

MINISTRY of EDUCATION and SCIENCE of UKRAINE

Ternopil Ivan Puluj national technical university

EDUCATIONAL-PROFESSIONAL PROGRAMME

«Electrical engineering»

of the second (Master of Science) level of higher education

on specialty 141 Electrical engineering

Branch of knowledge 14 Electrical engineering

Qualification: Master of Science in Electrical engineering

APPROVED BY ACADEMIC COUNCIL

**of Ternopil Ivan Puluj national
technical university**

Head of Academic council


_____ **P.V. Yasniy**

(Minutes № 5 of March 23, 2021)

Educational program is launched on September 1, 2021



Rector _____ **P.V. Yasniy**

Ternopil - 2021

Educational-professional program was developed by a work group (scientific-methods commission of the specialty) 141 Electrical engineering consisting of:

Project group manager (Head of educational program)
Tarasenko Mykola, Doctor of Science (Engineering), Prof.
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Rafalyuk Oleksandr, manager of TKBP «Strila»

Plis Yaroslav, a student of group EEm-51



**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	Master of Science 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	Master of Science Diploma (Single Honours), 90 credits ECTS / 18 months of study
Available accreditation	Accreditation commission of Ukraine (National agency of higher education quality assurance), Ukraine Certificate of accreditation of specialty 141 Electrical engineering of series H/D № 2087427 of 02.07. 2017. Valid to July 1, 2024
Cycle/level	FQ-EHEA – second cycle, EQF LLL – 7 th level, HPK – 7 th level
Requirements	Bachelor degree
Language(s) of instruction	English
Educational program validity	till July 1, 2024
Permanent Internet address of educational program description	http://tntu.org.ua/docs/osvprograma-mag.pdf
2-Purpose of the educational-professional program	
Training of specialists able to solve problems and complex specialized 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. Possible study on the Double diplomas program (Poland, Germany, France)
4 - Graduates suitability for employment and further education	
Suitability for employment	Power engineer, research engineer in agricultural power engineering, dispatcher of centralized dispatching office of power-supply system, engineer on emergency control equipment servicing, engineer on agricultural enterprise electrification, engineer on electric power stations and networks adjustment, technology improvement and operation, engineer on modes of operative dispatching service, engineer on relay protection and electrical automatics, engineer on repair and setting of electric-power equipment of atomic stations, engineer on dispatching and technological control means, engineer of insulation and excess voltage protection service, engineer of service of power enterprises lines, engineer of substations service, engineer of distributing networks service, design engineer (electrical engineering), expert in power management.
Further education	Possible study on the program FQ-EHEA, 8 level EQF LLL and 8 level HPK

	on competitive basis.
5 – Teaching and Assessment	
Teaching and study	<p>Passive (explanatory-illustrative); active (problem, game, interactive, project, information-computer self-developing) - according to dominating techniques and ways of teaching</p> <p>By organizational forms: group and integrating study.</p> <p>By pedagogical cooperation orientation: position and context study, technology of cooperation.</p>
Assessment	<p>Students' progress in study is estimated according to 100-mark, 4-mark ("excellent", "good", "satisfactory", "unsatisfactory") and verbal ("passed", "not passed") systems.</p> <p>Kinds of control: current, theme, random, final, self-control.</p> <p>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.</p>
6 – Program competences	
Integral competence (IC)	Be able to solve practical problems and complex specialized tasks process in the field of electrical power engineering, electrical engineering and electromechanics or in the process of study which are characterized by uncertain conditions and requirements and involving some research conducting and innovations implementation.
General competences (GC)	<p>GC 1. Be able to speak a foreign language.</p> <p>GC 2. Be able to carry out research on proper level.</p> <p>GC 3. Ability of abstract thinking, analysis and synthesis.</p> <p>GC 4. Ability to work in a team.</p> <p>GC 5. Be able to see, set and solve problems.</p> <p>GC 6. Ability in learning and master new knowledge.</p> <p>GC 7. Ability in applying theoretical knowledge in practice.</p> <p>GC 8. Be able to implement new achievements and developments in professional field due to self-study.</p>
Special (professional, subject area) competences of the specialty (SC)	<p>SC 1. Ability in planning, arranging and conducting scientific research in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>SC 2. Be able to develop and implement some measures on reliability, efficiency and safety increase at designing and operation of the equipment of the objects of electrical power engineering, electrical engineering and electromechanics</p> <p>SC 3. Be able to make analysis of technical-economic indices and to carry out an expertise of engineering design decisions in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>SC 4. Be able to demonstrate the proficiency on the matters of intellectual property and agreements in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>SC 5. Be able to develop plans and projects providing the set goal achieving and taking into account all aspects of the problem which has to be solved including production, operation, service and utilization of equipment of electrical power engineering, electrical engineering and electromechanics complexes.</p> <p>SC 6. Be able to apply software for computer modeling, automated design, automated production and automated development or design of some components electrical power engineering, electrical engineering and electromechanics systems.</p>
7 – Program Learning Outcomes (PLO)	
	<p>PLO 1. Carry out the search of resource support sources taking into account legal and economic aspects of scientific research and innovative activity.</p> <p>PLO 2. Understand regulatory-legal acts, norms and standards in the field of</p>

