

Semester master's program «Railway electro supply in Russia»

Semester program “Railway electro supply in Russia” is prepared by the chair "Power of railway transport" of Omsk State Transport University.

The proposed program includes basic disciplines which sections consist of advanced scientific achievements of the leading scientists of the OSTU and it is based on the rich traditions of the learning process of the university.

“Overhead wiring and electrical transmission line” is special discipline studies the electrical energy transmit to trains at a distance from the energy supply point. Course “Overhead wiring and electrical transmission line” includes such parts as general information about power transmission lines , electrified railways overhead wiring, catenary classification, climatic factors and design loads acting on overhead wiring elements and electrical transmission line (ELT), overhead contact line (OCS) and ELT support, protection and sectioning devices, insulating elements, OCS and ELT thermal design, OCS and ELT wind resistance and oscillations, OCS and ELT parameters and characteristics, electric rolling stock pantographs, pantographs and catenary interaction, rigid catenary system, contact wires, conductors and current collectors plates wear.



a



b

Pic. 1. Pantograph and overhead contact wire interaction simulating bench:
a – wind tunnel; b – overview



a



b

Pic. 2. Real pantographs during testing: a – “Faiveley” pantograph; b – “Siemens” pantograph

“Designing and operation of current-collecting device”. Electric current collectors are used for trolleybuses, trams, underground and electric locomotives to lead electrical power from overhead lines or electrical third rails to the electrical equipment of the vehicles. This discipline studies pantographs and catenary interaction from the points of mechanical, electrical and heating processes view. It is studying methods and ways of prognoses contact element wearing. The discipline educated determining the quality of current collection by using unique OSTU laboratory equipment. Course includes the overview of the latest achievement in foreign and Russian pantograph producing.



Pic. 3. Linear bench



Pic. 4. Current collectors and conducting wire interaction simulating bench for metro, third rail and monorail systems

“Rectifier substations”. A traction substation or traction current converter plant is an electrical substation that converts electric power from the form provided by the electrical power industry for public utility service to an appropriate voltage, current type and frequency to supply railways, underground and other transport with traction current. The discipline is very important for railway specialists because it gives serious and basic knowledge in AC and DC power electro supplying area.



Pic. 5. Block traction substation laboratory overview



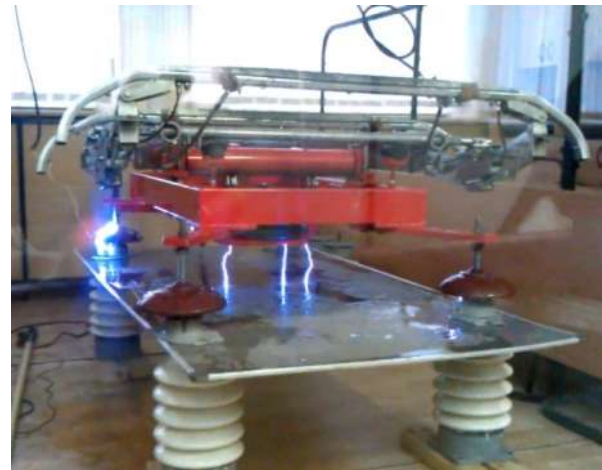
a



b

Pic. 6. Equipment for training and research complex:
a – the control unit and subway rectifier; b – switching system 110 kV

“Relay protection” is a branch of electrical power engineering that deals with the protection of electrical power systems from faults through the isolation of faulted parts from the rest of the electrical network. The objective of a protection scheme is to keep the power system stable by isolating only the components that are under fault, whilst leaving as much of the network as possible still in operation. Protection schemes must apply a very pragmatic and pessimistic approach to clearing system faults especially in such responsible railway branch.



Pic. 7. High voltage technique laboratory: a – test area; b – pantograph testing

“General railways course” is basic overview discipline studying Russian railways system. The course includes basics of railway electro supplying, transmission and providing energy taking into account specific Russian operation condition. The discipline considers AC and DC railway rolling stock, automation and remote control systems, railroad tracks and etcetera by using OSTU railway proving ground.

Distribution of academic hours on these subjects is shown in Table 1, the forms of control are shown in Table 2, the credits given are shown in Table 3.

Table 1 - The academic hours for each discipline

№№	Specification of the disciplines	Class hours			The total number of hours
		Lectures	Laboratory	Practical	
1.	Overhead wiring and ELT (electrical transmission line)	30	30	30	288
2.	Designing and operation of current-collecting device	14	16	-	108
3.	Rectifier substations	30	30	30	288
4.	Relay protection	30	30	30	288
5.	General railways course	16	-	-	108
Total		316			1080

Students have the opportunity to study advanced equipment and unique benches in the OSTU scientific and academic laboratories, to study test methods of power supply devices, to attend classes on the university landfill. The one is equipped by full-scale models of real devices and infrastructure of the Russian railways and rolling stock.

Table 2 –Teachers names and control forms of subject

№№	Name of subject	Names of teachers	forms of control
1.	Overhead wiring and ELT (electrical transmission line)	Cand. of Techn. Sciences, Associate Prof. Tomilov V.V.	exam
2.	Designing and operation of current-collecting device	Professor, Dr. of Techn. Sciences Sidorov O.A., Cand. of Techn. Sciences, Associate Prof. Tomilov V.V.	credit
3.	Rectifier substations	Cand. of Techn. Sciences, Associate Prof. Cremlev I.A.	exam
4.	Relay protection	Cand. of Techn. Sciences, Associate Prof. Zarenkov S.V.	exam
5.	General railways course	Teacher Hodunova O.A.	credit

Table 3 – The credits given

№№	Specification of the disciplines	Credits (ECTS)
1.	Overhead wiring and ELT (electrical transmission line)	8
2.	Designing and operation of current-collecting device	3
3.	Rectifier substations	8
4.	Relay protection	8
5.	General railways course	3
Total		30

The educational program provides competencies in the area of modern equipment and technology of railway electro supplying, provides language competence in professional work during research in international teams.

Future of international electrified railways depends on the quality of top managers having such master's degree, which is ready to provide Omsk State Transport University together with its partner universities.