Computers and ICT

The subject of computers and ICT provides a foundation for working professionally with the installation and maintenance of hardware and software. The subject also covers basic electronics since computer and communications technology equipment and devices are electronic.

Aim of the subject

Teaching in the subject of computers and ICT should aim at helping students develop the ability to work with commonly used systems and components in the area of computers and communications. Teaching should thus give students the opportunity to develop knowledge of systems, devices, components, methods and procedures used when computers are connected in existing networks. Students should also be given opportunities to develop the ability to solve problems, localise and remedy errors, both independently and together with others. Teaching should develop students' knowledge of computer security and the ability to work in ways consistent with sustainable development. It should also help students develop the ability to meet and communicate with clients and users in a service-oriented manner.

Teaching should blend practical and experimental phases with theory. Practical exercises should give students the opportunity to develop the ability to handle and manage technical equipment. Students should also be given the opportunity to express themselves both in speech and in writing by documenting their work.

Teaching in the subject of Computers and ICT should give students the opportunities to develop the following:

1) Knowledge of the structure and functions of computers, computer and communication systems, and also different types of networks.

2) Skills in planning and carrying out work in computers, and also in computers and communication systems.

3) Skills in carrying out optimisation, administration and diagnostics, and also remedying errors in computers and communication systems.

4) The ability to use instructions, manuals, topologies and other documents in both Swedish and English, and also to document their work.

5) The ability to provide support and assistance for users in a service-oriented way.

Courses in the subject

- Computer technology 1a, 100 credits

- Computer technology 1b, 100 credits
- Computers and network technology, 100 credits, which builds on the course computer technology 1a.
- Computer coordination and support, 100 credits, which builds on the courses computer technology 1a, or computer technology 1b.
- Digital communication technology, 100 credits, which builds on the course computer technology 1a.
- Industrial ICT, 100 credits, which builds on the course computer technology 1a.
- Multimedia systems, 100 credits, which builds on the course computer technology 1a.

Computer technology 1a

The course computer technology 1acovers points 1–2 and 4 under the heading Aim of the subject. The course covers basic knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Computer systems, their components and peripheral equipment.

- The foundations of OSI models (open systems interconnection) and applicable standards for computer communication.

- Programs e.g. simple communication and application programs for mobile devices.

- Simple drawing and simulation programs.

- The concept of files, file formats, compression and encryption.

- Use of field buses in e.g. industrial, electrical and other technological areas.

- Routines for making backups and installation of virus protection.

- ESD safe handling of microprocessors and memory (electrostatic discharge).

- Planning, mounting, configuring and starting computer systems for any of the areas involving measuring, steering, monitoring or documentation.

- Installation and configuration of application programs.

- Installation and configuration of computers in an existing network.

- Installation of printers and other devices in networks.

Knowledge requirements

Grade E

Students describe **in basic terms** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity is achieved in the systems.

Students plan and carry out **in consultation** with the supervisor and with **some** skills hardware and software installation, configuration and maintenance, and also remedy **simple** errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install and configure **in consultation** with the supervisor computers in an existing network. Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and

other documents in both Swedish and English, and also provide **simple** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity is achieved in the systems.

Students plan and carry out **after consultation** with the supervisor and with **good** skills hardware and software installation, configuration and maintenance, and also remedy **simple** errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install and configure **after consultation** with the supervisor computers in an existing network. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity are achieved in the systems.

Students plan and carry out **after consultation** with the supervisor and with **very good** skills hardware and software installation, configuration and maintenance, and also remedy **simple and also more advanced** errors in computers and computer systems. The results are **good** in terms of function, safety and quality. In addition, students install and configure **after consultation** with the supervisor computers in an existing network. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals, topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Computing and media networks

The course computing and media networkscovers points 1–7 under the heading Aim of the subject. The course covers advanced knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Planning, installation, starting and registering, and also maintenance of data and media network installations.

- Functions and structures of computers and media networks.

