

MINISTRY of EDUCATION and SCIENCE of UKRAINE

Ternopil Ivan Puluj national technical university

EDUCATIONAL-PROFESSIONAL PROGRAMME

«Electrical engineering»

of the first (Bachelor's) level of higher education

on specialty 141 Electrical engineering

Branch of knowledge 14 Electrical engineering

Qualification: Bachelor in Electrical engineering

APPROVED BY ACADEMIC COUNCIL

**of Ternopil Ivan Puluj national
technical university**

Head of Academic council


_____ **P.V. Yasniy**

(Minutes № 7 of August 30, 2019)

Educational program is launched on September 5, 2019



Rector _____ **P.V. Yasniy**

Ternopil- 2019

Preface

Educational-professional program was developed according to the current standard of higher education on specialty 141 «Electrical engineering», branch of knowledge 14 «Electrical engineering» for the first (Bachelor's) level of higher education

Project group manager (Head of educational program):

Tarasenko Mykola, Doctor of Science (Engineering), Prof.
Head of Electrical engineering department

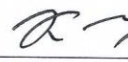


Members:

Andriychuk Volodymyr, Doctor of Science (Engineering), Prof.



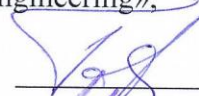
Kuzemko Nataliia, PhD (Engineering), Ass.Prof.



Reviews of external stakeholders:

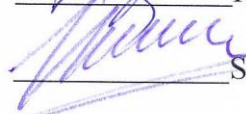
Reviews on educational-professional program «Electrical engineering».

Director of LLC «VV»



Honchar V.V.

Director of LLC SPE «Teplobak»



Shevchenko T. V.

Letter of Approval
of educational-professional program

Discussed and approved on the Electrical engineering Department Meeting
(Meeting Minutes № 1 of August 27, 2019)

Head of EE Department



Tarasenko M.H.

Discussed and approved by scientific-methods commission
of Applied Information Technologies and Electrical Engineering Faculty
(Meeting Minutes № 1 of August 28, 2019)

Head of scientific-methods commission



Kapatsila Y.B.

Discussed and approved by the Academic council of Applied Information Technologies and Electrical
Engineering Faculty
(Meeting Minutes № 1 of August 28, 2019)

Dean



Yaskiv V.I.

**Syllabus characteristics
on specialty 141 Electrical engineering**

1 – General information	
Full name of higher educational establishment and a structural subdivision	Ternopil I.Puluj national technical university, Electrical engineering Department
Full name of qualification	Bachelor in Electrical engineering
Program official name	Educational program of the specialty 141 «Electrical engineering» branch of knowledge 14 «Electrical engineering»
Diploma type and number of credits according to the program	Bachelor’s Diploma (Single Honours), 240 credits ECTS / 4 years of study;
Accreditation	Accreditation commission of Ukraine (National agency of higher education quality assurance), Ukraine Certificate of accreditation of specialty 141 Electrical engineering of series НД № 2087403 dated 02.07. 2017. Valid to July 1, 2024.
Cycle/level	FQ-EHEA – first cycle, EQF LLL – 6 th level, HPK – 6 th level/Bachelor
Requirements	Certificate of complete general secondary education, or educational-qualification level “Junior Specialist”
Language(s) of instruction	English
Educational program validity	till June 1, 2024
Permanent Internet address of educational program description	http://tntu.org.ua/docs/osvprograma-bak.pdf
2-Purpose of the educational-professional program	
Training of specialists able to solve practical problems and complex specialized tasks characterized by complex and uncertain conditions and involving the use of theories and methods of electrical engineering and electromechanics within their professional activity in the field of electrical power engineering, electrical engineering and electromechanics.	
3 – Characteristics of the educational-professional program	
Subject area (branch of knowledge)	Electrical engineering
Educational program orientation	Educational-professional
Main focus of the educational program and specialization	General education on specialty Electrical engineering
Specific features	Practical training in power-producing companies is required.
4 - Graduates suitability for employment and further education	
Suitability for employment	Power engineer, production power engineer, production area power engineer, workshop power engineer, power dispatcher, technician on bioenergy plants operation, expert in non-traditional power sources, technician on wind energy plants operation, technician on hydropower plants operation, technician on solar energy plants operation, technician-electrician, technician-power engineer
Further education	Possible study on the program of second cycle FQ-EHEA of level 7 EQF-LLL and of level 8 HPK

