SPŠ strojní a elektrotechnická České Budějovice

Initial identification data

Name: secondary school of mechanical and electrical engineering, České Budějovice, Dukelská 13

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Legal form:	Contributory organisation managed by the Ministry of Education
Headmaster:	Mgr. Jaroslav Koreš, Ph.D.

I. Graduate profile

Graduate employment:

The school educational programme (study focus) **Electromobility and alternative drives**, primarily prepares pupils for eventual study at the next tertiary educational level, especially at a university of technical and non-technical direction. As the curriculum is included in the study field of Electrical Engineering (26-41-M/01), the graduate is therefore prepared to engage in the normal work activities of a secondary technical or technical-economic worker in related technical fields, but also in electrical engineering fields where appropriate **qualifications of electrical workers are** required ("authorisation" to carry out

work on electrical equipment - Law 250/2021. Thus, he/she can apply his/her qualifications in production, assembly, technical maintenance, electrical equipment, design activities, its implementation or technological and design activities of an electrical nature.

The specialised vocational curriculum is designed as a dynamic system enabling graduates to apply themselves in new technical and technological conditions and to further develop these conditions. It consists of the curriculum of electrical engineering, electrical machines and devices, automatic drive control, traction power engineering and electronics. At the same time, it has the knowledge of an engineering worker with an in-depth knowledge of machine construction. The activities in the workshop training allow practical verification of the knowledge from the theoretical subjects.

During their studies at secondary school, graduates are prepared to be interested in further professional growth and to have the ability to adapt to changing working and economic conditions.

The aim of the study is for the student and subsequently the graduate to gain an overview of the entire structure of the electrical engineering field, to be able to orientate in its individual areas and to combine the acquired knowledge and skills. However, they will have to continue their education in this field even after graduating from a technical college.

During their studies, graduates had the opportunity to develop their skills and competences in the form of leisure activities, for example in the field of professional clubs, foreign languages (German, Italian, Spanish, French) or sports activities (ski instructor, fitness instructor).

Expected learning outcomes:

A. General competences

Education aims to graduate:

- adhered to the principles of the culture of language expression and common forms of communication;
- mastered the basic types of spoken and written speeches, oriented in the structure of the text, formulated his/her thoughts in a clear, factual and linguistically correct manner;
- have a command of at least one world language at the level of normal spoken and written communication, and an understanding of moderately complex text of a general and professional nature;
- mastered the basic methods of creative work (analysis, synthesis, generalization), was able to apply natural and technical knowledge and choose solutions that are functional, economical, safe and do not endanger health and the environment;
- he was a valid member of society, a supporter of democracy and tolerance of other people's opinions as well as tolerance of other ethnic groups and nations;
- Acted in accordance with the law, knew his/her rights and respected the rights of others;

- was able to engage in teamwork, performed tasks with initiative and precision, had a healthy self-confidence;
- was realistic about his/her abilities, was able to set the right goals in life, had an overview of his/her job opportunities, and purposefully pursued further education;
- had a general cultural outlook, understood the importance of art for life;
- understood the importance of a good environment and actively contributed to it;
- thought and acted economically;
- comply with the principles of occupational safety and health;
- have a responsible attitude to their health and fitness;
- he knew how to give first aid;
- use information and communication technologies in professional and personal life.

B. <u>Professional competences</u>

Education aims to graduate:

- correctly use and convert units of physical quantities;
- find relationships between phenomena and objects when solving practical problems and use them correctly in applications;
- create various forms of graphical representation (tables, diagrams, graphs, characteristics, schemes...);
- effectively use the necessary mathematical procedures in solving practical problems;
- created drawings of components, assemblies, schematics, etc. products of graphic technical documentation used in electrical engineering in accordance with valid standards (ČSN, EU, DIN) and oriented also in construction drawings and electrical schematics;
- know how to work with basic schematics - block, line, etc.;
- chose modern and purposeful procedures in electrical engineering, used and applied ČSN standards and others;
- apply the principles of technical standardisation and standardisation when solving technical tasks and correctly use technical standards;
- with the help of a CAD system, be able to design, control and model phenomena (transients, stability of electrical systems) occurring in electrical circuits;
- apply knowledge of the function and construction of basic types of machines and devices, perform designs of simpler machines and use proven or standardized methods of checking and verifying functional parameters of electrical circuits;
- applied the basic laws of hydromechanics and thermomechanics in the construction of machines, was able to use this knowledge e.g. in the solution of automation systems;
- be able to work with computer technology, use its possibilities, work with appropriate software (CAD systems, spreadsheets, etc. - this part is strengthened in the framework of the curriculum Electromobility and alternative drives);

