

Study plan

Name of study plan: Electrical Engineering, Power Engineering and Management - Electrical Power Engineering

Faculty/Institute/Others: Faculty of Electrical Engineering

Department: Department of Electrical Power Engineering

Branch of study guaranteed by the department: Electrical Power Engineering

Garantor of the study branch: prof. Ing. Josef Tlustý, CSc.

Program of study: Electrical Engineering, Power Engineering and Management

Type of study: Follow-up master full-time

Required credits: 110

Elective courses credits: 10

Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses in the program

Minimal number of credits of the block: 87

The role of the block: P

Code of the group: 2015_MEEMEP1

Name of the group: Compulsory subjects of the programme

Requirement credits in the group: In this group you have to gain 62 credits

Requirement courses in the group: In this group you have to complete 12 courses

Credits in the group: 62

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
BE1M13EMP	Ecology of materials and processes	Z,ZK	5	2P+2L	L	P
BE1M16EKE	Economy of Power Industry	KZ	4	2P+2S	Z	P
BE1M14EPT	Electric Drives and Traction <i>Jiří Lettl, Zdeněk Holovský Jiří Lettl Jiří Lettl (Gar.)</i>	Z,ZK	6	2P+2L	Z	P
BE1M14ESP	Electric Machinery and Apparatus <i>Pavel Mindl, Miroslav Chomát Miroslav Chomát Pavel Mindl (Gar.)</i>	Z,ZK	5	2P+2L	Z	P
BE1M15IAP	Engineering Applications <i>Jan Kyncl, Ladislav Musil</i>	Z,ZK	5	2P+2C	Z	P
BE1M15TVN	High Voltage Engineering <i>Radek Procházka Radek Procházka (Gar.)</i>	Z,ZK	5	2P+2L	L	P
BE1M14SSE	Machinery and Structures of Power Plants <i>Evžen Thöndel Evžen Thöndel</i>	Z,ZK	5	2P+2C	Z	P
BE1M15ENY	Power Plants <i>Zdeněk Müller, Jan Špetlík Zdeněk Müller (Gar.)</i>	Z,ZK	5	2P+2S	L	P
BE1M13JAS	Quality and Reliability	Z,ZK	6	2P+2C	Z,L	P
BE1M13ASS	Solar Systems Application <i>Jakub Holovský, Vít zslav Benda Jakub Holovský Vít zslav Benda (Gar.)</i>	Z,ZK	5	2P+2L	Z	P
BE1M14TVM	Theory and Application of Power Converters <i>Jiří Lettl Jiří Lettl Jiří Lettl (Gar.)</i>	Z,ZK	5	2P+2L	L	P
BE1M15PRE	Transmission and Distribution of Electricity	Z,ZK	6	2P+2S	Z	P

Characteristics of the courses of this group of Study Plan: Code=2015_MEEMEP1 Name=Compulsory subjects of the programme

BE1M13EMP	Ecology of materials and processes	Z,ZK	5
Electrical Technology from the perspective of ecology. Environmental assessment of the various types of surface protection. Environmental aspects of protective systems used in electronics. Environmental impacts of electrical production. Ekodesign proposal of the electrical product. Principles of the proposal product for a difficult operating environment. Disposal of electrical waste.			
BE1M16EKE	Economy of Power Industry	KZ	4
Fundamentals of financing of power companies. Cost structure of power generation and distribution. Prices and tariff systems for power, heat and gas production and distribution. Examples of economic evaluation and investment appraisal of the typical project in power sector. Renewable energy sources, externalities. Energy policy and energy law in CR. Liberalization and power market development.			