5 – Teaching and Assessment	
Teaching and study	Passive (explanatory-illustrative); active (problem, game, interactive, project, information-computer self-developing) and through laboratory training - according to dominating techniques and ways of teaching.
Assessment	Students' progress in study is estimated according to 100-mark, 4-mark ("excellent", "good", "satisfactory", "unsatisfactory") and verbal ("passed", "not passed") systems. Kinds of control: current, theme, random, final, self-control. Forms of control: oral and written questioning, tests, design projects, term papers and projects, laboratory reports, presentations, reports on internship programs and scientific-research papers, certification exam etc.
6 – Program competences	
Integral competence (IC)	Be able to solve practical problems and complex specialized tasks characterized by complex and uncertain conditions and involving the use of theories and methods of electrical engineering and electromechanics within their professional activity or in the study process in the field of electrical power engineering, electrical engineering and electromechanics.
General competences (GC)	<p>GC 1 Ability in applying theoretical knowledge in practice.</p> <p>GC 2. Be able to speak and write in state language.</p> <p>GC 3. Be able to speak a foreign language.</p> <p>GC 4. Be able to apply information and communication technologies.</p> <p>GC 5. Be able to search, process and analyze information from different sources.</p> <p>GC 6. Be able to see, set and solve problems.</p> <p>GC 7. Be able to make reasonable decisions.</p> <p>GC 8. Ability of team work.</p> <p>GC 9. Be able to communicate with representatives of other professional groups of various levels.</p> <p>GC 10. Be able to act as a socially responsible and conscious person.</p>
Professional competences of the specialty (PC)	<p>PC 1. Ability in using computer-aided systems of automated design (CAD), manufacture (CAM) and engineering calculations (CAE).</p> <p>PC 2. Ability in theoretical substantiating of the decisions made within carrying out design-engineering and research work.</p> <p>PC 3. Be able to apply conceptual knowledge of higher mathematics, physics and theoretical principles of electrical engineering to solve complex practical problems in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>PC 4. Ability to apply professional knowledge in electric networks and systems, stations and substations electrical part, high voltage engineering for practical problems solving in the field of electrical power engineering</p> <p>PC 5. Ability to apply knowledge in metrology and electric measurements, automatic control theory, relay protection and computer-aided power systems for solving the problems of optimization, control and security in electric power engineering.</p> <p>PC 6. Ability to use knowledge in electric machines, apparatuses and electric drive theory for practical problems solving in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>PC 7. Ability in following the standards, norms and specifications in electrical power engineering, electrical engineering and electromechanical equipment design</p> <p>PC 8. Ability to use modern methods of calculations, design and operation analysis of electrical power engineering and electromechanical systems</p>

PC 9. Ability to find and provide the most effective and power saving operational modes of electrical power engineering, electrical engineering and electromechanical equipment

PC 10. Ability to write and submit operational and other documents aimed at providing the rules of equipment maintenance and job management at electrical power engineering and electromechanics plants

PC 11. Ability in keeping to the requirements of safety regulations at electrical power engineering and electromechanical complex plants.

7 – Program learning outcomes (PLO)

PLO 1. Determine the principles of construction and normal operation of electrical power engineering, electrical engineering and electromechanical complexes and systems components.

PLO 2. Determine construction and operation principles of control and computer-aided systems components of electrical power engineering, electrical engineering and electromechanical complexes.

PLO 3. Estimate the electrical power system operation and develop measures to increase its efficiency.

PLO 4. Apply the computer-aided design systems (CAD), manufacture (CAM), and engineering calculations (CAE) for power systems static and dynamic stability calculation and analysis.

PLO 5. Analyze processes in electrical power engineering, electrical engineering and electromechanical equipment.

PLO 6. Collect information about the worst emergencies in the field of electrical power engineering to avoid such accidents in future.

PLO 7. Combine traditional and alternative power engineering to increase reliability and efficiency of power systems.

PLO 8. Estimate risks at doing some work in electric devices.

PLO 9. Estimate the operation reliability of power systems electric plants and electric power consumers under external influences electromagnetic obstacles conditions.

PLO 10. Find necessary information in information field.

