



INTRODUCTION TO THE PROFESSION

Working program of educational discipline (Syllabus)

Requisites of the Course

Cycle of Higher Education	<i>First (bachelor's)</i>
Branch of knowledge	<i>16 Chemical and Bioengineering</i>
Specialty	<i>163 Biomedical Engineering</i>
Educational program	<i>Medical Engineering</i>
Course status	<i>Mandatory discipline</i>
Mode of study	<i>full-time / day / mixed / remote</i>
Year of study/Semester	<i>1st year (autumn semester)</i>
ECTS workload	<i>4 ECTS credits / 120 hours</i>
Testing and Assessment	<i>Final Test, Module Test , Homework</i>
Course schedule	<i>According to the schedule on the site http://rozklad.kpi.ua/</i>
Language of instruction	<i>English</i>
Information about course supervisor / teachers	<i>Lecturer: Dr. med.nauk., prof. Department of BMI Maksymenko Vitaliy, e-mail – maksymenko.vitaliy@gmail.com. Associate Professor of BME, Candidate of Biological Sciences Kalashnikova Larysa , e-mail – doc_hom2000@yahoo.com Practical: Associate Professor of BME, Candidate of Biological Sciences Kalashnikova Larysa , e-mail – doc_hom2000@yahoo.com</i>
Course placement	<i>Platform «Sikorsky» - course "Introduction to the profession" https://do.ipk.kpi.ua</i>

Distribution of hours

Semester	Lectures	Practical	Laboratory	Self-study
<i>spring semester</i>	28	44		48

Curriculum of the discipline

1. Course description, goals, objectives, and learning outcomes

The Course "Introduction to the profession" belongs to the cycle of normative disciplines of professional training. It is designed for first-year bachelors who do not have a systematic understanding of the specialty.

Biomedical engineering has more than 18 specializations that are generally recognized by leading educational institutions. Representation of them is a necessary component of determining the role and place of the future graduate in the education system and the labor market. Biomedical engineering arose at the intersection of the humanities and engineering disciplines. Requires a deep understanding of biological and technical sciences. These challenges require the training of engineers capable of interdisciplinary collaboration at every stage of research, development, operation of medical devices and related technologies. According to international educational programs, the theoretical content of disciplines includes the main problems at the intersection of engineering and medical science, including: the evolution of medical equipment, a deep understanding of the principles of engineering technology in health care, basics of their management and quality standards.

The discipline "Introduction to the profession" acquaints students with the legal and regulatory framework of the profession, offers for further in-depth training the basic tools needed at the beginning of

training to search and process educational information, its understanding and presentation. The practical part is aimed at solving problems of analysis of information sources, modeling and planning of research, understanding of the terminological basis of medicine and biology, technologies and methods of preparation of scientific reports, articles, presentations.

The purpose of the discipline: formation of medical-engineering worldview on the basis of generalized and systematized basic knowledge for training specialists able to apply knowledge in practical situations, understand the subject area of professional activity, use information and communication technologies, process and analyze information from various sources, identify, formulate and solve engineering problems related to the interaction between living and non-living systems. Skills are required to study the Course:

General competencies (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

GC 1 - Ability to apply knowledge in practical situations

GC 2 - Knowledge and understanding of the subject area and understanding of professional activity

GC3 - Ability to communicate in the state language both orally and in writing

GC 4 - Skills in the use of information and communication technologies

GC 5 - Ability to perform research at the appropriate level.

GC 6 - Ability to search, process and analyze information from various sources.

GC 7 - Ability to generate new ideas (creativity).

GC 8 - Ability to make well-grounded decisions

GC 9 - Ability to communicate with representatives of other professional groups of different levels (with experts from other fields of knowledge / types of economic activity).

GC 10 - Safe activities skills.

Special (professional) competencies (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

PC 3 - Ability to study and apply new methods and tools for analysis, modeling, design and optimization of medical devices and systems.

