



## RTU Course "Typical Electrical Drive"

11103 Industriālās elektronikas un elektrotehnol.katedra

### General data

Code	EEP458
Course title	Typical Electrical Drive
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Post-graduate Studies
Course type	Academic
Field of study	Power and Electrical Engineering
Responsible instructor	Leonīds Ribickis
Academic staff	Ansis Avotiņš Inna Bušina
Volume of the course: parts and credits points	1 part, 5.0 Credit Points, 7.5 ECTS credits
Language of instruction	LV, EN, RU
Possibility of distance learning	Not planned
Maximum auditorium capacity	100
Maximum number of students per semester	200
Abstract	The realization of typical electric drives for different essential groups of mechanisms: cranes, lifts, conveyers, pumps, compressors, fans, excavators and machine-tools. Calculation of the drives. The dynamic loads, transient processes. Braking processes. Adjusting of efficiency of the mechanisms, modes of automation systems and schemes for control of typical electrical drives
Goals and objectives of the course in terms of competences and skills	The aim is to study mechanics of typical electric drive systems, influence of parameters on the drives characteristics, methods of speed control, calculation methods of transient processes, calculation of drives power parameters and motor selection for different operation regimes of typical electric drives. The students can describe and analyze systems of typical electric drives, select scheme for electric drive speed control and calculate elements of the schemes, calculate influence of transient processes on the operation of typical electric drives.
Structure and tasks of independent studies	Before each practical work the students are to prepare a report on its theoretical background and answer to the questions.
Recommended literature	1. L. Ribickis, J. Valeinis. Elektriskā piedziņa mehatronikas sistēmās. RTU izdevniecība, 2008. 286 lpp. 2. J. Valeinis. Ievads elektriskās piedziņas vadības sistēmās. RTU izdevniecība, 2007. 163 lpp. 3. A. Grantmanis. Rūpniecības iekārtu tipveida elektropiedziņa. RPI, 1978. 100 lpp. 4. В.И.Ключев, В.М.Терехов. Электропривод и автоматизация общепромышленных механизмов. Москва, Энергия, 1980. 358 стр.
Course prerequisites	Electric machines, Theoretical basics of electrical engineering, Power electronics, Basics of electrical drive.

### Course outline

Theme	Hours
Classification of general industrial mechanisms. Mechanisms of cycle operation.	4
Mechanisms of continuous operation. Typical industrial mechanisms.	4
Static and dynamic loads of electric drives of lifting mechanisms.	4
Static and dynamic loads of electric drives of conveyance mechanisms.	4
Limitation of loads of electric drives in mechanisms of cycle operation.	4
Typical electrical structures of robots and manipulators.	4
Electric drive of cranes. Computer control systems.	4
Schemes and control methods of lifting electro-magnets.	4
Regulations of precise stop in lifts, methods of its realization.	4
Structures of typical mechanisms with automatic operation cycle.	4
Systems of lifts positioning. Drive of lifts with frequency converters.	4
Control scheme of a high-speed lift. Electric drive of chair-lift. Schemes and control methods of multi-cage lifts.	4
Static and dynamic loads of conveyors.	4
Features of electric drives of continuous operation mechanisms, Linear drives.	4
Determination of torque and power of the electric drives of centrifugal mechanisms.	4
Automation of centrifugal mechanisms with controllable speed drives. Electric drive of excavators.	4
1. Pract.w. Electric drive of pump with asynchronous valve cascade.	4
2. Pract.w. Asynchronous electric drive with voltage regulator.	4
3. Pract.w. Drive of pumps with frequency converter.	4

**Learning outcomes and assessment**

Learning outcomes	Assessment methods
The students are able to describe typical electric drives, influence of parameters on mechanic and electro-mechanic characteristics.	Test examining the students' ability to describe typical electric drives, influence of parameters on the characteristics of the drive.
The students are able to calculate mechanic and electro-mechanic characteristics of DC and AC typical drives.	Test examining the students' ability to calculate mechanic and electro-mechanic characteristics of DC and AC drives.
The students are able to describe methods of speed control, typical systems of DC and AC drives.	Test examining the students' ability to describe methods of speed control, typical systems of DC and AC drives as well as take their regulation characteristics.
The students are able to calculate transient processes of typical DC and AC drive systems.	Test examining the students' ability to calculate transient processes of typical DC and AC drive systems as well as take characteristics of speed and current changing with time.
The students are able to calculate power losses for typical DC and AC drives.	Test examining the students' ability to calculate power losses for typical DC and AC drives.
The students are able to select electric motors for different operation regimes of the drives of manufacturing machines in different technologic processes.	Test examining the students' ability to select electric motors for different operation regimes of the drives of manufacturing machines in different technologic processes.

**Study subject structure**

Part	CP	ECTS	Hours per Week			Tests		
			Lectures	Practical	Lab.	Test	Exam	Work
1.	5.0	7.5	4.0	1.0	0.0		*	