PLO 11. Hold a discussion on professional topics.

PLO 12. Read professional literature both in native and foreign languages.

PLO 13. Follow the main principles and tasks of ecological safety of power engineering plants.

PLO 14. Explain the importance of traditional and renewable power engineering for stable economic development of the country.

PLO 15. Follow the principles of European democracy and respect to the citizens' rights.

PLO 16. Keep to the requirements of ecological safety of power engineering plants.

PLO 17. Combine personal and social interests in a team.

PLO 18. Demonstrate good professional, social and emotional behavior, healthy lifestyle.

PLO 19. Follow the requirements of professional ethics.

PLO 20. Follow the requirements of labour protection, industrial safety and industrial sanitary standard acts.

PLO 21. Imitate the actions, strategy and tactics patterns of practical problems solving by experienced workers of electric power engineering

PLO 22. Perform the electric equipment servicing of electric power stations, substations, systems and networks with the help of appropriate instructions and practical skills

PLO 23. Improve the skills of work with personal computer at calculating the steady-state operating conditions of electric networks of high and low voltage.

PLO 24. Combine methods of empirical and theoretical study for seeking the

	<p>ways of electric energy wastes reducing at its transportation and distribution in modern power systems.</p> <p>PLO 25. Find new ways of solving the problems of electric energy economic conversion, distribution and transmission under present conditions.</p>
8 – Program implementation resources	
Staff assistance	All academic staff involved in the educational-professional program has the required qualification which corresponds to the specialty taught and they have necessary experience of teaching and practical work. Some other professionals with experience in research/managerial/innovative/creative activity and/or in occupational work are involved in the educational process.
Materials and facilities	Available materials and equipment allow to provide the educational process completely during all cycle of training according to the Syllabus. The state of accommodation facilities is proved by sanitary-technical passports, which meet the requirements of current acts of standards.
Information support and teaching – learning materials	The program is completely provided with educational and methodical complexes of all educational components which are available in module environment of the university educational process.
9 – Academic mobility	
National credit mobility	Involves possible national credit mobility according to certain course modules providing general competences obtaining.
International credit mobility	The program develops some possible participation and internship in scientific-research projects and programs of academic mobility abroad. It is performed in active research environment and it is mobile by the program «Double diploma». Some agreements have been signed on academic mobility and Double diploma awarding with HEE of Poland, Germany, France and Great Britain.
Foreign students training	Main course modules of the program are provided with educational and methodical complexes for foreign students both in English and Ukrainian.