- had knowledge of the basics of electrical engineering and electronics, electrical machines and devices automation and machine construction with in-depth knowledge of the design of transport vehicles and related systems, correctly performed basic electrical measurements and observed the principles of safe work in electrical engineering;
- apply information about the structure, organisation and management of relevant technological processes and units;
- developed technical thinking, sense of safety when working with electrical equipment;
- understand the behaviour and characteristics of electrical thermal equipment, lighting equipment, electric drives, power electronics and electric traction;
- He had the necessary knowledge, solved problems, simple tasks and designs, expanded his skills and gained insight in these electrical engineering disciplines;
- mastered and applied the basic principles of operation of individual types of control and automation systems based on electrical, electronic, electrohydraulic, electro-pneumatic and modern methods of data transmission;
- proposed procedures for maintaining the operability of electrical machinery and equipment and the use of diagnostic methods;
- Designed manufacturing procedures for the production of simpler parts and assembly procedures for subassemblies or simpler products;
- determined machines, communal tools, instruments, gauges and other production aids for individual technological operations;
  comply with the principles of occupational safety and health according to Act 250/2021.
- . environmental protection principles
- oriented in corporate activities, marketing and management;
- oriented in the tax system;
- understand the functioning of the financial market and its basic entities;
- knew the process of setting up a company;
- understand the macroeconomic laws of the national economy and the EU;
- understand the company's relations with the external environment, especially with the bank, the trade office, the tax office and the commercial court;
- find functional dependencies in solving practical tasks, define, describe and use them;
- was able to express himself clearly, precisely and comprehensibly;
- he could articulate and defend his views.

II. Characteristics of the educational programme

1. Description of the overall concept of education

The school curriculum (Electromobility and alternative drives) is based on the framework curriculum for the field of education **26-41-M/01 Electrical Engineering**. Education according to this school curriculum is on the one hand broadly conceived so that the graduate has the widest possible application, on the other hand it offers a certain profiling in the areas that are most often in demand on the labour market in the region of the school's operation. The profiling of subjects is chosen by each pupil independently, with the first two years being common, when pupils concentrate on consolidating their knowledge and profiling themselves. Already at this stage, it is possible to exercise a certain selectivity in the individual subjects, in the form of an individual approach by teachers to pupils.

The educational strategy is designed so that the graduate has the necessary amount of general and professional knowledge, skills to solve specific tasks and problems in professional and personal life and has appropriate value attitudes. The teaching therefore has a high proportion of practical teaching in school laboratories, school workshops and internships in companies. Practical work is carried out in two blocks of fourteen days in Years 2 and 3, and partly in Year 4. The emphasis is on the acquisition of the English language and the acquisition of computer skills, automation systems and project work.

2. Organisation of teaching

Full-time study is organized as a four-year course. The content and programme of teaching is organized by subject, the vocational component is conceived in a block format, combining electrical and mechanical engineering teaching separately into a single block. Each subject is taught according to the relevant curriculum, which contains the aims of education, the teacher's working methods and the syllabus. The composition of the subjects and blocks and their teaching in each year of study is contained in the curriculum of the field of study. The syllabus of subjects and the curriculum are part of this school curriculum. Teaching is organised according to a timetable approved for each school year by the headmaster. The teaching takes place in the school building of the School of Mechanical and Electrical Engineering České Budějovice, Dukelská 260/13. The teaching also includes two weekly sports courses in the first and third year of study, and each pupil is obliged to complete a continuous professional practice in companies for two weeks in the second year of study and two weeks in the third year of study.
Subjects are divided into core and elective subjects. The basic subjects are compulsory for every pupil. Elective subjects within the scope of 7 weekly teaching hours in the fourth year of study are chosen by the pupil according to the offer given in the curriculum of the field of study at the end of the third year of study. The elective subjects are grouped into blocks providing a certain professional profile expressed by the field of study.

