ACADEMIC DISCIPLINE SYLLABUS
«ELECTRICAL SYSTEMS AND NETWORKS»

DNIPRO UNIVERSITY of TECHNOLOGY 1899

Educational Level	First (bachelor)
Educational-Professional program	"Electrical energetics, electrical engineering and electromechanics"
Duration of teaching	9, 10, 11, 12 quarters
Classes:	
lectures:	2 hours
practical activities:	1 hour
Language of teaching	English

Course page in the system of distance education of DUT: https://do.nmu.org.ua/enrol/index.php?id=1364

Department of electric drive

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1. Annotation to the course

Electrical systems and networks - a professional educational component of the cycle of special training in the specialty 141 "Electric Power, Electrical Engineering and Electromechanics". The discipline is taught in the third year, the course project is also performed in the third year. The program is designed to form in higher education students holistic competencies and knowledge of design, design principles and energy efficiency of electrical systems and networks.

The purpose of the discipline - the formation of competencies in the calculation and analysis of electrical networks, practical skills in choosing electrical equipment with the requirements of economy, reliability and quality of electricity.

Disciplinary learning outcomes (DLO):
- Solve complex specialized tasks in the design and maintenance of electromechanical systems, electrical equipment of power stations, substations, systems and networks.
- Apply suitable empirical and theoretical methods to reduce electricity losses in its production, transportation, distribution and use.

2. Structure of the Course

LECTURES	PRACTICAL CLASSES
1. ELEMENTS AND CONSTRUCTION OF ELECTRICAL NETWORKS.	1. Calculation of parameters of substitution schemes of electric networks.
2. FORMATION OF ELECTRICAL LOADING OF ELECTRICAL NETWORKS.	2. Calculations of power and energy losses.
3. SCHEMES OF REPLACEMENT OF ELECTRICAL NETWORKS.	3. Calculations of electrical networks.
4. LOSS OF POWER AND ELECTRICITY IN NETWORKS.	4. Technical and economic calculations of networks.
5. CALCULATIONS OF MODES OF ELECTRICAL NETWORKS WITH ONE-SIDED POWER SUPPLY.	5. Capacity distribution in two-way networks.
6. TECHNICAL AND ECONOMIC CALCULATIONS OF ELECTRICAL NETWORKS.	6. Determination of the cross section of wires (cable cores) in networks with two-way power supply.
7. CALCULATIONS OF CLOSED ELECTRICAL NETWORKS.	7. Selection of branches in transformers with PBZ.
8. QUALITY OF ELECTRICITY AND ITS REGULATION IN ELECTRICAL NETWORKS.	8. Check the regulating capacity of transformers with on-load tap-changers.
9. ENERGY SYSTEMS AND REGULATION OF THEIR MODES OF THEIR OPERATION.	9. Determining the power of compensating devices from the conditions of the balance of reactive power.
	10. Location of compensating devices in network diagrams.

Also, based on the results of studying the discipline, the "Course project on electrical systems and networks" is being carried out.

3. Evaluation system and requirements

3.1. The academic achievements of higher education students based on the results of the course will be assessed on the scale below:

Rating scale	Institutional scale
90 – 100	Excellent
74 – 89	Good
60 – 73	Satisfactory
0 – 59	Fail

3.2. Credits of the discipline are credited if the student received a final grade of at least 60 points. The lower grade is academic debt, which is subject to liquidation in accordance with the Regulations on the organization of the educational process of DTU.

Maximum rating:

Theoretical part	The practical part	Bonus	**Total**
60	40	5	**100**

During the study of the course, the applicant first completes an intermediate assessment based on the results of studies in one semester, and then takes an exam based on the results of studies in the next semester. The maximum assessment is carried out in each semester according to the above table.

The theoretical part in each semester is evaluated based on the results of passing two control test papers, each with 2 questions. These questions are open tests each weighing 15 points (60 points in total for the semester).

3.3 Evaluation criteria of theoretical work

Two open test questions are evaluated in **15 points each (30 points in total)**. The test survey is conducted using remote platform technology Moodle, Microsoft Office 365.

Wherein:
- **0 points** – there was no answer to the question or the answer was not relevant to the question;
- **3 points** – the answer is incomplete and contains only general data of the content of the question, or several serious mistakes were made in the answer;
- **6 points** – the answer is incomplete and contains a serious error or most of the answer is not related to the topic of the question;
- **9 points** – the answer basically reflects the essence of the question, but several inaccuracies were made or part of it does not correspond to the question, or the answer is schematic without the necessary explanations;
- **12 points** – the answer fully corresponds to the question, but some explanations are missing or a slight inaccuracy is allowed, or there is no consistency in the answer;
- **15 points** – the answer fully corresponds to the question, contains the necessary explanations and drawings, is written concisely, consistently and competently, and also contains a situational analysis.

3.4 Evaluation criteria of practical work

The practical part in each semester consists of two practical modules containing one problem worth 20 points.

Problems from the practical part are listed in the system Moodle, Microsoft Office 365. Problems solved on paper are scanned (photographed) and sent to the teacher's e-mail within the time allotted for passing the relevant module of the practical part. An answer sent late is considered as not submitted.

A correctly solved **task** is valued at 20 points, wherein:
- **20 points** – correspondence to the solution of the problem, with units of measurement;
- **16 points** – correspondence to the solution of the problem, without measurement units or errors in calculations;
- **12 points** – minor errors in formulas, without units of measurement;
- **8 points** – there are significant errors in the decision;

- **4 points** – the given formulas do not fully correspond to the essence of the problem;
- **0 points –** the solution is not given.

