STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Operating and diagnostics in power engineering**		Code **1010311461010316132**
Field of study **Power Engineering**	Profile of study (general academic, practical) **(brak)**	Year /Semester **3 / 6**
Elective path/specialty **Electrical Power Engineering**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **60** Classes: **-** Laboratory: **30** Project/seminars: **-**		No. of credits **5**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **5 100%** **5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	He/she has fundamental information in frame of technology and power machines used in commercial power engineering, liquid mechanics, and metrology. He/she has knowledge in frame of material science, fundamental of electric engineering, and structure of high voltage insulating systems.
2	**Skills**	He/she understands principles of work of machine parts and knows structure of basic electric power devices - steam boiler, steam and gas turbine, heat regenerator, compresor, fan. He/she is able to choose proper materials to high voltage insulating systems.
3	**Social competencies**	He/she has consciousness of necessary of extension their competencies, and to be ready to cooperate in frame of team.

Assumptions and objectives of the course:

Achievement of knowledge of application of correct principles of loading of power devices and machines. Recognition of tasks concerning to detailed structure, loading and diagnosctics of high voltage insulating systems of power devices.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. He/she has fundamental knowledge in frame of utility power devices in various state of loading. - [K_W12+++K_W14+K_W24+]
2. He/she has general knowledge about methods of optimalisation of work of power sources in electric power system. - [K_W18++K_W23++]
3. He/she has knowledge in frame of detailed structure, loading and diagnostics insulating systems of power devices. - [K_W19++]

Skills:

1. He/she is able to formula correct principles of loading of basic power devices. - [K_U18++]
2. He/she is able to utilty principles of correct work of power sources in electric power system. - [K_U20++]
3. He/she recognise state of loading of power instalation. - [K_U19++]

Social competencies:

1. He/she has consciousness of influence of power machine technology on natural environment. - [K_K02++]

Assessment methods of study outcomes

Lecture:

- grade of knowledge and skills indicated on exams with problem character,
- continous grading knowledge and skills on each lecture by disscussion regarding actual problems related to proper methods of loading.

Laboraty:

- tests verifying needed knowledge to realisation indicated problems in some field of laboratory tasks,
- grade of knowledge and skills related to realisation of laboratory tasks, grade of report,
- collection of extra points of collaboration in frame of team realising laboratory tasks.

Course description

Fundamental loading definition. Loading principles of devices. Utility of power block in various states. Work of producing devices in transition states, caused by failure or planned transition states. Changes of load, Work of power plant in electric power system - economic distribution of load. Dyspozytory of power plants. Problems of reliability. Repairs. Collection and analysis of load data. Diagnostics of basic kinds of failures. Recognotion of possibilities, limitations of diagnostics methods used in high voltage insulating systems of power devices.

Basic bibliography:

1. R.Janiczek ? Loading of power steam power plants, WNT W-wa 1990
2. Florkowska B., Diagnostics of high voltage insulating systems of power devices, Wydawnictwa AGH, Kraków, 2009

Additional bibliography:

1. Gładyś H., Matla R.: Work of power plant in electric power system. WNT. W-wa 1995
2. D.Laudyn, M.Pawlik, F.Strzelczyk ? Power plants, WNT W-wa 2000
3. M.Pawlik, J.Skierski ? Systems and devices of power station internal load. WNT W-wa 1986
4. Gacek Z., Structure of high voltage insulating systems used in electric power engineering, Wydawnictwo Politechniki Śląskiej, Gliwice, 2002
5. Florkowska B. i inni, Mechanisms, measurements and analysis partial discharges in diagnostics of high voltage insulating systems, Uczelniane Wydawnictwo Naukowo ? Dydaktyczne AGH, Kraków, 2001

Result of average student's workload

Activity	Time (working hours)
1. participations on lectures	60
2. participations in laboratory	30
3. preparation to laboratory tasks	28
4. preparation of laboratory reports	28
5. particiaption in consulations related to laboratory	5
6. preparation to test	20
7. participation during test	3

Student's workload

Source of workload	hours	ECTS
Total workload	174	5
Contact hours	98	4
Practical activities	91	2