

Construction Technicians Curricula

A1 Work-related English

Course contents

Learning objectives

*Time
guideline*

Grammar	Understanding and formulating statements, questions and demands worded positively and negatively;	40
	Identifying and reproducing actions, events and facts in present, past, future or timeless mode; identifying and reproducing several events as	

	<p>either simultaneous or consecutive, preceding or subsequent</p>	
	<p>Identifying and establishing spatial, temporal and logical relationships</p>	
	<p>Understanding and formulating action perspectives (active and passive tense)</p>	
	<p>Identifying and describing the number, nature and affiliation of objects, living beings and facts</p>	
	<p>Literal and mediated reproduction of information (direct/indirect speech)</p>	
	<p>Formulating conditions and references</p>	
<p>Vocabulary</p>	<p>Developing profound vocabulary</p>	<p>30</p>

	Understanding further lexical units by listening or reading (receptive vocabulary) or by independently deriving from texts (potential vocabulary)	
Pronunciation and intention	Knowledge of different pronunciation variants in the target language	10
	Mastering pronunciation to an extent to generally avoid misunderstandings, at word and at sentence level	
	Ability to translate characters of phonetic spelling into words	
Text production		20
Notes		
Continuous test		
Business correspondence		

Stages in the writing process (drafting, writing, revising)		
Keywords, text divisions		
Presentation and media		20
Applying a writing technique		
New technologies for information collection		
Presentations		
Delivering a speech		
Occupation-relevant skills		30
Technical terms		
Making phone calls		
Business correspondence		

A2 Native-tongue teaching

Course contents

Learning objectives

*Time
guideline*

Speaking and listening	Identifying the relation between language, thought and reality; learning presentation techniques; writing and holding speeches	30
Spoken texts		
Perception and reflection on the effect of spoken text		
Forms of practical rhetoric		
Development of argumentative structures by listening and producing argumentative texts for oral contribution		
Presentations		
Organising a speech		

Correspondence	DIN 5008; Business letter, Email; addressing authorities	25
Occupational correspondence		
Citation guidelines		
Correct punctuation		
Theoretical basics of documentation and presentation		
Arguing	Comprehending, describing and evaluating texts; method of text analysis; selection of adequate linguistic means for phrasing and sentence structure	15
Interpreting		10
Linguistic creative tools and their function		

Methods of interpretation		
Work-related skills	Acquiring all necessary job-specific knowledge	20
Making phone calls		
Technical terms		
Specialist literature		

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A3 State and society, environmental engineering

Course contents

Learning objectives

Time guideline

Labour and social order	The role of the individual in society; acknowledging the role of labour	15
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Qualifications		
Progress of vocations		
Importance and value of labour		
Essence of labour and relevance of human effort		
Evolution of work ethics		
Industrialisation	Brief historical overview; understanding the significance of industrialisation	10
Progress in social legislation		
Ensuring livelihood		
Equality of men and women		
Social equality and social security		
Significance and value of labour		10

Scientific-technical progress and changes in way of life		
Technological innovations		
Opportunities and risks of information and communication technology		
Power and responsibility		
Europe	Insight into the foundations of the EU; understanding correlations; obtaining findings by statistics, forecasts, theory formation and comparison; use of print and electronic media	35
European integration		
European cooperation vs. historical development		
Common ground vs. diversity of European traditions		
Main EU Treaties		

Democracy in the EU		
Social dialogue in the EU		
Environmental engineering	Classifying energy sources according to environmental compatibility, availability and price	30
	Evaluating properties and possibilities of different energy sources for heat generation	
	Evaluating different types of heat generation with respect to additional requirements, e.g. energy source storage, construction of waste gas ducts, residues disposal	
	Describing alternative/regenerative heat/power generation systems; e.g. solar systems, heat recovery systems, heat pumps	

	<p>Assessing the effects of user behaviour on energy consumption, e.g. perceived temperature, comfort, surface temperatures of building components, room air temperature, room ventilation</p>	
	<p>Ecology</p>	
	<p>Applying environment protection and energy saving laws, e.g. Energy Savings Act, Federal Emission Control Act</p>	

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A4 Energy consultancy and HVACR

