

SYLLABUS OF ACADEMIC DISCIPLINE “ELECTRIC MACHINES”



Degree	Bachelor
Educational program	«Energy, electrical engineering and electromechanics»
Terms of training	3 rd (2 nd quarter), 4 th semester (3 rd and 4 th quarter)
Types of classes:	
lectures: duration	2 hour per week
Laboratory lessons:	1 hour per week
Language of training	English

Page of the course in SDE NTU “DP”:

<https://do.nmu.org.ua/course/view.php?id=2995>

Department

Electrical Engineering



Instructor:

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1. Annotation

In conditions of energy saving technologies implementation and renewable energy sources use, development of electrical technologies such as electric machines, as means of electromechanical energy conversion, is of great importance. Use of electric machines in great degree defines technical level of many sectors of the national economy.

Progress in electrical machinery depends on electric machines theory. Understanding of electromechanical energy conversion processes is necessary as to electrical engineers as to many other professionals who are engaged in power engineering.

In discipline “Electric machines”, construction and principles of electric machines and power transformers operation are considered, explained basic phenomena taking place in this equipment. Analysis of electric machines operation, their equations and relationships between machines parameters, properties of different types of machines and transformers are explained.

2. Goal and tasks of discipline

The discipline goal is formation of competencies among future specialists in the field of compulsory discipline “Electric Machines”.

Discipline tasks:

Main task of the discipline is to teach higher education students skills:

- to determine principles of construction and functioning of electric machines as components of power, electrical and electromechanical complexes and systems
- to solve professional tasks on designing and application electric machines
- to take measures on technical servicing electric machines as parts of electromechanical systems, equipment of electric power stations, substations, and networks by means of relevant instructions and practical skills
- to discover new ways for economic conversion, distribution, transmission, and use of electricity by means of electric machines and transformers.

3. Results of study

After the course study, a student should:

- estimate parameters of electric machine performance as a part of electrical, power, and electromechanics equipment and relevant complexes and systems and determine ways to increase their energy efficiency and reliability
- possess methods of synthesis of electric machines with specified properties.

4. The course structures

LECTURES¹

- Transformers
- Issues of general theory of Electric Machines
- Asynchronous machines
- Synchronous machines
- DC machines
- Special electric machines

LABORATORY LESSONS¹

- Transformers
- Asynchronous machines
- Synchronous machines
- DC machines

COURSE PROJECT

- Designing power transformer
- Designing induction motor
- Designing induction motor at repair and restoration work.

¹For more details, see the working program of the discipline

5. Technical equipment and/or software

In laboratory works, special measuring and electromechanical equipment is used. List of equipment used for each the work is given in the discipline working program.

6. Assessment system and requirements

6.1. The students learning results for the course are assessed by the following scale:

Rating scale	Institutional scale
90...100	відмінно / Excellent
74...89	добре / Good
60...73	задовільно / Satisfactory
0...59	незадовільно / Fail

6.2. Students can get a final score for the discipline based on the current monitoring procedure when he/she obtained the core for current monitoring and self-study is not less than 60 points.

Maximum scores:

Maximum credit score in the discipline for the 3rd semester (2nd quarter)

Theoretical part	Laboratory part (total for all the works)		Total for the semester
	in case of timely delivery of the test	in case of un-timely delivery of the test	
100	100	75	100/80

Maximum exam score by discipline for the 4th semester

Theoretical part	Laboratory part (total for all the works)		Bonus	Total
	in case of timely delivery of the works	in case of un-timely delivery of the works		
100	100	75	4	100/80

6.3. Assessment criteria for determination the final semester score

Theoretical part is evaluated by a student's answers for test questions. For each test question in the task must be indicated number of points that are given for a completely correct answer. The test should be prepared so that in the case of proper answers for all the test questions the total mark be equal to 100 points. Answers to test questions are carried out in handwritten form under the supervision of a teacher. Two academic hours are given to answer the test questions. Under conditions of a lockdown at which distant learning is introduced, application "Forms" to Office 365 is used for testing results evaluation.

Laboratory works are evaluated for correctness of submitted reports on the works and of answers for control questions on each work.

The score for theoretical part should not exceed 100 points.

The score for laboratory works should not exceed 100 points in case of timely passing the reports and 75 points for untimely passing the reports. The final score for a student's work in the laboratory is given in the case of passing him reports on all the works of the semester.

The final semester score FS is determined as

$$FS = 0.6T + 0.4L$$

where T is the score obtained for the theoretical, and L – for the laboratory part of the course.

The obtained value is rounded to the nearest greater whole number.

