Curriculum for vg1 electrical engineering and computer technology

This is a translation from Norwegian Bokmål of the official Norwegian subject curriculum text.

Established as regulation by the Norwegian Directorate for Education and Training on 27 February, 2020 as delegated in letter on 13 September, 2013 from the Ministry of Education and Research, pursuant to the Act of 17 July, 1998 no. 61 relating to primary and secondary education (Education Act) Section 3-4, first paragraph.

Valid from 01.08.2020

About the subjects

Relevance and central values

Vg1 electrical engineering and computer technology focuses on the development of basic competence to carry out work on the electrical systems of today and tomorrow. Further, the programme subjects involve development of the pupils' competence within data and communication technology, electrical installations, machines and facilities. The programme subjects also involve the building, operation and further development of electrical facilities to meet future social needs.

All subjects are designed to help give pupils a strong foundation for learning. Vg 1 electrical engineering and computer technology shall promote curiosity, creativity and the joy of innovation through exploratory ways of working with components, circuits and equipment. Through comprehensive electrical trade assignments, the programme subjects contribute to mastery and reflection on one's own occupational practice and identity as an electrician in an equal and inclusive community. The programme subjects in vg 1 electrical engineering and computer technology shall facilitate cooperation irrespective of gender and culture. Vg1 electro and data technology shall contribute to knowledge of how social partners cooperate to develop a better workplace.

Core elements

Components, circuits and equipment

The core element components, circuits and equipment involves calculating and reading measurements in electrical and electronic circuits, and using equipment and components in comprehensive systems. It also involves being able to programme equipment and components.

Occupational practice

The core element occupational practice involves using different work methods, tools and materials. It also involves using acquired competence to make choices when working and assessing the result. Further, it involves communicating technical descriptions and documenting completed assignments. The core element also addresses what is expected of a professional electrician. The core element also involves safe work routines to prevent hazardous situations.

Energy and environment

The core element energy and environment involves various types of production, transmission and storage of electrical energy. It also involves energy efficiency measures in electrical installations, equipment and machines. Further, it addresses how production, utilisation and waste management of products and components impact the climate and environment

Safety in communications, electrical equipment and machinery

The core element safety in communications, electrical equipment and machinery involves the application of regulations to avoid harming health, lives and materials. The core element also includes securing data, and information and communication systems.

Interdisciplinary topics

Health and life skills

In vg1 electrical engineering and computer technology, the interdisciplinary topic of health and life skills addresses good and safe working positions, and coping with workplace requirements. The interdisciplinary topic also involves addresses technical solutions and how they contribute to a good indoor climate, and how technology can contribute to a person's quality of life.

Democracy and citizenship

In vg1 electrical engineering and computer technology, the interdisciplinary topic of democracy and citizenship addresses being able to cooperate to solve electrical assignments, and cooperation to develop an organised and more equal workplace.

Sustainability

In vg1 electrical engineering and computer technology, the interdisciplinary topic sustainable development addresses how energy solutions and technology can help reduce climate and environmental loads. The interdisciplinary topic also involves awareness of how one's own actions and choices impact sustainable development.

Basic skills

Oral skills

Oral skills in vg1 electrical engineering and computer technology involve being able to use technical terminology, comprehensible communication, and listening and showing respect for the person talking. The ability to participate in discussions on safety, energy solutions and technical solutions is also one of the skills.

Writing

Writing in vg1 electrical engineering and computer technology involves been able to express oneself in a comprehensible manner about electrical topics. This includes using precise technical language to explain one's choice of technical solutions and to document trade activities. This means that language, images and symbols shall be expressed in the correct manner for the trade, and texts shall be accurate and comprehensible for the reader.

Reading

Reading in vg1 electrical engineering and computer technology involves being able to acquire knew knowledge and insight, find appropriate information and interpret technical texts to help carry out work in accordance with applicable regulations and recommendations. This also includes knowledge of technical terms and symbols relevant to carrying out various assignments.

Numeracy

Numeracy in vg1 electrical engineering and computer technology involves being able to carry out mathematical calculations for electrical and electronic circuits, and assessing the results against measured values. This also involves being able to retrieve information from tables, statistics and diagrams, and correctly use symbols and prefixes when solving assignments.

Digital skills

Digital skills in vg1 electrical and computer technology involve establishing digital communication, troubleshooting, and simulation and programming with the aid of digital tools. Digital skills also involve being able to produce drawings and technical documentation, and critically evaluating sources when searching for information.

Competence aims and assessment

Competence aims and assessment electronic circuits and networks

Competence aims after electronic circuits and networks

The pupil is expected to be able to

- plan, carry out, assess and document assignments related to electronic circuits and networks, individually and in cooperation with others and give a reason for their choices
- build and programme a self-chosen product consisting of micro controls, analogue circuits, appropriate sensors and actuators to achieve the desired functionality
- connect various computer devices to a system, configure relevant components with the aid of software and establish communication between the devices to achieve the desired functionality
- assemble and configure a small computer network with an Internet connection, carry out appropriate measurements and explain simple measures for securing the network
- explore sensors for electronic circuits and networks, and discuss their area of application
- carry out risk assessments and work in accordance with electrical and ICT security routines, and health, safety and environment routines
- professionally carry out work in electronic circuits and networks in accordance with applicable regulations, assembly and installation instructions, and use appropriate hand tools and machines
- choose and use suitable instruments and software to carry out measurements and troubleshooting, and assess the readings against expected values
- assess the quality of their own work and suggest improvements
- use and handle materials and equipment in electronic circuits and networks in a responsible and sustainable manner in compliance with applicable internal control systems
- manage waste upon completion of work in an environmentally friendly way, and discuss the climate and environmental load of various products

Formative assessment

The formative assessment should help promote learning and the development of competence. The pupils demonstrate and develop competence in electronic circuits and networks when they use knowledge, skills and critical thinking to solve assignments in the programme subject.