Course contents

Learning objectives

Time guideline

Systems engineering - heating	Distinguishing heating systems by design features, such as heat generation, heat transfer medium, heat distribution system and heat delivery system	10
	Evaluating the effects of system temperatures and the type of heat release by co-active properties of the building structure, e.g. control response of the systems on storage capacity of the building components	
	Evaluating properties of commonly used materials for heating system components and their application	
	Explaining technical terms of the heat demand calculation and performing calculations according to DIN 4701 and by using a computer program	
	Describing different control options for central heating systems and their use options	

Systems engineering - ventilation	Describing different types of ventilation systems of residential buildings and their design features (exhaust air systems, supply and exhaust air systems with and without heat recovery, single room ventilation)	10
	Evaluating advantages and disadvantages of different systems with respect to different applications	
	Describing the basics for determining size formats of ventilation systems for residential buildings, e.g. air exchange rates for different rooms, acc. to DIN 1946, DIN 4701	
	Describing the influence of air volume, air speed and air temperature on comfort	
	Indicating options for heat recovery from exhaust air, specifying different materials for air pipes and ducts and evaluating their potential applications	

	Taking into consideration measures of fire and sound insulation with respect to ventilation systems in buildings	
Air tightness	Describing the relevance and system requirements	5
	Describing organisational requirements, e.g. air tightness concept, on-site responsibility, workflow scheduling, detailed planning	
	Selecting air tightness materials (compatibility, effectiveness, durability), and designing joints and connections	
	Detecting weak points of a dense building envelope, e.g. quality of the building components (windows and doors), their connections and pipe lead-ins, installation areas (shafts, pre-wall installation, etc.)	
Modernisation planning		35

<p>Applying laws and regulations to save energy in existing buildings</p>	<p>Applying the Energy Saving Act, Energy Saving Ordinance and related regulations and DIN standards</p>	
	<p>Describing requirements according to the German Energy Saving Ordinance in new buildings and existing buildings</p>	
	<p>Describing retrofit obligations for existing building</p>	
<p>Including buildings and technical facilities and documenting them for the evaluation of building physics</p>	<p>Collecting and clearly documenting data relevant for the physics assessment of an existing building with regard to drafting of a modernisation concept, e.g. exterior walls, exterior wall cladding, windows, boilers, radiators, exhaust ducts</p>	

<p>Drafting and presenting a concept for improvement of the energy balance of an existing building</p>	<p>Drafting and verifying modernisation measures for a building and its technical systems with regard to comfort; e.g. insulation of the heat-transferring enclosing surfaces of a building, including effect on the systems, replacement of the heating system and the effect on the heat-transferring encapsulation areas, recycling of building materials and (systems) components</p>	
	<p>Indicating modernisation measures for a building and its technical facilities, e.g. preparing reports and conducting consultations</p>	
<p>Preparing a cost-benefit analysis of the planned modernisation measure</p>	<p>Contrasting estimated costs of a modernisation measure with expected savings, calculated on the basis of the annual heating demand; e.g. insulation expenses for heat-transferring enclosure surfaces, including modifications of the heating system, with saved energy costs due to a reduced annual heating demand</p>	

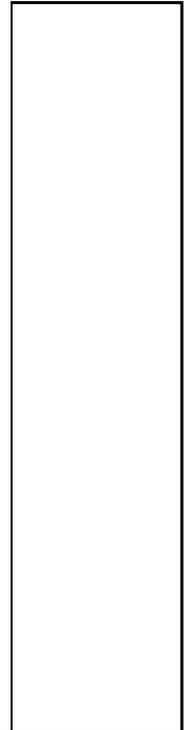
	<p>A realistic calculation, including explanation with regard to amortisation and profitability by computer-aided standardised calculation methods for partial measures or for the overall modernisation measure, e.g. insulation of the heat-transferring surrounding surfaces, modification of the heating system, etc.</p>	
<p>Drafting a disposal concept for a planned modernisation measure</p>	<p>Producing a waste disposal concept during the modernisation measure, e.g. removal and disposal of materials, structural elements and equipment</p>	
<p>Considering in a modernisation planning legal provisions for construction works in existing buildings</p>	<p>Taking into account building and environmental laws when planning modernisation, as well as the close surrounding property and marginal distances, e.g. when changing the shape of the roof or changing the heating energy source</p>	
	<p>Characterising investor's responsibility resulting from the consulting service</p>	