PC 5 - Ability to apply physical, chemical, biological and mathematical methods in the analysis, modeling of the functioning of living organisms and biotechnical systems.

PC 9 - Ability to identify, formulate and solve engineering problems related to the interaction between living and non-living systems.

PC 12 - Ability to develop, plan and apply mathematical methods in the analysis, modeling of the functioning of living organisms, systems and processes in biology and medicine.

The program learning outcomes after studying the discipline "Introduction to the profession" are (OPP was put into effect by the Rector's Order NON/ 89/2021 of 19.04.2021):

PLO 1 - Understanding of fundamental-applied, medical-physical and bioengineering bases of technologies and equipment for research of processes of a human body.

PLO 24 - Knowledge of the basic methods and tools used to quantify the functioning of physiological systems.

PLO 29 - Professional communication with healthcare professionals in the state and foreign languages (English or one of the other official EU languages) and understanding of their requirements for biomedical products and services.

2. Prerequisites and postrequisites of the course (place in the structural and logical scheme of education according to the relevant educational program)

The discipline "Introduction to the profession" is a normative discipline belongs to the cycle of professional training and has an interdisciplinary nature. It is the foundation for understanding the role and place of other disciplines in the education of biomedical engineer, integrates according to its subject, the basic characteristics and definitions of other educational and scientific fields of the profession: Biomechanics, Biophysics, Anatomy and Physiology. According to the structural and logical scheme of the bachelor's program is closely related to other disciplines of the professional unit (Analysis and design of electronic medical equipment, Undergraduate practice and Diploma design) and disciplines of language and practical training unit, as it is the basis for understanding their relationship and meaning in the bachelor's program.

3. Course Overview

The main sections and topics that will be considered in the process of studying the course:

Section 1. Paradigm of biomedical engineering

*Topic 1.1. History of biomedical engineering / History of the Faculty of Biomedical Engineering KPI.
Igor SIKORSKY*

Topic 1.2. Biomedical engineering in the global health system.

Topic 1.3. Classification of technologies and tools of biomedical engineering

Topic 1.4. Engineering aspects of medical and biological technologies

*Topic 1.5. IT technologies in health care / Biomechanics, rehabilitation engineering, robotics /
Biotechnology, translational bioengineering*

Section 2. Methodology of scientific research

Topic 2.1. Features of scientific work

Topic 2.2. Fundamentals of scientific publication. Fundamentals of scientific report

Topic 2.3. Method of educational discussion

Section 3. Biomedical ethics

*Topic 3.1.. Bioethics: its subject, status and range of problems Ethics of relations in the system
"doctor-patient" Principles and rules of biomedical ethics*

Topic 3.2. Moral aspects of biomedical research and experiments on humans and animals

Topic 3.3 .. "Open" problems of biomedical ethics.

4. Coursebooks and teaching resources

Basic:

1. Bielík Lukáš Methodology of science an introduction /Comenius university in Bratislava · 2019, 216 p
https://fphil.uniba.sk/fileadmin/fif/katedry_pracoviska/klmv/bielik/Bielik-Methodology_of_Science.pdf
2. Ranjit Kumar RESEARCH METHODOLOGY a step-by-step guide for beginners
Typeset by C&M Digital (P) Ltd, Chennai, India Printed and bound in Great Britain by TJ
International Ltd, Padstow, Cornwall Printed on paper from sustainable resources 2019.- 336 p/
[http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-
Research_Methodology_A_Step-by-Step_G.pdf](http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf)
3. Kothari C.R. Methods Research

[https://www.cusb.ac.in/images/cusb-iles/2020/el/cbs/MCCOM2003C04% 20\(Business%20Research%20](https://www.cusb.ac.in/images/cusb-iles/2020/el/cbs/MCCOM2003C04%20(Business%20Research%20)

4. Zaporozhan V. M., Aryayev M. L. Bioethics Odessa The Odessa State Medical University 2008.-289 p

<https://repo.odmu.edu.ua/xmlui/bitstream/handle/123456789/1211/ZaporozhanBioethics.pdf?sequence=1&isAllowed=y>