BE1M14EPT	Electric Drives and Traction	Z,ZK	6
The course focuses on the principles of designing electric drives with AC motors in different ways and different types of load, reliability, design for explosive environments and for special purposes and the necessary technical documentation. Students learn the basics of electric traction drives for trams in public transport systems, electric locomotives, as well as the systems of hybrid cars and electric vehicles.			
BE1M14ESP	Electric Machinery and Apparatus	Z,ZK	5
The course is focused on contact and solid-state switching devices in LV networks. Basic topologies AC switches and stress of their components, systems with modern semiconductor devices and their protection circuits, testing electrical devices. The course also deals with the general theory of electrical machines. Magnetic field. Fundamentals of commutation. The transformer efficiency, voltage drop. Transients - switch to the network, a short circuit. Mathematical model of synchronous and asynchronous machines. A rotating magnetic field. Induction machine, starting and speed control. Influence of harmonic magnetic field. Single-phase induction motor. Work synchronous machine on a network. Torque, stability, overload capacity.			
BE1M15IAP	Engineering Applications	Z,ZK	5
The aim of the course is to get an overview of solving basic mathematical problems occurring in engineering practice using computer algebra systems			
BE1M15TVN	High Voltage Engineering	Z,ZK	5
The course contains the fundamental theories of high voltage engineering with respect to application in electrical power engineering. The knowledge of high voltage generators, measurement technique of high voltages and currents, properties of insulation systems, diagnostics methods and electrical discharges and their elimination. The practical laboratory exercises in high voltage laboratory are included.			
BE1M14SSE	Machinery and Structures of Power Plants	Z,ZK	5
The aim of the course is to acquaint students with forms of energy transformation in power plants, describing the function of power facilities, their structure, properties and characteristics.			
BE1M15ENY	Power Plants	Z,ZK	5
The course introduces power plants electric circuit topologies and self-consumption equipment characteristics. There are explained steam and nuclear power plants design, dynamics and characteristics. Separate part is concentrated on hydro power plants principles and characteristics.			
BE1M13JAS	Quality and Reliability	Z,ZK	6
Terminology and definitions from the area of quality and reliability and their control, philosophy of quality, systems of quality control in the world. Reliability as a part of quality. Basic definitions from the area of reliability, basic distributions used in reliability and their basic characteristics. Back-up using a warm and cold standby, types of warm and cold standbys. Reliability of components and systems, calculation of reliability using composition and decomposition. and using a method of a list. Basic statistical methods and tools joined with quality control, managerial tools for quality control. Techniques FMEA and QFFD, house of quality. Capability of a process. Taguchi loss function. Audits. Statistical inspection.			
BE1M13ASS	Solar Systems Application	Z,ZK	5
Solar energy. Photovoltaic phenomena. Photovoltaic cells and modules and their characteristics. Photovoltaic systems and their applications. Photo-thermal phenomena. Photo-thermal power stations. Significance, economic and environmental aspects of solar energy exploitation.			
BE1M14TVM	Theory and Application of Power Converters	Z,ZK	5
The course focuses on typical applications of power semiconductor converters on their sizing, switching and protection of power semiconductor converters. It also summarizes the basics of modulation and control strategies of power semiconductor converters and modern trends in their application in electric drives and other applications.			
BE1M15PRE	Transmission and Distribution of Electricity	Z,ZK	6
The course introduces particular topics concerning transmission and distribution systems, mainly load flow solutions, specific aspects of system steady states and possibilities to control these states. The course also deals with synchronous generators characteristics in different operational states.			

Code of the group: 2015_MEEMDIP

Name of the group: Diploma Thesis

Requirement credits in the group: In this group you have to gain 25 credits

Requirement courses in the group: In this group you have to complete 1 course

Credits in the group: 25

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BDIP25	Diploma Thesis	Z	25	22s	L	P

Characteristics of the courses of this group of Study Plan: Code=2015_MEEMDIP Name=Diploma Thesis

BDIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			

Name of the block: Compulsory courses of the specialization

Minimal number of credits of the block: 19

The role of the block: PO

Code of the group: 2015_MEEMEPO3

Name of the group: Compulsory subjects of the branch

Requirement credits in the group: In this group you have to gain 19 credits

Requirement courses in the group: In this group you have to complete 4 courses

Credits in the group: 19

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BE1M15DEE	Distribution of Electrical Energy Zdeněk Müller	Z,ZK	5	2P+2S	Z	PO
BE1M15ETT	Electrical Heat Jan Kyncl Jan Kyncl (Gar.)	Z,ZK	5	2P+2S	Z	PO
BE1M15ELS	Electrical Light Petr Žák, Petr Žák	Z,ZK	5	2P+2L	L	PO
BE1M15IND	Master Project	Z	4	0+4s	Z	PO