Air tightness measurement with blower door and thermography	Performing a blower door measurement and determining the n50 air tightness rate	15
	Evaluating planning and execution of the air tightness class	
	Creating an air tightness concept, taking into account adjacent construction elements	
	Offering consultancy service for the investor and planner	
	Defining deadlines for planning, execution as well as furnishing documentation on proof of air tightness	
	Locating and assessing any leaks (by flowmeter, thermography) and indicating suggestions for further sealing	
Fire alarm system	Overview of the basics and on interworking with other construction elements	25
Fire variables		

Fire emergence		
Fire detectors		
Fire brigade control panel		
Key depot		
Cable network		
Switchboard technology		
Controllers for extinguishing system shutters		
Smoke and heat exhaust system		
Configuration and documentation		
Regulations and guidelines		
Building services engineering		50

Heating and air-conditioning technology
Antennae and satellite technology
Basics of receiving technology
Antennae
Mounting of antennae
Satellite technology
Refrigeration, air conditioning and heating systems
Water-bearing pipe systems
Lightning protection systems
Earthing systems
Emergency power systems

Overview of the basics and on interworking with other construction elements



Compensation systems	
Regenerative energy technologies	
Lighting technology	
Communication technology	
Escape routes	
150	

B1 Structural Design

Course contents

Learning objectives

*Time
guideline*

Principles of structural design		25
Overview of history of structural design	Knowledge of chronological classification of architectural history	

Load exposure and building stability	Promoting student's competence to understand building constructions	
Dimensional coordination in structural engineering		
Masonry and bonds		
Timber and timber joints		
Formwork and reinforcement works in reinforced concrete constructions		
Moisture protection		
Local building regulations		
Basics of foundation engineering		15
Interactions between building and ground	Insight into the area of foundation engineering	
Rock cycle	Overview of solid and granular soils	

Cohesive, granular and organic soils	Knowledge of soil types and soil classes	
Ground water, seepage water, capillary water, adhesive water, adsorption water	Knowledge of water types in the soil	
Bearing capacity and settlements	Overview of settlements and ground seepage	
Methods of soil exploration, drilling, probing	Knowledge of the content of subsoil surveys and subsoil comments	
Site excavation and drainage		8
Soil pressure on vertical wall at departure angle	Insight into securing of construction pits	
Excavation pit and excavation pit sheeting (embankments, horizontal construction, driven steel girders, sheet piling)	Knowledge of excavations with arched and vertical walls	
Dewatering (open drainage, drilled well, vacuum process, electro-osmosis)	Overview of the procedures on lowering groundwater	

Foundations		8
Types of foundations (shallow foundations, deep foundations, single foundations, strip foundations, slab foundations, pile foundations, pile gratings)	Overview of foundations	
Securing existing flat foundations next to a lower lying pit	Knowledge of underpinning work on existing foundations	
Constructive measures for foundation levelling	Attaining ability to create foundation plans	
Moisture protection		8
Constructive measures	Knowledge of moisture types and moisture damage	
Construction examples (sealing of structures against soil moisture, sealing of structures against non-pressurised	Knowledge of structures, options and principles of structure protection against soil moisture,	

<p>surface water and leachate, water-pressure-bearing bituminous waterproofing for structures)</p>	<p>groundwater and pressurised water, against precipitation moisture and condensation</p>	
<p>Steelwork</p> <p>Introduction to steelwork, functions of steelwork, production areas, steel structures, standards</p> <p>Riveted connections in steel structures, standards, rivet types, tubular rivet diameter, rivet length, rivet materials, symbols for riveted joints, strength, structural steels, rolled products, steel structures, dimensioning and verification</p> <p>Screw connections in steel structures, standards, types of screws, strength classes, symbols for bolted joints, strength, structural steels, rolled</p>	<p>Insight into different production areas of steelwork and steel structures</p> <p>Insight into rivet types, materials, strength; acquiring skills in design and verification of riveted joints</p> <p>Insight into screw types, strength classes, types of connection, strength</p>	<p>40</p>

products, steel structures, dimensioning, verification

Welded joints, standards, welding processes, structural steels according to their suitability for welding, filler metals, seam types, graphic representation of welds, welding specifications, weldable constructions, test methods, rolled products, steel structures, dimension, verification

Tension rods, constructions, steel profiles, design features, dimensioning, verification

Pressure rods, bar constructions, column constructions, steel profiles, dimensioning, verification