2. List of EPP educational components and their logical sequence

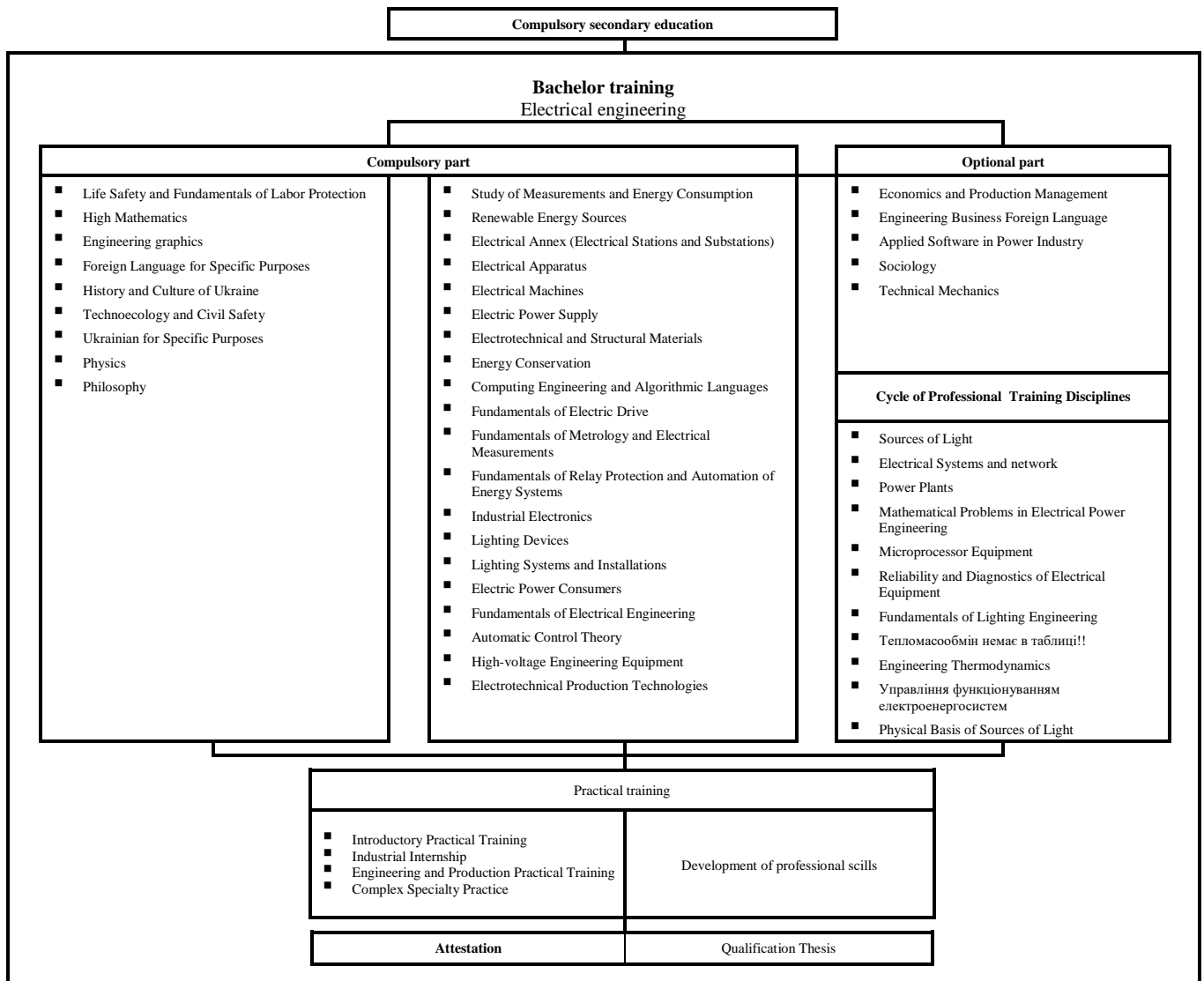
2.1. List of EPP components

Discipline code	Educational program components (disciplines, course projects (works), practices, qualification work)	Number of credits	Summary control form
1	2	3	4
EPP COMPULSORY Components			
CC1.	Life Safety and Fundamentals of Labor Protection	4,0	Exam
CC 2.	Higher Mathematics	18,5	Exam
CC 3.	Engineering Graphics	4,0	Exam
CC 4.	Foreign Language for Specific Purposes	6,0	Exam
CC 5.	History and Culture of Ukraine	5,0	Exam
CC 6.	Technoecology and Civil Safety	4,0	Dif.credit test
CC 7.	Ukrainian for Specific Purposes	5,0	Exam
CC 8.	Physics	10,5	Exam
CC 9.	Philosophy	4,0	Exam
CC 10.	Study of Measurements and Energy Consumption	6,0	Exam
CC 11.	Renewable Energy Sources	3,0	Exam
CC 12.	Course project on subject «Renewable Energy Sources»	1,0	Dif.credit test
CC 13.	Electrical Annex (Electrical Stations and Substations)	4,0	Exam
CC 14.	Electrical Apparatus	4,0	Залік
CC 15.	Electrical Machines	4,5	Exam
CC 16.	Course project on subject «Electrical Machines»	1,0	Dif.credit test
CC 17.	Electric Power Supply	4,0	Exam
CC 18.	Course project on subject «Electric Power Supply»	1,0	Dif.credit test
CC 19.	Electrotechnical and Structural Materials	6,0	Exam
CC 20.	Energy Conservation	4,5	Exam
CC 21.	Computing Engineering and Algorithmic Languages	4,0	Exam
CC 22.	Fundamentals of Electric Drive	3,0	Exam
CC 23.	Course project on subject «Fundamentals of Electric Drive»	1,0	Dif.credit test
CC 24.	Fundamentals of Metrology and Electrical Measurements	4,0	Exam
CC 25.	Fundamentals of Relay Protection and Automation of Energy Systems	5,0	Dif.credit test
CC 26.	Industrial Electronics	4,0	Exam
CC 27.	Lighting Devices	5,5	Exam
CC 28.	Course project on subject «Lighting Devices»	1,0	Dif.credit test
CC 29.	Lighting Systems and Installations	4,5	Exam
CC 30.	Course project on subject «Lighting Systems and Installations»	1,0	Dif.credit test
CC 31.	Electric Power Consumers	4,0	Exam

