requirements. Implementation of the results obtained and obtaining supporting documents. Submission of documents for preliminary examination of the dissertation. Preparation of a scientific report for final attestation (dissertation defense).	Reporting on the progress of the individual graduate Phd student's plan twice a year. Providing an opinion on the scientific novelty, theoretical and practical significance of the results of the dissertation.

5. FORM OF GRADUATION CERTIFICATION FOR HIGHER EDUCATION APPLICANTS

Final exam of applicants for higher education in 131 Applied Mechanics is conducted in the form of dissertation defense and ends with the issuance of a standard document on awarding him the degree of Doctor of Philosophy with the qualification of Doctor of Philosophy in Mechanical Engineering in 131 Applied Mechanics.

Final qualifying work graduate must demonstrate the ability to solve complex problems and issues in applied mechanics and engineering through research and innovation.

The qualifying work of the applicant is subject to mandatory testing for academic plagiarism.

Final exam is open and public.

6. MATRIX OF CORRESPONDENCE OF PROGRAM COMPETENCIES TO THE COMPONENTS OF THE EDUCATIONAL PROGRAM

	PhC1	LgC1	PG1	PG2	PC1	PC2	PC3	PC4	PSC1	PSC2	PSC3	Scientific component
GC 1			x									x
GC 2			x									x
GC 3			x									x
GC 4				x								x
GC 5		x										x
GC 6	x											
PC 1					x							x
PC 2		x										x
PC 3			x									x
PC 4						x						x
PC 5							x					x
PC 6						x		x				x

7. MATRIX FOR ENSURING PROGRAMMATIC RESULTS BACKGROUND WITH APPROPRIATE COMPONENTS OF EDUCATIONAL PROGRAMS

	PhC1	LgC1	PG1	PG2	PC1	PC2	PC3	PC4	PSC1	PSC2	PSC3	Scientific component
LO 1			x		x							x
LO 2	x					x						x
LO 3						x						x
LO 4		x	x									x
LO 5		x	x		x	x	x	x				x
LO 6			x	x								x
LO 7			x									x
LO 8					x	x	x	x				x