Insight into welding processes and ability to design and proof welds, knowledge of weldable designs and test methods

Insight into the construction of tension rods, acquiring the ability of dimensioning tension rods and to carrying out proof tensile strength tests

Developing knowledge in construction of pressure bars, skills in designing pressure bars

<p>Column feet, constructive design, anchoring, dimensioning, verification</p> <p>Column heads, constructive design</p> <p>Carrier positioning, types of positioning, verification</p> <p>Carrier systems, ceiling beams, beams, dimensioning, verification</p>	<p>Insight into the column construction with anchoring, ability to proof own work</p>	
<p>Timber construction</p> <p>Basics of timber construction, historical development, timber, wood-based materials</p> <p>wood preservation technology, structural and chemical wood protection</p>	<p>Reliable knowledge of wood structure and of wood-based materials</p> <p>Knowledge in decision-making with regard to proper selection of wood preservation methods</p>	<p>20</p>

Wall structures	Insight into static effectiveness between walls and ceilings within the building structure	
Stiffening function of the walls	Overview of the function of freestanding and inclined walls	
	Overview of the interaction of walls and ceilings	
	Knowledge of constructional and static effectiveness of solid structures with load-bearing longitudinal and transverse walls	
Wall assembly		8
Walls made of prefabricated parts / supporting systems	Insight into prefabrication systems of assembled wall constructions	
Load-bearing and non-load-bearing walls	Overview of constructional structures, element sizes and production methods	
Upright wall panels		

Window and door lintels	Overview of large and small panel construction	
Staircase walls		
Internal dividing	Knowledge of module and measures coordination	
Partition walls	Insight into manufacturing and installation tolerances	
Firewalls	Knowledge of static-constructive connections (thermal material movements, assembly joints, joints on exterior wall elements, dimensioning of joints, sealing measurements)	
Skeleton construction		
Skeleton constructions and building functions	Overview of the classification system of skeleton construction	
Anchors	Insight into skeletons types	

Bracing		
Staff connection	Insight into the static structure of structural systems	
Load-bearing structures material		
Load-bearing systems		
Supports and joints		
Outer wall constructions	Insight into the outer wall formation	
Reinforced concrete, steel and wood frame construction (framework)	Insight into skeleton structures determined by the selected material	
Architectural history		
Antiquity (Egypt, Mesopotamia, Crete-Mycenae)	Knowledge of architectural styles	26

Antiquity (Greece, Rome-Byzantium)	Identifying style elements, supporting systems, technology and materials as a function of the progress of respective production forces	
Middle Ages (Romanticism, Gothic period)	Overview of technical possibilities, tools and procedures	
Modern era (Renaissance, Baroque / Rococo, Classicism)	Identifying the relevance of ancient architectural ideas in European architecture	
20th century: historicism, art nouveau, functionalism	Knowledge of predominantly used construction materials, recognition of the significance of form and content of selected architectural objects	
Preservation of monuments (tasks and examples)	Competent determining of historical buildings in the home country with regard to the origin of individual details and ornaments and using them for monument preservation tasks	
Thermal insulation in buildings		26

Calculating a double shell exterior wall	Ability to arithmetically and constructionally solve simple heat protection problems	
Calculating a back-ventilated cold roof	Overview of issues of sound insulation, sound absorption, noise reduction and vibration isolation	
Sound insulation in buildings	Overview of components with adequate sound insulation	
Fire protection in buildings	Overview of the role of fire protection	
	Knowledge of regulations and terms of building material and fire resistance classes	
	Insight into fire protection measures (escape routes, horizontal and vertical fire sections)	
Ceiling construction		
Ceiling function, ceiling types	Insight into/overview of ceiling construction systems	

Static, functional, building physics, material requirements	Knowledge of various materials used for ceiling structures	12
Wood, steel, concrete, reinforced concrete ceilings	Knowledge of the technological process	
Ceiling types and constructions	Knowledge of static systems	
Detailing of ceiling systems	Types of beamed ceilings, stone, concrete, reinforced concrete and steel ceilings	
Windows and doors		
Types of construction of windows (frame, double box)	Insight into the function of windows	
Window types and their installation	Knowledge of the window design depending on: type of connection with the structure, type of glass surface, type of building material	
Window sizes		