At the assessment of answers of a test on the theoretical part, an instructor takes into consideration possible errors of a student which cause reduction of the score, e.g.:

- absence of unit of measure for named physical quantities or their incorrect use
- errors of calculation
- errors in formulae
- essential errors in solving
- incorrect statements
- absence of an answer, etc.

6.4. Criteria of laboratory work assessment

Criteria of laboratory works assessment are set out in paragraph 6.3.

7. The course policy

7.1. Policy of academic integrity

The higher education students' academic integrity is important condition for mastering knowledge in the discipline and obtaining a positive score for current and final assessment. Academic integrity is based on condemnation of the practices of copying (writing with external sources other than those allowed for use), plagiarism (reproduction of published texts by other authors without attribution), fabrication of data or facts used in educational process. Policy of academic integrity is governed by the Regulations on the system of prevention and detection of plagiarism at the National Technical University "Dnipro Polytechnic" (http://www.nmu.org.ua/ua/content/activity/us_documents/System_of_prevention_and_detection_of_plagiarism.pdf).

In the event of a student's violation of academic integrity (copying, plagiarism, fabrication), the work is assessed as unsatisfactory and must be repeated. At this, the teacher can change the task,

7.2. Policy of communication

A student should have his/her activated e-mail address. All written questions must be sent by a student to the teacher via corporate email.

7.3. Policy on retake

Laboratory works and course projects not passed on time are evaluated with lower scores (see 6.3).

7.4 Appraisal appeal policy

If a student does not agree with obtained score, he/she can appeal it in the established order.

7.5. Classes attending

For students of full-time form of education attending classes is mandatory. Good reasons for lessons missing can be illness, participation in a university event, studying by a program of academic mobility that must be documented.

When good reason is available for considerable time interval, learning can be performed on online basis when this is agreed with the teacher delivering the discipline.

7.6. Bonuses

Students, who did not miss classes without good reasons, carried out and passed laboratory works before beginning the week of pre-sessional monitoring events and have current scores for theoretical and laboratory parts of the discipline not less 74 points, obtain additional 4 bonus points to the total final score for the semester. Additional 4 bonus points are given also to students taking part in student scientific circle of department of electrical engineering and presented results of their scientific work at a student scientific conference or at competition of students' scientific works.

8 Рекомендовані джерела інформації

1. Gerhard Hennenberger. Electrical machines I. Basics, Design, Function, Operation: Aachen University, 2002, - 207 pp.
2. Ivanov, O.B., Shkrabets, F.P., Zawilak, Jan. (2011). "Electrical generators driven by renewable energy systems", Wroclaw University of Technology, Wroclaw – 169 p.
3. Іванов О.Б., Циценков Д. В. Проектування трифазних асинхронних двигунів: Навчальний посібник для студентів, що навчаються за спеціальністю 141 «Електроенергетика, електротехніка та електромеханіка» (англійською мовою). – Д.: Національний технічний університет «Дніпровська політехніка», 2020. – 111с. іл.
4. Півняк Г.Г., Довгань В.П., Шкрабець Ф.П. Електричні машини: Навчальний посібник. – Дніпропетровськ: Національний гірничий університет, 2003. – 327 с.
5. Белікова Л. Я., Шевченко В. П. Електричні машини: Навчальний посібник. – Одеса: Наука і техніка, 2012. – 480 с.
6. Яцун Я.А. Електричні машини: Підручник. – Львів: Видавництво Львівської політехніки, 2011. – 464 с.
7. Collection of methodical materials for laboratory work on discipline "Electric machines" (section "DC Machines") for students studying specialty 141 "Electrical Power Engineering, Electrical Engineering and Electromechanics" / O.B. Ivanov, D.V. Tsyplenkov; Dnipro University of Technology – D.: DniproTech, 2021. – 40 p.
8. Collection of methodical materials for laboratory work on discipline "Electric machines" (section "Transformers") for students studying specialty 141 "Electrical Power Engineering, Electrical Engineering and Electromechanics" / O.B. Ivanov, D.V. Tsyplenkov; Dnipro University of Technology – D.: DniproTech, 2021. – 32 p.
9. Collection of methodical materials for laboratory work on discipline "Electric machines" (section "Induction machines") for students studying specialty 141 "Electrical Power Engineering, Electrical Engineering and Electromechanics" / O.B. Ivanov, D.V. Tsyplenkov; Dnipro University of Technology – D.: DniproTech, 2021. – 20 p.
10. Collection of methodical materials for laboratory work on discipline "Electric machines" (section "Synchronous Machines") for students studying specialty 141 "Electrical Power Engineering, Electrical Engineering and Electromechanics" / O.B. Ivanov, D.V. Tsyplenkov; Dnipro University of Technology – D.: DniproTech, 2021. – 20 p.