In practical teaching in laboratories and workshops, in lessons for exercises, in foreign language, Czech language, mathematics, physics and physical education lessons, pupils are divided into groups with the number of pupils corresponding to the capacity of each laboratory and workshop, the methods of teaching and safety regulations.

3. Practical training and professional practice

Practical lessons, practical exercises

Practical teaching is carried out from the first to the fourth year in all classes mainly in the form of teaching in workshops (practice), continuous professional practice and exercises in professional subjects in professional laboratories.

Practical teaching is supported to the maximum extent possible, which is directly related to theoretical teaching, the practical component is significantly strengthened in the form of laboratory exercises, seminars and workshop exercises. This creates the conditions for the gradual acquisition of methods of work and thinking that are appropriate for the future employment of graduates. The ability to apply knowledge and skills in the independent solution of appropriate problems is developed.

The aim of the training is to acquire the required level of skills and knowledge of the pupils with a focus on manual dexterity. It is important to acquire knowledge of working procedures and to observe work safety.

Practical training is carried out in the form of exercises in professional classrooms with work stations and appropriate equipment, as well as in the form of professional excursions, workshops, professional lectures and continuous professional practice in the 2nd and 3rd year and in the operations of social partners. In the case of work experience abroad within Erasmus+ projects, the duration of the work experience corresponds to the content of the approved project. It provides knowledge of the phenomena, principles, laws and relations of technological and operational, economic, ecological and social contexts as well as basic skills to apply these relations and contexts in solving practical tasks, it also forms a good relationship of the student to productive work, science and technology.

Practical training takes place in workplaces with the necessary machines and tools, equipment and aids. The layout is determined by the prescribed curricula for the relevant disciplines and specialisations. Practical training requires the division of the class into groups. Each group must pass through the prescribed departments during the school year. The timetable for practice is adapted to these requirements.

Professional practice

In the second and third year, a continuous 14-day internship is included, which takes place in real working conditions directly at the workplaces of individuals and legal entities. The school prepares practice contracts, including the content, which are forwarded by the pupils to the natural or legal person with whom the pupil will carry out the fortnight's practice. A member of staff of the organisation (instructor) is responsible for the management and supervision of the pupil's work experience at the work experience placement.
Each student secures his/her own internship during the year of study. If the pupil does not secure the internship, the school will provide it. The purpose of the apprenticeship is to use the knowledge and experience gained in the year.

III. Characteristics of cooperation with social partners in the implementation of the SPP

The school cooperates with social partners in the implementation of the SPP (Electromobility and alternative drives). This cooperation is mainly based on the current needs of both parties. Competent representatives of companies are particularly important feedback in terms of the content and learning outcomes of the students in the study programme. The main part of the cooperation is the provision of professional practice for second and third year pupils, the output evaluation of professional practice from the point of view of the company, the possibility of consultations of experts of these companies with our teachers, discussions with school pupils and suggestions for written work for the profile part of the final examination.

The school expects and expects from the cooperation with social partners:

- monitoring and analysis of regional labour market needs and graduate employment opportunities;
- the formulation of the requirements of regional social partners and the regional labour market for the competences of graduates in given fields of education;
- Providing practical vocational training - especially apprenticeships and vocational training - in a real work environment and professional lectures and excursions for students and teachers; internships for both teachers and pupils, involvement of pupils and teachers in projects and company competitions, participation of social partners in the output evaluation of educational results in a given curriculum (final exam, profile part of the final exams, assignment of topics for final exams with defence before the final exams board and assessment of these works), assistance in providing material conditions for teaching and DVPP, suggestions for updating the curriculum, etc.

A. The school cooperates with a number of companies in developing the concept of education and material support for teaching:

- the school council as an advisory body to the headmaster,
- Labour Office in České Budějovice and the South Bohemian Chamber of Commerce,
- ČEZ, a. s.,
- Temelín Nuclear Power Plant,
- Jihostroj, a. s., Velešín,
- E.ON Česká republika, s. r. o.,
- EGE, spol. s r. o., České Budějovice,
- TSE spol. s r. o., České Budějovice,
- SINOP CB a. s.,
- Elektro S.M.S. spol. s r. o. (wholesale of electrical materials),

- Forpsi Internet CZ, a. s.,
- ČEPS, a. s.,
- Voltcom, spol. s r. o., and others.