- Build-up and functional modes of broadband multifunctional networks for properties (BMF networks), and hybrid, fibre and coaxial networks (HFC networks).

- Foundations of data communication technology.

- Connecting fibre boxes and user outlets.

- Cable laying and rules for multiple cable laying.

- Splicing and installing fibre optic cables.

- Joining fibre cables and category 5 and 6 networks.

- Measuring techniques and instruments for measuring and testing in fibre networks.

- Techniques for repairs and fault tracing in computer and media networks.

- Measurement and fault tracing techniques in fibre networks.

Knowledge requirements

Grade E

Students carry out with **some** skills simple installations of computer and media networks. Students draw up a **simple** work plan based on drawings, diagrams, standards and specifications relevant to the task. Prior to the work, students choose **in consultation** with the supervisor tools, instruments, materials and other equipment for the task, and use these with **some** skills in environmentally friendly ways.

During their work, students detect possible problems and errors in not only new but also existing installations, and solve and repair them **in consultation with** the supervisor.

Students carry out work in a way which is safe for themselves and others, and also with due account of the working environment, ergonomy and aesthetics. Students check safety with **satisfactory** results, create **simple** documentation of their work and start the installation.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students carry out with **good** skills simple installations of computer and media networks. Students draw up a **coherent** plan of the work based on drawings, diagrams, standards and regulations relevant to the task. Prior to their work, students choose **after consultation** with the supervisor tools, instruments, materials and other equipment for the task, and use this with **good** skills in environmentally friendly ways.

During their work, students identify possible problems and errors in both new and existing installations, and solve and repair these **after consultation** with the supervisor.

Students carry out work in a way which is safe for themselves and others, and also with due account of the working environment, ergonomy and aesthetics. Students check safety with **satisfactory** results, create **thorough** documentation of their work and start the installation.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students carry out with **very good** skills simple, **and also more advanced,** installation work in computer and media networks. Students draw up a **coherent** plan of the work based on drawings, diagrams, standards and regulations relevant to the task. Prior to their work, students choose **after consultation** with the supervisor tools, instruments, materials and other equipment for the task, and use this with **very good** skills in environmentally friendly ways.

During their work, students identify possible problems and errors in both new and existing installations, and solve and repair these **after consultation** with the supervisor.

Students carry out work in a way which is safe for themselves and others, and also with due account of the working environment, ergonomy and aesthetics. Students check safety with **good** results, provide **accurate and detailed** documentation of their work and start the installation.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Computers and network technology

The course computers and network technologycovers points 1–4 under the heading Aim of the subject. The course covers advanced knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Hardware and software installation, building, configuring and upgrading computers and computer systems.

- Local networks, structures and working methods.

- Protocols for data transmission via networks.

- Different types of processors and their areas of use.

- Common operating systems and their properties.

- Performance of different data storage media. Storage of data in optical media.

- The concepts of switching and routing.

- The concept of virtual networks.

- Internal and external busses, their areas of use and performance.

- Backup copying and virus protection.

- Installation of peripheral equipment and upgrading drive routines.

- Installation and maintenance of local printers.

- Configuring graphic cards.

- Computer start and boot up sequences, and installation and upgrading of BIOS (basic input/output system) or firmware.

- Checking and optimising performance and functions of computers and computer systems.

- Fault tracing in computers and computer systems.

Knowledge requirements

Grade E

Students describe **in basic terms** how computers and local networks are built up and function, and also how operating reliability is achieved.

Students plan and carry out **in consultation** with the supervisor and with **some** skills hardware and software installation, building, configuration, upgrading, optimisation and fault tracing, and also remedy errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install **in consultation** with the supervisor computers in local networks. Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **simple** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** how computers and local networks are built up and function, and also how operating reliability is achieved.