Characteristics of the courses of this group of Study Plan: Code=2015_MEEMEPO3 Name=Compulsory subjects of the branch

BE1M15DEE	Distribution of Electrical Energy	Z,ZK	5	The course introduces students into power quality principles, transmission and distribution system equipment and protection. The course covers also Smart grid principles and devices including measurement and telecommunication systems.		
BE1M15ETT	Electrical Heat	Z,ZK	5	The aim is to gain knowledge of heat transfer, physical similarity theory, mathematical models frequently used components of energy systems (heat exchangers, heat pumps, thermal storage tanks, air treatment equipment). Are discussed mathematical models of induction and arc of electro-thermal equipment.		
BE1M15ELS	Electrical Light	Z,ZK	5	The aim of the course is to make students acquainted with most frequent applications of optical radiation and with theoretical and practical principles of resolving lighting systems for indoor and outdoor areas, respecting necessary visual performance with emphasis on energy efficiency solutions and aspects of health and safety.		
BE1M15IND	Master Project	Z	4	Arranged for by the Department of Electrical Power Engineering. To write an individual seminar work on a topic chosen by the students (ideally the topic of the seminar work is identical with the master's thesis topic); to get acquainted with operation of a power generating plant (technology, economy, law, environmental protection, relations to the outside world); to acquire knowledge in the field of labour-law legislation, self-presentation, acquaintance with electrical power engineering of the CR in a broader context. Presentation of the outcomes of individual seminar works before students.		

Name of the block: Elective courses

Minimal number of credits of the block: 4

The role of the block: V

Code of the group: 2015_MEEMEVOL

Name of the group: Elective subjects

Requirement credits in the group:

Requirement courses in the group:

Credits in the group: 0

Note on the group: ~Student can choose arbitrary subject of the master's program (EEM - Electrical Engineering, Power Engineering and Management, EK - Electronics and Communications, KYR - Cybernetics and Robotics, OI - Open Informatics, OES - Open Electronics Systems) which is not part of his curriculum. Student can choose with consideration of recommendation of the branch guarantee. You can find a selection of optional courses organized by the departments on the web site
<http://www.fel.cvut.cz/cz/education/volitelne-predmety.html>

Code of the group: 2015_MEEMEH

Name of the group: Humanities subjects

Requirement credits in the group: In this group you have to gain at least 4 credits (at most 42)

Requirement courses in the group: In this group you have to complete at least 1 course (at most 12)

Credits in the group: 4

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members) Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
BE0M16HSD	History of economy and social studies	Z,ZK	4	2P+2S	L	v
BE0M16HT2	History of science and technology 2	Z,ZK	4	2P+2S	L	v
BE0M16FI2	Philosophy II	Z,ZK	4	2P+2S	L	v
BE0M16MPS	Psychology	Z,ZK	4	2P+2S	L	v
A003TV	Physical Education	Z	2	0+2	L,Z	v
BE0M16TE1	Theology	Z,ZK	4	2P+2S	L	v

Characteristics of the courses of this group of Study Plan: Code=2015_MEEMEH Name=Humanities subjects

BE0M16HSD	History of economy and social studies	Z,ZK	4
This subject deals with the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aims and achieved results as well as the social and cultural development and coexistence of the various ethnical groups in the Czech countries.			
BE0M16HT2	History of science and technology 2	Z,ZK	4
This subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history and traditions of the subject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the influence of technical engineers			
BE0M16FI2	Philosophy II	Z,ZK	4
The course is oriented on the transdisciplinary aspects of philosophy, informatics, physics, mathematics and biology.			
BE0M16MPS	Psychology	Z,ZK	4
A003TV	Physical Education	Z	2
BE0M16TE1	Theology	Z,ZK	4
This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which grows our civilization up.			