B. The school cooperates with other partners in addition to the above-mentioned companies, e.g. Budějovice,
- MOSLED, spol. s r. o. Č. Budějovice.

C. In the area of further education of teaching staff, the school uses the services of:
- National Institute for Further Education of Teaching Staff - Regional Workplace Č. Budějovice,
- Centre for the Survey of Educational Achievement, Department of Education, No. Budějovice, Tábor and others.

D. In the field of educational counselling, the school cooperates mainly with the Pedagogical and Psychological Counselling Centre in Č. Budejovice (mainly Český Krumlov, Prachatice).

E. Universities - our school cooperates intensively with ZČU Plzeň (Faculty of Electrical Engineering), we regularly visit their open days. Our graduates also apply to CTU, Brno University of Technology and VŠTE in České Budějovice.

F. Parents are perceived as a crucial social and cultural environment that determines the educational aptitude of pupils and the choice of their educational path. Cooperation with this group of social partners is becoming increasingly important, especially in terms of increasing the success of pupils in their studies at our school.
Parents can influence the content and methods of education through the School Council (SC), which is established in the school in accordance with the School Act, another partner is the school's SRPS. Last but not least, regular parents' meetings, held with high parental participation online during the emergency period after 11 March 2020, serve for mutual cooperation and communication.

IV. Curriculum

Field of study: 26-41-M/01 ELECTRICAL ENGINEERING
ŠVP: ŠVP Electromobility and alternative drives
Validity: from 1 September 2023

Teaching block			Weekly number of hours in a year				Weekly hours
	Teaching subject	Shortcut	**I.**	**II.**	**III.**	**IV.**	
Social science subjects	Czech Language and Literature	CL	3(1)	3	3	3(1)	12
	English language	AJ	3(3)	3(3)	3(3)	3(3)	12
	Foundations of Social Sciences	ZSV	0	2	1	0	3
	Basics of ecology	ZEK	1	0	0	0	1
	History	DJ	2	0	0	0	2
	Total weekly hours of social studies subjects		**9**	**8**	**7**	**6**	**30**
Science subjects	Mathematics	MA	4(1)	3(1)	3(1)	3(1)	13
	Physics	F	3(1)	2	0	0	5
	Economics	EC	0	0	3(1)	0	3
	Information Technology	IT	2(2)	2(2)	2(2)	0	6
	Chemistry	CH	1	0	0	0	1
	Total weekly hours of science subjects		**10**	**7**	**8**	**3**	**28**
Block **Construction of means of transport**	Mechanics of means of transport	MED	1	2	1	**0**	**4**
	Construction of machines and vehicles	KSV	1	2	2	3	8
	Constructing by computer	KPP	1	2	0	0	3
	Inspection and measurement	KM	0	0	0	2	2
	Engineering technology	ST	2	3	2	1	8
	Total weekly hours of vocational pr. Mechanical engineering		**5(2)**	**9(3)**	**5(2)**	**6(2)**	**25**
Block	Electrical engineering in transport	ETD	5	5	0	0	10
	Electric drives	EPD	0	0	6	6	12

Electrical engineering of transport equipment	Electrochemistry	ECH	0	0	0	1	1
	Control systems	RSD	0	0	0	2	2
	Vehicle electronics	ELV	0	0	3	3	6
	Total weekly hours of vocational pr. Electrical engineering		**5(2)**	**5(2)**	**9(3)**	**12(4)**	**31**
Activation subjects	Practice	PRA	3(3)	3(3)	3(3)	2(2)	11
	Physical education	TV	2(2)	2(2)	2(2)	2(2)	8
	Total weekly hours of active activity		**5**	**5**	**5**	**4**	**19**
	Selected lots from Mechanical Engineering	VPS	0	0	0	3	3
	Selected parts of Electrical Engineering	VPE	0	0	0	3	3
	Seminar in mathematics	SM	0	0	0	3	3
	Total weekly hours of professional compulsory elective subjects		**0**	**0**	**0**	**3**	**3**
	Total teaching hours per week in the year		**34**	**34**	**34**	**34**	**136**