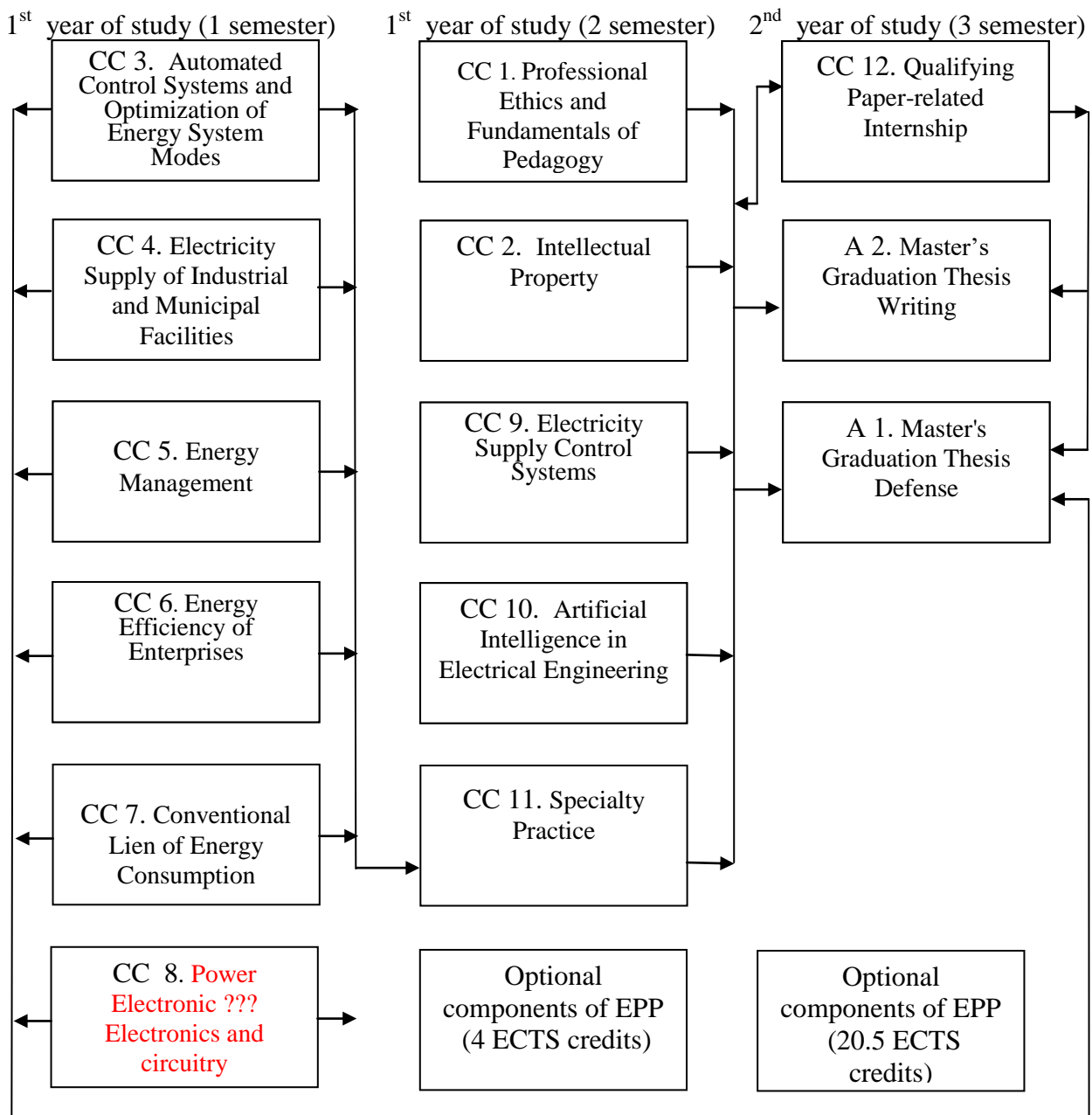
	<p>electrical power engineering, electrical engineering and electromechanics following the principles of energy safety strategy of the country.</p> <p>PLO 3. Be able to speak and write in state and a foreign language to carry out joint developments and research with foreign scientists and experts in the field of electrical power engineering, electrical engineering and electromechanics.</p> <p>PLO 4. Have skills in scientific principles of job management and be able to carry out scientific-research work with substantiation of direction and technique of scientific research in the field of electrical power engineering, electrical engineering and electromechanics keeping to the rules and principles of academic honesty, present the research materials on international scientific conferences and seminars.</p> <p>PLO 5. Be able to make analysis of processes in electrical power engineering, electrical engineering and electromechanics equipment of industrial and municipal objects.</p> <p>PLO 6. Be able to plan measures on increasing the reliability of operation, assembling safety and service of electrical power engineering, electrical engineering and electromechanics objects and systems.</p> <p>PLO 7. Be able to propose some options to increase the energy efficiency of electrical engineering, electromechanical equipment of industrial and municipal objects.</p> <p>PLO 8. Be able to reconstruct current electrical networks, stations and substations, electrical engineering and electromechanics complexes and systems to increase their efficiency and extend their operational life.</p> <p>PLO 9. Know how to use the methods of mathematical, physical and computer modeling of objects based on advanced software to solve engineering tasks of electrical power engineering, electrical engineering and electromechanics.</p> <p>PLO 10. Be able to conduct studies on removing technical faults while implementing modern methods of electromechanical systems control.</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 COURSES			
Cycle of general training			
CC 1.	Professional Ethics and Fundamentals of Pedagogy	4,0	Credit test
CC 2.	Intellectual Property	4,0	Credit test
TOTAL according to cycle:		8,0	
Cycle of professional training			
CC 3.	Automated Control Systems and Optimization of Energy System Modes	4,0	Credit test
CC 4.	Electricity Supply of Industrial and Municipal Facilities	4,0	Exam
CC 5.	Energy Management	4,0	Exam
CC 6.	Energy Efficiency of Enterprises	4,0	Credit test
CC 7.	Conventional Lien of Energy Consumption	4,0	Exam
CC 8.	Power Electronic ??? Electronics and circuitry	4,0	Exam
CC 9.	Electricity Supply Control Systems	4,0	Exam
CC 10.	Artificial Intelligence in Electrical Engineering	4,0	Exam
TOTAL by professional training:		32,0	
Practical training			
CC 11.	Specialty Practice	9,0	Differential credit test
CC 12.	Qualifying Paper-related Internship	7,5	Differential credit test
Total on practical training:		16,5	
TOTAL according to cycle:		48,5	
TOTAL according to compulsory part		56,5	
Optional components of EP			
Higher education applicants choose educational optional components from the suggested list in the TNTU e-learning system Atutor (tab – «OPTIONAL DISCIPLINES»). http://dl.tntu.edu.ua/login.php . All students registered in the TNTU e-learning system Atutor have free access to the list of optional disciplines.			
TOTAL optional components		24,5	
Attestation			
A 1.	Master's Graduation Thesis Defense	1,5	
A 2.	Master's Graduation Thesis Writing	7,5	
Total for certification:		19,5	
Total for Master training		90,0	