The teacher facilitates pupil participation and encourages the desire to learn through a variety of assignments. The teacher can give assignments that cover multiple or all the programme subjects. The teacher shall have conversations with the pupil regarding their development within electronic circuits and networks. The pupils shall have the opportunity to express what they believe they can accomplish and reflect on their own academic development. The teacher provides guidance on further learning and adapts the education to enable the pupils to use the guidance provided to develop their competence in the programme subject.

Assessment of coursework

The grades awarded for coursework reflect the overall competence of the pupil in electronic circuits and networks at the end of the education in the programme subject. The teacher plans and facilitates the pupils in demonstrating their competence in various ways. Using the competence aims as a starting point, the teacher shall assess how the pupil demonstrates understanding, reflection and critical thinking, and how the pupil masters challenges and solves assignments in various contexts. The teacher awards grades in electronic circuits and networks based on the competence the pupil has demonstrated by planning, completing, assessing and documenting their own academic work.

Competence aims and assessment energy control systems

Competence aims after energy and management systems

The pupil is expected to be able to

- plan, execute, assess and document work assignments related to energy control systems, individually and in cooperation with others and ground their choices
- programme and put into operation systems to control rotational direction and engine speed, explain the principal behaviour of motor control systems, and discuss power loss
- assemble, programme and put into operation a demand-driven system for lighting, heating and various power outlets, and discuss energy saving in relation to the chosen control system
- use the correct hand tools and machines to produce metal parts and other materials based on blueprints
- assemble and put into operation a small system for producing and storing renewable energy, including rectifiers and inverters, and explain the conversion of DC voltage into AC voltage

- assemble and put into operation control systems that use movement, pressure and temperature measurements as input data
- assemble a small distribution system with the associated earthing system and describe the principal construction of TN, IT and TT networks
- choose suitable leads, cables and guards, calculate and assess voltage drops, and document protection against overloading and electric shocks
- identify the components in an air handling and heat pump system, explain how the main components work and measure CO2 and temperature
- carry out risk assessments and work in compliance with electrical safety routines, machine safety routines, and health, safety and environment routines
- carry out lifesaving first aid
- use documentation and appropriate instruments to troubleshoot electrical installations
- work professionally on energy control systems in accordance with regulations, assembly and installation instructions, and use appropriate hand tools and machines
- calculate electricity, voltage, resistance, impedance and power in DC voltage and AC voltage circuits, and use appropriate instruments to measure and assess the measured result against the expected result
- explain various types of production, storage and transmission of electric power and reflect on and discuss the potential impact of these on climate and environment
- explain and assess how social partners cooperate to develop a better workplace
- use and handle materials and equipment in energy control systems in a responsible and sustainable manner in accordance with applicable internal control systems

Formative assessment

The formative assessment should help promote learning and the development of competence. The pupils demonstrate and develop competence in energy control systems when they use knowledge, skills and critical thinking to solve assignments in the programme subject.

The teacher facilitates pupil participation and encourages the desire to learn through a variety of assignments. The teacher can give assignments that cover multiple or all the programme subjects. The teacher shall have conversations with the pupil regarding their development within energy control systems. The pupils shall have the opportunity to express what they believe they can accomplish and reflect on their own academic development. The teacher provides guidance on further learning and adapts the education

to enable the pupils to use the guidance provided to develop their competence in the programme subject.

Assessment of coursework

The grades awarded for coursework reflect the overall competence of the pupil in energy control systems at the end of the education in the programme subject. The teacher plans and facilitates the pupils in demonstrating their competence in various ways. Using the competence aims as a starting point, the teacher shall assess how the pupil demonstrates understanding, reflection and critical thinking, and how the pupil masters challenges and solves assignments in various contexts. The teacher awards grades in energy control systems based on the competence the pupil has demonstrated by planning, completing, assessing and documenting their own academic work

Type of assessment

Assessment of coursework

Electronic circuits and networks: The pupils shall have one grade awarded for coursework.

Energy control systems: The pupils shall have one grade awarded for coursework.

Examination for pupils

Electronic circuits and networks: The pupils shall not sit for an examination.

Energy control systems: The pupils shall not sit for an examination.

Examination for external candidates

Electronic circuits and networks: External candidates shall sit for a written examination in the programme subject. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will have a preparatory part.

Energy control systems: External candidates shall sit for a written examination in the programme subject. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will have a preparatory part.

Electronic circuits and networks, and energy control systems: External candidates shall take an interdisciplinary practical examination in these programme subjects. The examination will be prepared and graded locally. The county council decides whether the local examination for external candidates will include a preparatory part.