V. Overview of the elaboration of the educational content of the RVP into the ŠVP

School:	**Secondary School of Mechanical and Electrical Engineering České Budějovice**			
Code and name of the RVP:	**26 - 41 - M/01 ELECTRICAL ENGINEERING**			
Name of the SPP:	Electromobility and alternative drives			
Educational areas and content areas	Min. number of weekly teaching hours	Teaching Subject	Total number of weekly teaching hours	Use of available Hours
Czech language	5	Czech Language and Literature	7	2
Foreign language	10	Foreign language	12	2
Social science education	5	Foundations of Social Sciences History	3 2	0
Science education	6	Physics Chemistry Fundamentals of Ecology	5 1 1	1
Mathematics education	12	Mathematics	13	1
Aesthetic education	5	Czech Language and Literature	5	0
Education for health	8	Physical education	8	0
Education in information and communication technologies	6	Information technology	6	0
Economic education	3	Economics	3	0
Electrical engineering (incl. electrical chemistry)	6	Electrical engineering of transport equipment	6	0
Electrical Engineering	16	Electrical engineering of transport equipment	16	0
Electrotechnical measurements	8	Electrical engineering of transport equipment	8	0
Technical drawing	3	Constructing by computer	3	0

Available hours	Total DH 35			
Total	**128**		**132**	**39**
Professional practice	4 weeks	Practice in companies	4 weeks	
Courses	1 week	Sports courses	2 weeks	

Curriculum of the teaching block Construction of means of transport

Fields of education	26-41-M/01 Electrical engineering
Length and form of study	4 years, daily
Total number of hours per study	970 hours (170 + 170 + 306 + 324)
Validity	From 1 September 2023

Number of lessons per week			
1st year	**2nd year**	**3rd year**	**4th year**
5(2)	9(2)	5(2)	6(2)

It covers the curriculum and outcomes of the RVP topics:

- Engineering basis

Characteristics of the subject

The block of mechanical engineering in the field of means of transport is taught in the first year with a subsidy of five hours per week, in the second year with a subsidy of nine hours per week, in the third year with a subsidy of five hours and in the fourth year with a subsidy of six hours per week. The curriculum builds on the knowledge and skills acquired in primary school in the subject of physics. The curriculum is divided into units which, in a given sequence, represent a system of content and logic. The unit also contributes to a deeper and more comprehensive understanding of the issues in engineering. In each year, pupils have two lessons per week in the form of exercises, where they consolidate the knowledge acquired in a smaller number, practise and repeat the material, and have the opportunity for individual consultation with the teacher.

The aim of the course is to familiarize students with issues in the field of mechanical engineering. The student will become familiar with the rules of technical drawing. The student will then learn about the modern approach to computer aided design. In the field of engineering technology, the student will learn about the materials used and their properties. The block also includes issues in the field of machine building.
The teaching is aimed at ensuring that students are able to solve design problems, select suitable materials, design suitable production technology and create technical documentation.

The teaching of the subject of construction of machines and vehicles has the task to educate students in the theory of construction and operation of machines so that they can apply themselves in the field of machine construction, in the field of maintenance of machinery, as lower management workers in engineering production after graduation. At the same time, they should acquire a level of basic theoretical knowledge in the field of machine construction and operation such that they are prepared to successfully complete their studies at higher vocational or technical schools.
This subject is a professional application of basic vocational and mathematical-scientific subjects. Machine and Vehicle Design provides students with comprehensive information on the subject from the perspective of standardized components and a range of established design solutions while assessing their advantages and disadvantages. The focus, however, remains on actively learning strategies for solving machine and vehicle design problems, including design, inspection, and load capacity calculations at the high school level.

Engineering technology, together with other technical subjects, especially machine and vehicle construction and mechanics, forms the basis of technical education. The teaching of engineering technology builds on and deepens the knowledge of physics, chemistry, mechanics, electrical engineering. Its mastery is a prerequisite for the graduate to be able to independently perform the activities of a technologist. A good level of knowledge of technology is also part of the qualification of all technical workers in engineering. The way of thinking to which the pupil is guided throughout his studies makes him skilful in everyday life.
The content of the engineering technology curriculum is divided into four years. In close relation to the maturity of the pupil and his/her ability to understand the material, the thematic content is arranged in the way the whole technological process takes place in practice. In the first year, the pupil learns about the properties of materials used in technical practice, how to test these properties and how to design a suitable material. In addition, the student is introduced to the basics of metallurgy and technologies for the production of standardised semi-finished products.