2. 2. Structure-logic scheme of EPP



3. Forms of attestation of the second (Master'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 Master's Qualification paper (Diploma thesis). The student is awarded with the Master of Science degree in Electrical engineering. A document of standard form is awarded to the student. Qualification paper public defense takes place on the open meeting of examination commission.

4. Matrix of accordance of program competences to educational program components

	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12	A 1	A 2
GC 1	+									+			+	+
GC 2		+								+			+	+
GC 3		+	+							+			+	+
GC 4	+												+	+
GC 5			+		+			+			+	+	+	+
GC 6		+						+		+	+	+	+	+
GC 7											+	+	+	+
GC 8		+									+	+	+	+
SC 1	+	+											+	+
SC 2			+	+	+		+		+				+	+
SC 3			+	+	+	+			+				+	+
SC 4		+								+			+	+
SC 5			+	+		+	+	+	+	+	+	+	+	+
SC 6										+	+	+	+	+

5. Matrix of accordance of program learning outcomes (PLO) specified by the standards to educational program components (EC)

	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12	A 1	A 2
PLO 1		+											+	+
PLO 2		+											+	+
PLO 3	+												+	+
PLO 4			+	+	+	+	+	+	+	+	+	+	+	+
PLO 5				+	+			+			+	+	+	+
PLO 6			+	+		+			+		+	+	+	+
PLO 7				+		+			+	+			+	+
PLO 8			+	+		+	+	+	+	+			+	+
PLO 9										+			+	+
PLO 10							+	+					+	+