3.5 Evaluation criteria of the final work

If the student of higher education received less than 60 points according to the current performance or seeks to improve the grade, **a final assessment (exam)** is conducted during the session.

The exam is conducted in the form of a complex control paper, which includes questions from the theoretical and practical part of the course. The ticket consists of three theoretical open tests and two practical open tests (tasks) each weighing 20 points **(100 points in total)**.

Wherein:
- **20 points** – full correspondence to the essence of the question;
- **15 points** – compliance with the essence of the question with minor deviations and inaccuracies;
- **10 points** – partial correspondence to the essence of the question without its full disclosure;
- **5 points** – there are significant errors in the performance of the test;
- **0 points** – the answer is not given or does not relate to the topic of the question.

4. Course policy

4.1. Academic Integrity Policy

Academic integrity of higher education students is an important condition for mastering the results of training in the discipline and obtaining a satisfactory grade from the current and final tests. Academic integrity is based on condemnation of the practices of copying (writing with external sources other than those permitted for use), plagiarism (reproduction of published texts by other authors without attribution), fabrication (fabrication of data or facts used in the educational process). The policy on academic integrity is regulated by the Regulation "Regulations on the system of prevention and detection of plagiarism at the Dnipro University of Technology ". http://www.nmu.org.ua/ua/content/activity/us_documents/System_of_prevention_and_detection_of_plagiarism.pdf.

In case of violation of academic integrity by a higher education applicant (copying, plagiarism, fabrication), the work is evaluated unsatisfactorily and must be repeated. The teacher reserves the right to change the topic of the task.

4.2. Communication policy

Applicants for higher education must have activated university mail.

All written questions to teachers regarding the course should be sent to the university e-mail.

4.3. Retaking policy

Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade. Relocation takes place with the permission of the dean's office if there are good reasons (for example, sick leave).

4.4 Evaluation Appeal Policy

If the applicant does not agree with the assessment of his knowledge, he may protest the assessment given by the teacher in the prescribed manner.

4.5. Attending classes

For higher education students, full-time attendance is mandatory. For applicants for higher education who receive educational services under the Dual form of education, an individual schedule is provided. Good reasons for not attending classes are illness, participation in university events, academic mobility, which must be documented. The applicant for higher education must inform the teacher either in person or through the headmaster about the absence from classes and the reasons for absence.

For objective reasons (for example, academic mobility) training can take place online in consultation with the course leader.

5. Recommended sources of information

1. Півняк Г.Г., Волотковська Н.С., Кігель Г.А. Розрахунки електричних мереж систем електропостачання. – НГУ, 2011. / Pivnyak G.G., Volotkovskaya N.S., Kigel G.A. Calculations of electrical networks of power supply systems. - NMU, 2011.

2. Кігель Г.А, Півняк Г.Г. Електричні мережі систем електропостачання. – НГУ, 2011. / Kigel G.A., Pivnyak G.G. Electrical networks of power supply systems. - NMU, 2011.

3. Експлуатація електроустановок: Навч. посібник / Г.Г. Півняк, А.В. Журахівський, Г.А. Кігель, Б.М. Кінаш, А.Я Рибалко, Ф.П. Шкрабець, З.М. Бахор; За ред. академіка НАН України Г.Г. Півняка. – Дніпропетровськ, НГУ, 2005. / Operation of electrical installations: Navch. help / G.G. Pivnyak, A.V. Zhurakhivsky, G.A. Kigel, B.M. Kinash, A.Ya Ribalko, F.P. Shkrabets, Z.M. Bakhor; For red. Academician of the National Academy of Sciences of Ukraine G.G. Pivnyak. – Dnipropetrovsk, NMU, 2005.

4. Перхач В.С. Математичні задачі електроенергетики. Л.: Вища шк., 1981. / Perkhach V.S. Mathematical problems of electric power industry. L.: Vishcha school, 1981.

5. Сулейманов В.М., Кацадзе Т.Л. Електричні мережі та системи. – К.: НТУУ «КПІ», 2008. / Suleimanov V.M., Katsadze T.L. Electrical networks and systems. - K .: NTUU "KPI", 2008.

6. Сегеда М.С. Електричні мережі та системи. – Л.: НМК ВО «Каменяр», 1999. / Segeda M.S. Electrical networks and systems. - L .: NMK VO "Kamenyar", 1999.

7. Зорін В.В., Штогрин Є.А., Буйний Р.О. Електричні мережі та системи (окремі розділи): навчальний посібник для студентів вищ. техн. навч. закл. – Ніжин: ТОВ «Видавництво «Аспект-Поліграф», 2011. – 248 с. іл./ Zorin V.V., Shtogrin E.A., Buinyi R.O. Electrical networks and systems (separate sections): study guide for university students. technical education closing - Nizhyn: LLC "Aspect-Polygraph Publishing House", 2011. - 248 p. fig.

8. Pivnyak G. G. Transients in Electric Power Supply Systems. Textbook for institutions of higher education/ G. G. Pivnyak, I.V. Zhezhelenko, Y.A. Papaika; under the editorship of G.G. Pivnyak; Ministry of Education and Science of Ukraine, National Mining University – 5th edition, revised and expanded: Translation from Ukrainian. – Dnipropetrovsk: NMU – 2015. – 419 pp.