CC 32.	Fundamentals of Electrical Engineering	14,5	Exam
CC 33.	Automatic Control Theory	4,5	Exam
CC 34.	High-voltage Engineering Equipment	5,0	Exam
CC 35.	Electrotechnical Production Technologies	4,0	Залік
CC 36.	Introductory Practical Training	3,0	Dif.credit test
CC 37.	Industrial Internship	3,0	Dif.credit test
CC 38.	Engineering and Production Practical Training	3,0	Dif.credit test
CC 39.	Complex Specialty Practice	4,5	Dif.credit test
CC 40.	Complex Specialty Exam	1,5	
Total for Compulsory Components		180,0	

Optional components of EP			
1	2	3	4
OC 1.1.	Economics and Production Management	3,5	Credit test
OC 1.2.	Engineering Business Foreign Language	10,0	Exam
OC 1.3.	Applied Software in Power Industry	3,5	Credit test
OC 1.4.	Sociology	3,0	Credit test
OC 1.5.	Technical Mechanics	3,5	Credit test
OC 1.6.	Sources of Light	3,0	Credit test
OC 1.7.	Electrical Systems and Networks	3,0	Exam
OC 1.8.	Power Plants	3,5	Credit test
OC 1.9.	Mathematical Problems in Electrical Power Engineering	3,5	Credit test
OC 1.10.	Microprocessor Equipment	3,5	Exam
OC 1.11.	Reliability and Diagnostics of Electrical Equipment	3,5	Exam
OC 1.12.	Fundamentals of Lighting Engineering	4,0	Credit test
OC 1.13.	Engineering Thermodynamics	3,5	Credit test
OC 1.14.	Management of Electric Power Systems	3,0	Credit test
OC 1.15.	Управління функціонуванням електроенергосистем	3,0	Credit test
OC 1.16.	Physical Basis of Sources of Light	3,0	Credit test
Total for optional components:		60,0	
Total for EP		240,0	

2. 2. Structure-logic scheme of EPP



3. Forms of attestation of the first (Bachelor's) degree of higher education

The attestation of graduates of the educational program on the specialty 141 “Electrical engineering” is in the form of public defense of Bachelor’s Qualification paper (Diploma thesis). The student is awarded with the Bachelor’s degree in Electrical engineering. A document of standard form is awarded to the student. The attestation is open and public.

	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	PLO 25	
CC 33.	•	•	•	•	•	•	•	•	•			•				•				•		•	•	•	•	
CC 34.	•	•	•	•	•								•										•	•	•	•
CC 35.			•	•	•	•	•					•									•		•	•	•	•
CC 36.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CC 37.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CC 38.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CC 39.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
CC 40.	•	•	•	•	•	•	•			•	•	•			•		•		•	•	•	•	•	•	•	•
OC 1.1.	•		•	•	•	•	•	•	•	•		•	•	•							•		•	•	•	•
OC 1.2.						•				•	•	•										•		•	•	•
OC 1.3.	•	•	•	•	•	•	•			•		•	•	•	•	•						•	•	•	•	•
OC 1.4.						•		•		•	•	•	•	•	•	•	•	•	•	•		•		•	•	•
OC 1.5.			•	•	•	•	•					•									•		•	•	•	•
OC 1.6.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
OC 1.7.	•	•	•	•	•								•										•	•	•	•
OC 1.8.	•	•		•																			•	•	•	•
OC 1.9.	•	•	•	•	•	•	•	•	•	•		•		•		•						•	•	•	•	•
OC 1.10.			•	•	•	•	•														•		•	•	•	•
OC 1.11.	•	•	•	•	•	•	•	•	•	•		•	•	•		•		•			•		•	•	•	•
OC 1.12.			•	•	•	•	•					•									•		•	•	•	•
OC 1.13.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
OC 1.14.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
OC 1.15.	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
OC 1.16.			•	•	•	•	•					•									•		•	•	•	•