Subject programme

1. Subject name / subject module: **Electrical Machines**
2. Lecture language: **English**
3. The location of the subject in study plans:
   - Area or areas of the studies: **Computer Engineering and Mechatronics**
   - Degree of the studies: **1st degree studies**
   - Ftield or fields (implementation of effects standard): **Mechatronics**
4. Supervision of subject implementation:
   - The Institute / Another unit: **Institute of Informatics and Mechatronics**
   - The person responsible for the subject: **Szychta Leszek, prof. dr hab. inż.**
   - People cooperating in the development of the programme of the subject:
5. The number of hours and forms of teaching for individual study system and the evaluation method:

Teaching activities with the tutor																						
Mode of study	Form of classes																					Total
		SOW	ECTS	Laboratory work	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	...	SOW	ECTS	ECTS
Full-time studies				32	43	3																3
Part-time studies																						
Credit rigor				Graded assignment																		

6. Student workload – ECTS credits balance:
   1 ECTS credit corresponds to 25-30 hours of student work needed to achieve the expected learning outcomes including the student's own work

Activity (please specify relevant work for the subject)	**Hourly student workload (full-time studies/part-time studies)**
Participation in lectures	-
Participation in laboratory classes	32
Preparation to laboratory classes	20
Preparation of homeworks	13
Independent study of the subject	10
Participation in an exam / graded assignment	-
Total student workload (TSW)	75
ECTS credits	3
* Student's workload related to trainings	75
Student's workload in classes requiring direct participation of academic teachers	32

7. Implementation notes: recommended duration (semesters), recommended admission requirements, relations between the forms of classes:
   - Recommended admission requirements – none.
   - Recommended duration of the subject is taken from the course plan.
8. Specific learning outcomes – knowledge, skills and social competence:

Specific learning outcomes for the subject		**Form**	**Teaching method**	**Methods for testing of (checking, assessing) learning outcomes**
Outcome symbol	**Outcome description**			
Knowledge				
K_W05	**A student has basic knowledge of electrical machines as a part of electronics and electrical engineering, necessary to understand at an advanced level the complex dependencies of mechatronic systems**	**Laboratory work**	**Inquiry methods**	**Student learning activities.**
K_W08	**A student knows and understands selected specific issues in the field of electronics and electrical engineering related to: designing electrical machines**			
Skills				
K_U15	**A student is able to assess the suitability and choose the appropriate methods tools and materials to solve a simple task in the field of electrical machines .**	**Laboratory work**	**Inquiry methods**	**Student learning activities.**
K_U16	**A student is able to use appropriate methods, techniques and tools - in accordance with the given specification - to design and implement electrical machines as a part of Mechatronics.**			

9. Assessment rules / criteria for each form of education and individual grades:

0% - 50%	ndst	**80% - 86%**	db
51% - 70%	dst	**87% - 93%**	db+
71% - 79%	dst+	**94% - 100%**	bdb

Activity	Grades	Calculation	To Final
Lab reports	dst, db, bdb(3,4,5)	arithmetic mean (5,3,4)* 50%	2
Activity druing classes	dst, db, bdb(3,4,5)	arithmetic mean (5,3,4)* 20%	0,8
Homeworks	dst, db, bdb(3,4,)	arithmetic mean (5,3,4) * 20%	0,8
Attendance	during 80% of all classes	80% * 5 -> 4 * 10%	0,4
Final result			4,0
Grade		4,0/5 = 80%	**db (4.0)**

10. The learning contents with the form of the class activities on which they are carried out:
(Laboratory work)

1. Basic Design Considerations of Electrical Machines;
2. Design of Magnetic Circuits;
3. Design of Transformer;
4. Design of Three-phase Induction Motor;
5. Design of Single-phase Induction Motor;
6. Design of Synchronous Machine;
7. DC Machine.

11. Required teaching aids:

a. Lecture - multimedia projector.

b. Laboratory classes - specialist laboratory.

12. Literature:

a. Basic literature:

Stephen Chapman, Electric Machinery Fundamentals, Mc Graw Hills, 2012

Paul Krause, Analysis of Electric Machinery, McGraw Hill, 1987

b. Supplementary literature:

Howard Jordan, Energy Efficient Electric Motors and their Applications, VNR, 1983

13. Available educational materials divided into forms of class activities (Author's compilation of didactic materials, e-learning materials, etc.)

14. Teachers implementing particular forms of education:

Form of education	Name and surname
1. Lecture	
2. Laboratory classes	Szychta Leszek, prof. dr hab. inż.
3. Training	
4. Project classes	
5. Workshop classes	
6. Simulation game	
7. Language classes	