. 5. The Cambridge Textbook of Bioethics / Editor-in-Chief Peter A. Singer University of Toronto and University Health Network, Canada Executive Editor A. M. Viens Hertford College, Oxford, UK, CAMBRIDGE UNIVERSITY PRESS Cambridge, New York, Melbourne, Madrid, Cape Town Singapore, São Paulo, 2008.- 555 p

<https://vulms.vu.edu.pk/Courses/BIF402/Downloads/The-cambridge-textbook-of-bioethics.pdf>

Supplementary:

1. Bright Wilson E. An Introduction to Scientific Research

<https://pdfs.semanticscholar.org/f885/7ef1851b6a1b4d7c8d2cc6b4a54c2b475743.pdf>

2. Introduction toScientific Research, Eleventh Edition 2011

https://kupdf.net/download/introduction-to-scientific-research_5c0a2190e2b6f5604066dd36_pdf

3. Karen L. Rich Introduction to Bioethics and Ethical Decision Making.

http://samples.jbpub.com/9781284059502/chapter_2_sample.pdf

4. Rahul Mohan Bioethics: An Overview https://www.asiabiotech.com/15/1505/0034_0035.pdf

5. Principles of Clinical Ethics and Their Application to Practice 2021

<https://www.karger.com/Article/FullText/509119>

Educational content

5. Methods of mastering the discipline (educational component)

№ s/n	Subject	Program learning outcomes	The main tasks	
			Control measure	Термін виконання
1	History of Biomedical Engineering / History of the Faculty of Biomedical Engineering KPI. Igor SIKORSKY.	PLO 1 PLO 24 PLO 29	Practical work 1	1 st week
2	Biomedical engineering in the global health system	PLO 1 PLO 24 PLO 29	Practical work 2-3	2 nd week
3	Classification of technologies and means of biomedical engineering	PLO 1 PLO 24 PLO 29	Practical work 4	3 rd week
4	Classification of medical equipment. General block diagram of the equipment	PLO 1 PLO 24 PLO 29	Practical work 5-6	4 th week
5.	General characteristics of data acquisition devices	PLO 1 PLO 24 PLO 299	Practical work 7	5 th week
6.	Devices of network and registration of biomedical signals	PLO 1 PLO 24 PLO 29	Practical work 8-9	6 th week
7	Stimulators and generators. Principles of structure, Characteristics Features of scientific work	PLO 1 PLO 24 PLO 29	Practical work 10	7 th week
8.	Features of scientific work	PLO 1	Practical work	8 th week

		PLO 24 PLO 29	11-12	
9	Fundamentals of scientific publication. Fundamentals of scientific report	PLO 1 PLO 24 PLO 29	Practical work 13	9 th week
10.	Method of educational discussion	PLO 1 PLO 24 PLO 29	Practical work 14	10 th week
11.	IT technologies in healthcare / Biomechanics, rehabilitation engineering, robotics / Biotechnology, translational bioengineering	PLO 1 PLO 24 PLO 29	Practical work 15	11 th week
12	Bioethics: its subject, status and range of problems Ethics of relations in the system "doctor-patient"	PLO 1 PLO 24 PLO 29	Practical work 16-17	12 th week
13	Moral aspects of conducting biomedical research and experiments on humans and animals	PLO 1 PLO 24 PLO 29	Practical work 18	13 th week
14	Open "problems of biomedical ethics	PLO 1 PLO 24 PLO 29	Practical work 19	14 th – 15 th week
	Module test	PLO 1 PLO 24 PLO 29	Practical work 20	16 th week
	Home test	PLO 1 PLO 24 PLO 29	Practical work 21	17 th week
15	Final tests		Practical work 22	18 th week

6. Self-study

One of the main types of semester control during the mastering of the discipline "**Introduction to the profession**" is the performance of homework. Homework is performed in accordance with the requirements, within the period specified by the teacher.