Students plan and carry out **after consultation** with the supervisor and with **good** skills hardware and software installation, building, configuration, upgrading, optimisation and fault tracing, and also remedy errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install **after consultation** with the supervisor computers in local networks. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** how computers and local networks are built up and function, and also how operating reliability is achieved. **In addition, students give an account in detail and in a balanced way of the relationship between the different parts making up a network.**

Students plan and carry out **after consultation** with the supervisor and with **very good** skills **advanced** hardware and software installation, building, configuration, upgrading, optimisation and fault tracing, and also remedy errors in computers and computer systems. The results are **good** in terms of function, safety and quality. In addition, students install **after consultation** with the supervisor computers in local networks. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals,

topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Computer technology 1b

The course computer technology 1bcovers points 1–4 under the heading Aim of the subject. The course covers basic knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Computer systems, their components and how they work.

- The foundations of OSI models (open systems interconnection) and applicable standards for computer communication.

- Programs e.g. simple communication and application programs for mobile devices.

- The concept of files, file formats, compression and encryption.

- Routines for making backups and installation of virus protection.

- Installation, configuration and starting computer systems for e.g. administration, communication, documentation and simpler business systems.

- Installation and configuration of application programs, and also administration of access rights and passwords.

- Installation and configuration of computers in an existing network.

- Installation of printers and other devices in networks.

Knowledge requirements

Grade E

Students describe **in basic terms** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity is achieved in the systems.

Students plan and carry out **in consultation** with the supervisor and with **some** skills hardware and software installation, configuration, and also **simple** administration in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install and configure **in consultation** with the supervisor computers in an existing network. Students handle with **some** skills equipment and software, and also carry out work safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **simple** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity is achieved in the systems.

Students plan and carry out **after consultation** with the supervisor and with **good** skills hardware and software installation, configuration, and also **simple** administration in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. In addition, students install and configure **after consultation** with the supervisor computers in an existing network. Students handle with **good** skills equipment and software, and also carry out work safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** how computers and communication systems are built up and function, and also how operating reliability and protection of integrity are achieved in the systems.

Students plan and carry out **after consultation** with the supervisor and with **very good** skills hardware and software installation, configuration, and also **simple and more advanced** administration in computers and computer systems. The results are **good** in terms of function, safety and quality. In addition, students install and configure **after consultation** with the supervisor computers in an existing network. Students handle with **very good** skills equipment and software, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals, topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Digital communication technology

The course digital communication technologycovers points 1–4 under the heading Aim of the subject. The course covers advanced knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Operating systems for mobile devices.

- Communication networks for mobile computer equipment.

- Data communication via satellite.

- Reference models and standards for data communication.

- Security and integrity aspects in the use of wireless devices.

- Installation and configuration of wireless devices in communication systems in different environments.

- Configuring, upgrading and installing applications in mobile devices.

- Aerial technologies and aerials for wireless networks.

- Configuring wireless access points.

- Installation of wireless network cards.

- Installation and configuration of bridges, routers and gateways.

- Configuring security functions and encryption.

- Fault tracing in local wireless networks and equipment.

- Checking and measuring transmission speeds and signal strength.

- Methods of carrying out diagnostics, tracking and fault tracing.

Knowledge requirements

Grade E

Students describe **in basic terms** the structure, functions and working methods of local networks, wireless networks and international communication networks, and also how operating reliability is achieved.

Students plan and carry out **in consultation** with the supervisor and with **some** skills installation, configuration, diagnosis, tracing and simple fault tracing, and also remedy **simple** errors in digital communication systems. The results are **satisfactory** in terms of function, safety and quality.

Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **simple** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** the structure, functions and working methods of local networks, wireless networks and international communication networks, and also how operating reliability is achieved.

Students plan and carry out **after consultation** with the supervisor and with **good** skills installation, configuration, diagnosis, tracing and simple fault tracing, and also remedy errors in digital communication systems. The results are **satisfactory** in terms of function, safety and quality. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** the structure, functions and working methods of local networks, wireless networks and international communication networks, and also how operating reliability is achieved. **In addition, students give an account in detail and in a balanced way of the relationship between the different parts making up a digital communications system.**

Students plan and carry out **after consultation** with the supervisor and with **very good skills** advanced **installation, configuration, diagnosis, tracking and fault tracing, and also remedy** advanced **errors** in digital communication systems. The results are **good** in terms of function, safety and quality. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals, topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Computer coordination and support

The course computer coordination and supportcovers points 2–5 under the heading Aim of the subject, with special emphasis on point 5.