The teaching of the subject of mechanics at secondary vocational schools is intended to educate students in the theory of mechanics so that after graduation they can apply themselves primarily in the field of designing machines and machinery, as junior managers in engineering production. At the same time, they should acquire such a level of basic theoretical knowledge in the field of mechanics that they will be prepared to successfully complete their studies at higher vocational or technical schools. This subject is a professional application of basic vocational and mathematical science subjects.
Mechanics provides students with comprehensive information mainly on how to design and size machine components in the design of specific machinery. The focus, however, remains on actively learning strategies for solving mechanical problems including design, control calculations, and load capacity calculations at the high school level.

The Inspection and Measurement curriculum provides students with the necessary knowledge and skills at an appropriate level in the inspection and measurement of engineering products to determine their quality. The development of skills of a manipulative and intellectual nature predominates, while knowledge is mainly based on learning in other subjects.

Practical lessons, practical exercises

Practical teaching is supported to the maximum extent possible, which is directly related to theoretical teaching, the practical component is significantly strengthened in the form of laboratory exercises, seminars and workshop exercises. This creates the conditions for the gradual acquisition of methods of work and thinking that are appropriate for the future employment of graduates. The ability to apply knowledge and skills in the independent solution of appropriate problems is developed.

Practical teaching takes place in divided groups of pupils, where each pupil can work independently at the computer or at stations on assigned tasks. At the end of each topic, pupils produce independent work. In this work, the pupil demonstrates all newly acquired knowledge and skills and at the same time incorporates into this work the knowledge and skills acquired in the previous thematic units, depending on the assignment and the requirements of the final work.

Practical exercises take place in the laboratories (the class is usually divided into three groups, the teaching takes place in parallel). The laboratories have the necessary measuring equipment, computer equipment. An interactive whiteboard is available.

Curriculum of the teaching block Electrical Engineering of Transport Vehicles

Fields of education	26-41-M/01 Electrical engineering
Length and form of study	4 years, daily
Total number of hours per study	970 hours (170 + 170 + 306 + 324)
Validity	From 1 September 2023

Number of lessons per week			
1st year	**2nd year**	**3rd year**	**4th year**
5(2)	5(2)	9(3)	12(4)

It covers the curriculum and outcomes of the RVP topics:

- Electrotechnical basis

Characteristics of the subject

The block of electrical engineering of means of transport is taught in the first and second year with five hours per week, in the third year with nine hours per week and in the fourth year with twelve hours per week. The curriculum builds on the knowledge and skills acquired in primary school in the subject of physics. The curriculum is divided into units which, in a given sequence, represent a system of content and logic. The unit also contributes to a deeper and more comprehensive understanding of the necessary laws of physics. In the first and second year, pupils have two lessons a week in the form of exercises, where they consolidate the knowledge acquired in smaller numbers, practise and repeat the material, and have the possibility of individual consultation with the teacher.

The aim of the course is to introduce students to the different types of materials used throughout the field of electrical engineering. The student learns the individual properties of materials, technical parameters, suitability for different applications.
The teaching aims to ensure that students are able to select suitable materials for different technical needs, to understand the technology of production of electrical materials. Furthermore, they should learn the technology of manufacturing electronic elements and components.

In the thematic unit DC current, pupils are introduced to the basic laws of electrical engineering. They apply this knowledge in solving practical problems, e.g. finding voltage drops in a line, power consumption of an appliance, selection of a suitable conductor. In addition, they apply basic electrical engineering laws practically when analysing simple DC circuits. In the thematic unit electrostatic field, students learn the basic quantities, work with them and are able to use the given knowledge to select a suitable capacitor. At the end of the first year, pupils learn about the basic quantities of magnetic fields and are able to compare the quantities of current, electrostatic and magnetic fields.