The main purpose of homework - mastering the material taught in lectures and independent theoretical material. The student can write homework only on the subject agreed with the teacher

Approximate subject of reports:

1. Biomedical ethics: the goal of biomedical ethics, the basic understanding and the principle.
2. The problem of life and death in biomedical ethics.
3. Ethical comprehension of the problems of genetic engineering.
4. Moral and legal aspects of transplantology
3. Ethical and deontological principle in oncology.
5. Misce of biomedical ethics in the structure of ethical knowledge.
6. Features of professional ethics. Medical ethics as a type of professional ethics.
8. For moral values in medicine.
9. Principles of biomedical ethics.
10. Rules of biomedical ethics.
12. Features of bioetics. Bioetics yak social institute.

13. Problems in the field of bioethics
14. Ethical problems of new reproductive technologies.
15. Moral aspects of death and death

Homework is a current control measure that covers practical skills in applying modern tools and technologies for searching, processing and analyzing information, researching interdisciplinary areas related to biomedical engineering using modern tools, critically analyzing the results of own research and the results of other researchers in context the whole set of modern knowledge about the researched problem.

The title page of the Homework should have the following content: the name of the university; name of the faculty; name of department; name of specialty, name of educational-professional program, name of academic discipline; theme of calculation and graphic work; surname and name of the student, course, number of the academic group, year.

The title page is followed by a detailed plan (content) of the Homework in which it is necessary to highlight the introduction, sections of the main content (main topics studied), their subdivisions (if necessary), conclusion, list of sources used. The table of contents on the right indicates the page numbers at the beginning of each question. Each section begins on a new page.

The total amount of Homework, depending on the chosen topic, can vary from 15 to 20 pages of the main text (in agreement with the teacher). The scope of Homework work is determined by the student's ability to briefly and at the same time comprehensively explain and analyze the educational material. Mandatory requirement: clear reference to sources of information. All figures, facts, opinions of scientists, quotations, formulas must have a reference in the form of [2] (number means the number of the source in the list of references at the end of the creative work. The list of used sources (at least 5 sources) taken from the Internet, you need, as for ordinary literature, specify the author, the title of the article, and then provide the address of the site on the Internet.

Homework is evaluated by the following criteria: the logic of the plan; completeness and depth of disclosure of the topic; correct formulation of conclusions and conclusions; design; substantiation of the student's own opinion on this issue in the form of a conclusion.

Deadline for submission of calculation and graphic work for verification: 13-14th week of study. Homework is not tested for plagiarism, but must meet the requirements of academic integrity. In case of academic dishonesty, the work is canceled and not checked.

Policy and control

7. Attendance policy

Attending classes

Attendance at lectures is optional. Attending practical classes is desirable. All works and activities are aimed at the students' compliance with the assessment rating requirements. A significant part of a student rating is formed through active participation in activities in practical classes. Therefore, skipping a practical class does not allow a student to get points in the semester rating. General assessment takes place according to a scheme of the agreed grading system. Expected learning outcomes, control measures and deadlines are announced to students in the first practical class.

Control measures missed

Missed control measures (defense of practical work) can be worked out during the next classes, (provided that the task is scheduled for the current lesson), or in consultations.

Skipped express tests/ quizzes cannot be completed.

Skipped Module Test can be worked out in consultations.

Violation of deadlines, penalty points and rewarding points

Rewarding points		Penalty points*	
Criterion	Weight points	Criterion	Weight points
Improving and expanding the topic of Hometest	1 point (for each practical work)	Uncorrect of Home work	From -0.5 points to -5 points (depending on the delivery date)
Passing distance courses on topics that are agreed with teachers	5 points	Untimely implementation of a Home Test	- From -1 points to -3 points (depending on the delivery date)

* if the control measure was missed for a good reason (illness, which is confirmed by a certificate of the established sample) - penalty points are not accrued.

Academic integrity

The policy and principles of academic integrity are defined in Section 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: <https://kpi.ua/code>.

