



Country BULGARIA	Institution Vasil Levski National Military University	Module <b>Electric Machines</b>	<b>ECTS 3.0</b>
Service <b>ICT</b> Languages <b>English, Bulgarian</b>	Minimum Qualification for Lecturers <ul style="list-style-type: none"> <li>English: Common European Framework of Reference for Languages (CEFR) Level B2 or NATO STANAG 6001 Level 2.</li> <li>Physics.</li> <li>Electrical Engineering.</li> </ul>		
Prerequisites for international participants: <ul style="list-style-type: none"> <li>English: Common European Framework of Reference for Languages (CEFR) Level B1 or NATO STANAG Level 2.</li> <li>3rd year of national (military) higher education.</li> <li>Knowledge of Physics and Electrical Engineering.</li> </ul>		Goal of the Module: <ul style="list-style-type: none"> <li>Introduction to the basic principles and laws of physics used in electromechanical devices.</li> <li>Description of various electro-mechanical devices (EMDs).</li> <li>Development of skills for practical work with EMDs.</li> </ul>	

<b>Learning outcomes</b>	Knowledge	<ul style="list-style-type: none"> <li>Classification and signatures of EMDs.</li> <li>Construction and operation principles of various EMDs.</li> </ul>
	Skills	<ul style="list-style-type: none"> <li>Abilities to operate and maintain various EMDs.</li> </ul>
	Competences	<ul style="list-style-type: none"> <li>Design and construction of EMDs.</li> <li>Estimation and calculation of parameters of EMDs.</li> </ul>
<b>Verification of learning outcomes</b>		
<ul style="list-style-type: none"> <li><b>Observation:</b> Throughout the course students are to accomplish different practical tasks individually or in teams.. During the tasks students are to be evaluated for competences.</li> <li><b>Test:</b> At the end of the course, the students have to accomplish a test.</li> </ul>		

Module Details		
Study topics	class hours	Details
<b>Chapter I "Introduction to electromechanical devices"</b>		
Fundamentals of EMDs	2	<ul style="list-style-type: none"> <li>Classification and signatures of EMDs – 1 hour</li> <li>Principles and laws of physics used in construction and operation of EMDs – 1 hour</li> </ul>
<b>Chapter II "Static EMDs"</b>		



Electric transformers	2	<ul style="list-style-type: none"><li>• Construction of transformers. – 1 hour</li><li>• Operational modes – 1 hour</li></ul>
<b>Chapter III "Dynamic EMDs"</b>		
AC electric machines	4	<ul style="list-style-type: none"><li>• Asynchronous electric machines– 2 hours</li><li>• Synchronous electric machines – 2 hours</li></ul>
DC electric machines	3	<ul style="list-style-type: none"><li>• Construction of DC electric machines– 1 hour</li><li>• Operational modes – 2 hours</li></ul>
<b>Chapter IV "Special-purpose EMDs"</b>		
Stepper motors	2	<ul style="list-style-type: none"><li>• Construction of Stepping motors – 1 hour</li><li>• Operational modes – 1 hour</li></ul>
Selsyn (Synchro)	2	<ul style="list-style-type: none"><li>• Construction of selsyn – 1 hour</li><li>• Operational modes – 1 hour</li></ul>
<b>Chapter V "Practical work and assessment"</b>		
Practical work	12	<ul style="list-style-type: none"><li>• Study of various EMDs in laboratory</li><li>• Completion of specific tasks</li></ul>
Assessment	3	Test – 3 hours
<b>Additional hours to increase the learning outcomes</b>		
Self-Study	30	<ul style="list-style-type: none"><li>• Enhancing knowledge by studying various EMDs.</li><li>• Reflection of the topics issued.</li></ul>
Total	30	<b>Lectures: 15 Practical work and assessment: 15</b>

This study course description is created and revised at "Communication network and systems" Department and accepted at Faculty council.

Developed by:  
major, assist. prof. Dyanko Hubenov, PhD

REFERENCES:

1. A textbook of electrical machines, ISBN:978-93259-7562-0, 2014.
2. Г. Георгиев, "Електрически машини"
3. Г. Георгиев, „Ръководство за проектиране на малки трансформатори“
4. Г. Георгиев, „Ръководство за лабораторни упражнения“