The second year begins with the issue of electromagnetic induction, students are introduced to the basic quantities and learn to determine the magnetic force, the carrying capacity of the electromagnet, the number of turns of the coil, the magnitude of the induced voltage and understand the principle of electrical machines. Next comes the area of alternating current. Pupils solve AC circuits and create vector diagrams of them. The three-phase system topic introduces pupils to the electrical quantities of simple three-phase systems when connected in a star and in a triangle. The theoretical part of the subject is complemented by practical exercises in workshops where pupils use modern component base to learn about basic electronic components, build and investigate electronic circuits and test their theoretical knowledge. In the second year, the block introduces pupils to the basics of energy in transport.

In the third and fourth year, students gain knowledge of electrical machines and devices, automation technology and electrical drives.
The student acquires the necessary competences in the field of production, distribution and consumption of electricity and gains information about the structure, organisation and management of the relevant technological processes and units. It is important to develop technical thinking, a sense of safety when working with electrical equipment, to be able to apply theoretical knowledge at an appropriate level when working on electrical installations and networks.
Knowledge in this field can be applied in all fields of technology, starting with power generation, power distribution and especially the use of electricity in household consumption and the production of almost every conceivable product.

The electrical machinery and apparatus section is in many ways complementary to and corresponds with the power engineering, electronics, electrical measurement section. The main objective is to apply the curriculum of electrical machines and apparatus in the educational process so that the pupil acquires the necessary competences in the field of production and consumption of electricity and gains information about the structure, organisation and management of the relevant technological processes and units. It is important to develop technical thinking and a sense of safety when working with electrical equipment. The teaching in the automation part is mainly focused on understanding the function of the basic control circuit and the elements of which it is composed, as well as understanding the influence of feedback on the operation of the regulated system. Instruction in the electrical drives section is aimed at understanding the control of DC and AC drives.

The vehicle electronics part is taught in the third and fourth year. The concept of teaching is designed with an emphasis on a deeper study and understanding of modern electronic components, their properties and use in transport. The main objective of this is to acquire the skills and knowledge necessary for practical activities, further education in the field and the acquisition of technical thinking skills. The aim is to gain an overview of the most commonly used electronic

components and their properties, with an emphasis on the ability to independently look up detailed information available and consider its impact on circuit function.

In the fourth year, students will learn about control systems and the basics of microprocessor technology. The electrochemistry part of the fourth year deals with the origin, properties and use of electrochemical cells.

The curriculum of the Electrical Engineering of Vehicles block provides pupils with the necessary knowledge of the basic electrical engineering concepts they need in the field of electromobility at an appropriate level.
Teaching takes place in classrooms equipped with a data projector, which allows teachers to use modern didactic procedures and methods in individual lessons. All lessons are undivided.

The teaching block is the basic preparatory subject of electrotechnical education in the field of electromobility. The main objective of the block is to teach students the basic phenomena and principles in the field of electromobility, to understand the behaviour and properties of electrical components and circuits. Pupils will be able to explain phenomena and laws in electrical engineering using mathematical relationships and solve them numerically. The student will use laws and other physical information, understand physical constants and be able to explain them. The student will be able to look up information in tables and navigate the literature to solve problems. The pupil will draw and explain a diagram of an electrical circuit.

The education of pupils with special educational needs is carried out with the help of support measures that are different from or in addition to the individual and organisational measures associated with the education of other pupils. In order to ensure correct diagnosis, we cooperate with pedagogical-psychological counselling centres, special education centres, psychologists, psychiatrists, etc.

Teaching is supplemented by excursions and lectures on specialist topics wherever possible.

Practical lessons, practical exercises

Practical teaching is supported to the maximum extent possible, which is directly related to theoretical teaching, the practical component is significantly strengthened in the form of laboratory exercises, seminars and workshop exercises. This creates the conditions for the gradual acquisition of methods of work and thinking that are appropriate for the future employment of graduates. The ability to apply knowledge and skills in the independent solution of appropriate problems is developed.

Practical teaching takes place in divided groups of pupils, where each pupil can work independently at the computer or at stations on assigned tasks. At the end of each topic, pupils produce independent work. In this work, the pupil demonstrates all newly acquired knowledge and skills and at the same time

incorporates into this work the knowledge and skills acquired in the previous thematic units, depending on the assignment and the requirements of the final work.

Practical exercises take place in the laboratories (the class is usually divided into three groups, the teaching takes place in parallel). The laboratories have the necessary measuring equipment, computer equipment. An interactive whiteboard is available.