Core content

- Customer reception and case handling e.g. oral customer reception, customer reception via e-mail, and other types of case handling systems.

- Pedagogical guidance for IT systems: both pedagogical thinking and knowledge of techniques for this e.g. remote control of the mouse.

- Manuals and other help documentation for users e.g. simple texts, hypertexts, images, films, recording mouse movements and menu management.

- Analyse user requirements and transform them into concrete solutions.

- License types and handling.

- Assessment and choice of IT products currently on the market.

- Technical documentation of computer systems.

- Basic fault tracing methodology.

- System integration.

Knowledge requirements

Grade E

Students describe **in basic terms** how customer reception functions, and how case handling systems are designed and operate.

Students plan and carry out **after consultation** with the supervisor and with **some** skill pedagogical guidance, fault tracing and support for customers, and also remedy **simple** errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals and other documents in both Swedish and English, and also provide **simple** documentation of their work. In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** how customer reception functions, and how case handling systems are designed and operate.

Students plan and carry out **after consultation** with the supervisor and with **good** skills pedagogical guidance, fault tracing and support for customers, and also remedy **simple** errors in computers and computer systems. The results are **satisfactory** in terms of function, safety and quality. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals and other documents in both Swedish and English, and also provide **accurate** documentation of their work. In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** how customer reception functions, and how case handling systems are designed and operate.

Students plan and carry out **after consultation** with the supervisor and with **very good** skills pedagogical guidance, fault tracing and support for customers, and also remedy **simple and also more advanced** errors in computers and computer systems. The results are **good** in terms of function, safety and quality. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals and other documents in both Swedish and English, and also provide **accurate and detailed** documentation of their work. In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Industrial ICT

The course Industrial ICT 1covers points 1–4 under the heading Aim of the subject. The course covers advanced knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Commonly used software for control, monitoring and data collection in electric power and energy distribution, and in buildings, manufacturing and process industries e.g. SCADA (supervisory control and data acquisition).

- HMI (human machine interface), i.e. from use of software for visualising data in real-time to safe and user friendly interfaces.

- Commonly used field bus systems and wireless information technology in electric power and energy distribution, in buildings, and also in manufacturing and process industries.

- Operating reliability and traceability in industrial information technology.

- Planning, mounting, configuring and starting industrial information technology hardware for collection of data from measuring, steering or process control applications for personal computers. For instance, addressed I / O device (input / output), which can read values from a measuring sensor to the computer.

- Installation and configuration of industrial software for data collection, e.g. OPC servers and clients (open connectivity).

- Analysis and assessment of data collection, with regard to such factors as data quality and function.

- Interpretation of documentation e.g. manuals for hardware and software.

- Methods for systematic documentation of projects e.g. PDM (product data management).

- Systematic documentation using e.g. logging data or database management.

Knowledge requirements

Grade E

Students describe **in basic terms** how industrial software and industrial information technology hardware is built up and functions, and also how operating reliability and traceability can be achieved.

Students plan and carry out **in consultation** with the supervisor and with **some** skills installation, configuration, start up and fault tracing, and also remedy errors in industrial information

technology hardware for the collection of data. In addition, students plan and organise **in consultation** with the supervisor and with **some** skills installation and configuration of industrial software for storing and visualising data. The results are **satisfactory** in terms of function, safety and quality. Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **simple** documentation of their work. In addition, students give a **simple** assessment of the quality of the data collected.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** how industrial software and industrial information technology hardware is built up and functions, and also how operating reliability and traceability can be achieved.