Norms of ethical behavior

Normative principles of behavior of students and employees, defined in sections 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: <https://kpi.ua/code>.

Procedure for appealing the results of control measures

Students have the opportunity to raise any issue related to the control procedure and expect it to be addressed according to predefined procedures.

The student has the right to appeal the results of the control measure according to the approved provision on appeals in the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (approved by the order №NON/128/2021 from 20.05.2021) - <https://osvita.kpi.ua/index.php/node/182>

Inclusive education

The course "**Introduction to the profession**" can be taught to the most of students with special educational needs.

Distance learning

Distance learning takes place through the Sikorsky Distance learning Platform «Sikorsky».

Distance learning through additional online courses on certain topics is allowed subject to agreement with students. If a small number of students wish to take an online course on a specific topic, studying the material with such courses is allowed, but students must complete all the tasks provided in the discipline.

The list of courses is offered by the teacher after the students have expressed a desire (because the bank of available courses is updated almost every month).

The student provides a document confirming the completion of the distance course (in the case of a full course) or provides practical tasks from the distance course and subject to an oral interview with the teacher on the topics can receive grades for control measures provided for the studied topics (express control / test tasks, practical work).

Performance of practical works is carried out during independent work of students in a remote mode (with a possibility of consultation with the teacher through e-mail, social networks).

Teaching in a foreign language

Teaching in English is carried out only for foreign students.

At the request of students, it is allowed to study the material with the help of English-language online courses on topics that correspond to the topics of specific classes.

8. Monitoring and grading policy

Grading system (current control):

No s/n	Control measure	%	Weight points	Number	Total
1.	Express control works	15	3	5	15
2.	Active work on a practical classes	30	5	6	30
3.	Module Test (MT)	25	25	1	25
4.	Homework	30	30	1	30
5.	Final Test ¹	70	70	1	70
<i>Total</i>					100

In the final practical class of the course, students will add their rewarding points, if there are any, to the performance score, and /or subtract their penalty points if there are any, from the performance score, and in case it is in total higher than 60 points, they may either get their Pass or take the Final Test to improve their grade. If the grade for the Final Test is higher than the final performance grade, the student receives the grade based on the results of this Test. If the grade for the Test is lower, the final performance grade is cancelled and the student receives a grade based on the results of the Test.

Students whose final performance grade is 30-60 points have to take the Final Test in order to complete the course.

Students whose score is below 30 did not meet the requirements of the course and are not allowed to take the Final Test.

Calendar control (CC) is performed twice a semester as monitoring of the current state of compliance with syllabus requirements.

The purpose of calendar control is to improve the quality of student learning and monitor the implementation of the schedule of the educational process by students.

Criterion		The first CC	The second CC
Deadline of calendar controls		8th week	14th week
Conditions for obtaining a positive calendar control	Current grade		≥ 24 балів
	Execution of practical work	КП №№1-4	+
		КП №№5-8	-
	Express control works /quizzes	At least 4 of any lectures	+
		At least 8 of any lectures	-
Module Test	Estimated MCW	-	

In the case of a plagiarism or an academic poor quality during training the control measure is not credited.

¹ Taken into account in the amount of the rating together with the grade for CGW in case the student has not scored 60 points per semester or he wants to improve his grade.

Semester certification of students

Mandatory requirements for the admission to the Final Test		Criterion
1	Current grade	$RD \geq 40$
2	All practical works are completed	More than 0 points
	Obtaining a positive assessment for the performed Home Test	More than 15 points
	Obtaining a positive assessment for the performed Module Test	More than 10 points
3	Writing at least 3 express control works	More than 6 points

The results are announced to each student separately in the presence or remotely (by e-mail). It is also recorded in the "Electronic Campus" system.

Optional requirements for admission to closure:

1. Active work during practical classes.
2. Positive result of the first and the second calendar control.
3. Attending of lectures.