Door structures	Insight into functions and knowledge of the construction	
Exterior and interior doors		
Installation of doors		
Door sizes		
Stairwell		
Regulations of the staircase	Insight into stair forms - stairs as a function of the building size, relevance, available space, material and construction type	25
Offsetting methods	Knowledge of the staircase - left and right stairs, running width, head height, platform length	
Stair structures made of wood, reinforced concrete and other materials	Knowledge of rise-to-tread-ratio calculation, rules for sizing widths and slopes	
Chimneys		
		14

Function of heating and chimney	Insight into the functional context	
Dimensioning	Overview of the formation of the chimney	
Chimney construction	Overview of the dimensioning of the chimney cross section and height	
Chimney positioning and constructing		
Roof constructions		44
Roof supporting structures for house and hall construction	Overview of the correlation between roof skin, roof shape and the supporting structure	
Joining means	Overview of the types of roof supporting structures	
Purlin and rafter roofs	Knowledge of the construction of purlins and rafter roofs	
Roof cladding	Overview of the shape of the roof skin (stress, types, installation)	

Flat roofs	Knowledge of the construction of flat roofs as a warm/cold roof	
Roof drainage	Knowledge of ecological construction	

Subject didactics

Presenting essential design principles for traditionally constructed buildings. Indicating relations between construction, statics and building physics. Pointing out fire protection principles. It is recommended to introduce under the guidance of the teacher a planning exercise for a concrete structure so that the participating students can autonomously acquire knowledge and deepen their proficiency level, as well as their acquired and existing skills. Students shall be able to read architectural drawings and to graphically depict components and structural elements. They shall have basic knowledge of traditional building constructions and be able to include structural and building physics aspects into building design. They shall assess existing building designs and, construction-wise, decide on necessary renovation

measures. In the field of architectural history, audio-visual teaching materials shall prevail. When interpreting selected architectural examples, excursions are of high methodological-didactic value.

B2 Construction drawing aided by selected user programs (CAD)

Course contents

Learning objectives

*Time
guideline*

Basics of structural drawing		12
Purpose and types of architectural drawings	Knowledge of the usual types of architectural drawings	
Standards governing construction drawings	Proper selection of the scale depending on the representation	
Line types and line widths, hatchings	Knowledge of dimensioning principles	
Standard fonts and scales		
Dimensioning of objects		

Geometric basic constructions		8
Straight line, angle, circle and its divisions	Command of basic geometric constructions	
Triangle, square, polygon		
Arch structures		
Displaying of objects		6
Oblique parallel projection (isometry, dimetry, trimetry)	Performing development of lateral surfaces of simple architectural forms	
Right-angled parallel projection (two-panel projection, three-panel projection)	Determination of roof bevels, including model making	
Determination of true sizes		8
Projections, true lengths, true surfaces		
Structural Design Drawing		26

Presentation rules (sections, hatchings and symbols, dimensional coordination)	Knowledge of the arrangement of horizontal and vertical sections	
Dimensioning of floor plans, sections and components	Knowledge of abbreviations and symbols for building materials, components and furnishings	
Presentation of floor plans, sections and views		
Layout plan representation		
Representation of components (installation and assembly plans, roof structures, stairs, chimneys, detail drawings)		
perspective drawings		
Practice-oriented introduction to a CAD program		18

User interface	Attaining skills and abilities to compose own drawings	
Loading and saving drawings	Further deepening with the goal to compose complex drawings	
Plotting and printing graphics		
Drawing lines and polygons		
Drawing objects		
Drawing aids		
Working with reference points		
Entering and altering texts		
Presenting parts of a simple drawing in different layers	Recognising the significance of the layer technology	

Executing complex editing functions with line styles and hatchings, modifying and querying object properties		
Parameterising drawings		
Using different dimension types		
Changing dimension settings		
Drawing a floor plan		12
Composing a floor plan, and, additionally, practicing the following subtasks on other objects	Developing and deepening skills to effectively compose drawings	
Using Layers		
Drawing objects with different coordinate entries		
Proper use of the command "chamfer"		

Parameterising drawings		
Adding text		
Printing different layers	Printing drawings to scale	
Plotting a drawing		
Complex constructions		20
Examples of building constructions		
Selected examples (by students) from practical work		
Data processing		20
EDP fundamentals		
Operating systems		
Word processing		

B3 Mathematics, Geometry, Physics*Course contents**Learning objectives**Time
guideline*