List of courses of this pass:

Code	Name of the course	Completion	Credits
A003TV	Physical Education	Z	2
BDIP25	Diploma Thesis	Z	25
Independent final comprehensive work for the Master's degree study programme. A student will choose a topic from a range of topics related to his or her branch of study, which will be specified by branch department or branch departments. The diploma thesis will be defended in front of the board of examiners for the comprehensive final examination.			
BE0M16FI2	Philosophy II	Z,ZK	4
The course is oriented on the transdisciplinary aspects of philosophy, informatics, physics, mathematics and biology.			
BE0M16HSD	History of economy and social studies	Z,ZK	4
This subject deals with the history of the Czech society in the 19th - 21th centuries. It follows the forming of the Czech political representation, its aims and achieved results as well as the social and cultural development and coexistence of the various ethnical groups in the Czech countries.			
BE0M16HT2	History of science and technology 2	Z,ZK	4
This subject traces historical developments in electrical engineering branches in the world and in the Czech Lands. Its ultimate goal is to stimulate students' interest in the history and traditions of the subject, while highlighting the developments in technical education and professional organizations, the process of shaping scientific life and the influence of technical engineers			
BE0M16MPS	Psychology	Z,ZK	4
BE0M16TE1	Theology	Z,ZK	4
This subject provides to students the basic orientation in christian theology and requires no special previous education. After short philosophic lecture the basic theologic disciplines are gone through. The subject is determined not only to believer students who want to know the reliable theologic grounding but also above all to ones who want to get know Christianity - religion from which grows our civilization up.			
BE1M13ASS	Solar Systems Application	Z,ZK	5
Solar energy. Photovoltaic phenomena. Photovoltaic cells and modules and their characteristics. Photovoltaic systems and their applications. Photo-thermal phenomena. Photo-thermal power stations. Significance, economic and environmental aspects of solar energy exploitation.			
BE1M13EMP	Ecology of materials and processes	Z,ZK	5
Electrical Technology from the perspective of ecology. Environmental assessment of the various types of surface protection. Environmental aspects of protective systems used in electronics. Environmental impacts of electrical production. Ekodesign proposal of the electrical product. Principles of the proposal product for a difficult operating environment. Disposal of electrical waste.			
BE1M13JAS	Quality and Reliability	Z,ZK	6
Terminology and definitions from the area of quality and reliability and their control, philosophy of quality, systems of quality control in the world. Reliability as a part of quality. Basic definitions from the area of reliability, basic distributions used in reliability and their basic characteristics. Back-up using a warm and cold standby, types of warm and cold standbys. Reliability of components and systems, calculation of reliability using composition and decomposition. and using a method of a list. Basic statistical methods and tools joined with quality control, managerial tools for quality control. Techniques FMEA and QFFD, house of quality. Capability of a process. Taguchi loss function. Audits. Statistical inspection.			
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BE1M14TVM	Theory and Application of Power Converters	Z,ZK	5
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The aim of the course is to make students acquainted with most frequent applications of optical radiation and with theoretical and practical principles of resolving lighting systems for indoor and outdoor areas, respecting necessary visual performance with emphasis on energy efficiency solutions and aspects of health and safety.			
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BE1M15IAP	Engineering Applications	Z,ZK	5
The aim of the course is to get an overview of solving basic mathematical problems occurring in engineering practice using computer algebra systems			
BE1M15IND	Master Project	Z	4
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BE1M16EKE	Economy of Power Industry	KZ	4
Fundamentals of financing of power companies. Cost structure of power generation and distribution. Prices and tariff systems for power, heat and gas production and distribution. Examples of economic evaluation and investment appraisal of the typical project in power sector. Renewable energy sources, externalities. Energy policy and energy law in CR. Liberalization and power market development.			

For updated information see <http://bilakniha.cvut.cz/en/f3.html>

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