The final performance score or the results of the Final Test are adopted by university grading system as follows:

Number points	Assessment on the university scale
100-95	Excellent / Відмінно
94-85	Very good / Дуже добре
84-75	Good / Добре
74-65	Satisfactory / Задовільно
64-60	Sufficient Enough / Достатньо
Less 60	Unsatisfactory / Незадовільно
The course requirements are not met	Not allowed / Не допущено

9. Additional information on the course (educational component)

The list of questions for preparation for modular control work, and also for preparation for credit is given in appendix 1.

Distance learning through additional online courses on certain topics is allowed subject to agreement with students. If a small number of students wish to take an online course on a specific topic, studying the material with such courses is allowed, but students must complete all the tasks provided in the discipline.

The list of courses is offered by the teacher after the students have expressed a desire (because the bank of available courses is updated almost every month).

The student provides a document confirming the completion of the distance course (in the case of a full course) or provides practical tasks from the distance course and subject to an oral interview with the teacher on the topics can receive grades for control measures provided for the studied topics (express control / quizzes, practical work).

Work program of the course (syllabus):

is developed by Associate Professor of BME, Candidate of Biological Sciences Larisa Kalashnikova

Approved by the Department of Biomedical Engineering (protocol № ___ to _____)

Approved by the Methodical Commission of the Faculty of Biomedical Engineering (protocol № ___ to _____)

**The list of questions for preparation for the Module Test,
And also for preparation for the Final test**

1. The main provisions of scientific epistemology
2. Classification and structure of scientific information
3. Norms of scientific ethics
4. Comparative characteristics of theoretical research methods
5. Classification of scientific documents
6. Norms of scientific ethics in the publication of scientific work
7. Identify the features of methodological principles of scientific research.
8. Describe the main methods of scientific research.
9. Biomedical ethics: goals and objectives of biomedical ethics, basic concepts and principles.
10. Ethical understanding of the problems of genetic engineering.
11. Types of transplantation. Moral and legal aspects of transplantology
12. Principles of biomedical ethics.
13. Rules of biomedical ethics.
14. Bioethics as a social institution.
15. The problem field of biomedical ethics. Communication in the triad of bioethics, biomedical ethics, medical ethics
16. Doctor and patient: ethical models of interaction.
17. The problem of determining the beginning of human life. Moral status of the embryo.
18. Ethical and medical problems of abortion.
19. Ethical dilemmas of eugenics
20. Ethical problems of new reproductive technologies. Artificial insemination.
21. Ethical problems of new reproductive technologies. In vitro fertilization
22. Ethical problems of new reproductive technologies. Surrogacy
23. Biological and clinical death. The problem of "brain death". Development of the criterion of death
24. The concept of euthanasia. Passive and active euthanasia.
25. Moral, legal and organizational aspects of transplantation. Methods of organ harvesting.
26. Ethics committees: status, mechanisms of creation, functions and tasks.
27. Rule of three R. Ethical standards for the use of animals in biomedical research.
28. Ethical norms of experiments and human participation. Nuremberg Code.
29. Biomedical ethics: the origin and place in the system of scientific, ethical and social knowledge
30. Modern models of doctor-patient relations in the mirror of the principles and rules of biomedical ethics
31. Causes and conditions of biomedical ethics.
32. Historical stages of development of biomedical ethics
33. Biomedical ethics as a social institute
34. Bioethical aspects of the use of animals in biomedicine. Moral code for working with laboratory animals.
35. Moral problems of the project "Human Genome".
36. The Nuremberg Code - an ethical aspect.
37. The concept of euthanasia. For and against euthanasia
38. Methods of genetic technologies. Definition and main function
39. Ethical problems of free embryos.

40. *Paternalistic and non-paternalistic models of bioethics*
41. *Describe the concept of bioethics "information consent"*
42. *Justice in bioethics. Levels of justice. Basic ideas of justice.*
43. *Define "quality of life" according to the WHO Scope of "quality of life"*
44. *Basic principles of research quality of life*
45. *Describe aspects of "quality of life"*
46. *The role of the commission on bioethics in Ukraine.*