Students plan and carry out **after consultation** with the supervisor and with **good** skills installation, configuration, start up and fault tracing, and also remedy errors in industrial information technology hardware for the collection of data. In addition, students plan and organise **after consultation** with the supervisor and with **good** skills installation and configuration of industrial software for storing and visualising data. The results are **satisfactory** in terms of function, safety and quality. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work. In addition, students make a **well grounded** assessment of the quality of data collected.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** how industrial software and industrial information technology hardware is built up and functions, and also how operating reliability and traceability can be achieved.

Students plan and carry out **after consultation** with the supervisor and with **very good** skills installation, configuration, start up and fault tracing, and also remedy errors in industrial information technology hardware for the collection of data. In addition, students plan and organise **after consultation** with the supervisor and with **very good** skills installation and configuration of industrial software for storing and visualising data. The results are **good** in terms

of function, safety and quality. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals, topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work. In addition, students make a **well grounded and balanced** assessment of the quality of data collected.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.

Multimedia systems

The course multimedia systemscovers points 1–5 under the heading Aim of the subject. The course covers advanced knowledge in the subject.

Core content

Teaching in the course should cover the following core content:

- Configuring, adapting and linking different devices to a functioning multimedia system.
- Configuring graphic cards and computer displays, TVs and projectors, and also installation of equipment for video conferencing.
- Configuring media players and web browsers.
- Network functions and configuration of TV sets, decoders and TV cards for computers.
- Installation and configuration of IP telephony equipment (internet protocols).
- Configuring digital audio cards and audio systems, and connecting speaker systems.
- Installation of servers for home use.
- Installation of different communication programs (messaging programs) and social media.
- Adapting cloud services (cloud net or cloud computing), Internet-based services.
- Methods of coding and protecting intellectual property rights.
- Systematic fault tracing and simple error remedies.
- Providing support for users of multimedia computers and multimedia systems.
- The Consumer Services Act for support and home services.

Knowledge requirements

Grade E

Students describe **in basic terms** the structure, function and working methods of multimedia systems, and also how operating reliability is achieved.

Students plan and carry out **in consultation** with the supervisor and with **some** skills installation, configuration, connection of units and simple systematic fault tracing, and also remedy **simple** errors in multimedia systems. The results are **satisfactory** in terms of function, safety and quality. Students handle with **some** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **simple** documentation of their work.

Students provide **with some certainty** support to users in a service-oriented way.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade D

Grade D means that the knowledge requirements for grade E and most of C are satisfied.

Grade C

Students describe **in detail** the structure, function and working methods of multimedia systems, and also how operating reliability is achieved.

Students plan and carry out **after consultation** with the supervisor and with **good** skills installation, configuration, connecting units and simple systematic fault tracing, and also remedy **simple** errors in multimedia systems. The results are **satisfactory** in terms of function, safety and quality. Students handle with **good** skills equipment and tools, and carry out tasks safely. In their work, students use **with some certainty** instructions, manuals, topologies and other documents in both Swedish and English, and also provide **accurate** documentation of their work.

Students provide **with some certainty** support to users in a service-oriented way.

In consultation with the supervisor, students assess **with some certainty** their own ability and the requirements of the situation.

Grade B

Grade B means that the knowledge requirements for grade C and most of A are satisfied.

Grade A

Students describe **in detail and in a balanced way** the structure, function and working methods of multimedia systems, and also how operating reliability is achieved. **In addition, students give an account in detail and in a balanced way of the relationship between the different parts making up a multimedia system.**

Students plan and carry out **after consultation** with the supervisor and with **very good** skills **advanced** installation, configuration, connecting units and systematic fault tracing, and also remedy errors in multimedia systems. The results are **good** in terms of function, safety and quality. Students handle with **very good** skills equipment and tools, and carry out tasks safely. In their work, students use **with certainty** instructions, manuals, topologies and other documents in both Swedish and English, and provide **accurate and detailed** documentation of their work.

Students provide **with certainty** support to users in a service-oriented way.

In consultation with the supervisor, students assess **with certainty** their own ability and the requirements of the situation.