Basic principles		15
Computational laws, brackets and fractions, roots, powers, logarithms	Safe knowledge in the use of real numbers operations	
Proportions, percentage calculation, interest calculation		
Functions		10
Linear, quadratic, exponential functions	Mastery of the concept of function and safe handling of elementary functions	
Trigonometric functions	Ability to safely solve equations	

Circle and ellipse as a function		
Linear and quadratic equations		
Equations systems		
Application: continuous carriers; moment surfaces		
Geometry and trigonometry		
Intercept and similarity theorems	Safe knowledge of the geometry of the triangle and polygons	21
Pythagorean theorems		
Trigonometric functions, sine and cosine theorems		
Angle types and conversions		

Applications: resolution of forces, trusses, embankments, embankment sections, roofs, ramps		
Stereometry		20
Cylinders, cones, stumps	Safe knowledge in the calculation of construction-relevant objects	
Prisms, pyramids, stumps		
Prismatoid, wedge, pontoon, ramp		
Spheres, spherical segments		
Applications: excavations, roofs, foundations		
Statistics		15
Measurement series, averages, dispersion measures	Safe knowledge in the application of statistical methods	

Distributions, diagrams		
Linear correlation and regression		
Application: building physics, building materials		
infinitesimal calculus		15
Difference and differential quotient, geometric interpretation	Insight into methods of higher mathematics, skills in solving simple problems with the help of calculus	
Derivatives of polynomial functions		
Differential relationship between internal forces		
Application: deflection, bending moment, lateral force, supporting forces of a beam under bending moment		
Introduction to building physics	Insights	

Application areas and functions		
Types of heat transfer		
Room air conditioning components		
Basics of Building Physics		
Heat transfer	Development of skills in the determination of K-values	8
Heat storage capacity		
Temperature profile in components		
Thermal protection in winter		
Heat balance method		32
Simplified process		
Requirements for structural changes to existing buildings		

Verification on a residential building		
Thermal bridges		
Thermal insulation in summer	Knowledge of heat storage capacity of interior components (total energy transmittance, reduction factors of sun protection devices)	8
Moisture protection		10
Protection against water vapour condensation		
Glaser diagram		
Verification		
Sound insulation		16
Basic principles		
Protection against external noise		

Structure-borne noise insulation and impact sound insulation in buildings		
Fire protection		6
Fire safety standards		
Fire protection requirements		
Fire-retardant and fire-resistant components		

Subject didactics

Mathematics and Geometry: The purpose of this subject is to empower students on the basis of reliable numeracy skills and mastery of mathematical procedures and algorithms, to safeguard mathematical penetration of other teaching areas, such as: N. Statics, reinforced concrete, surveying and building materials. Mathematical theories and derivations shall be applied only insofar as they are deemed necessary for the understanding of solution methods. When selecting exercise examples for the individual

material areas, building-specific reference should always be sought for and the relevance of the teaching area is to be presented on the basis of construction-relevant tasks. Thus, the subject is an independent contribution to the student's ability to solve emerging practical problems based on acquired knowledge. When designing the lesson, it should be emphasised that many solutions may be used to solve a mathematical problem. Frequently recurring calculations, such as the solving of equations and systems of equations, are to show the advantage of using algorithms, which can be proven especially by the use of computer technology. Special emphasis is placed on providing students with ready-to-use, constantly accessible skills supported by the use of formula collections, spreadsheets and the use of the calculator.

Physics: This subject allows students to gain expertise in construction planning and executing, and in conducting rehabilitation works for the partial areas of heat protection, moisture protection, sound insulation and fire protection. Students will be equipped with prerequisites to properly assess and evaluate building physics. They will be familiar with standards, regulations and guidelines of building physics. They will be able to provide evidence in the areas of thermal insulation, both, in the cold and warm season, moisture protection and sound insulation. The students will know about possibilities of influencing environmental protection.

B4 Materials science, Chemistry

Course contents	Learning objectives	Time guideline
Substance composition	Knowledge of the atomic structure	10
Atomic structure	Ability to describe chemical bonds and their structure	
Chemical bonding and structure	Ability to read from PSE corresponding values of the atomic structure	
Chemical processes in aqueous solution		7
Electrolytic dissociation	Understanding the relevance of electrolytic dissociation and the ability to draw architecture-related conclusions	
pH value	Knowledge of the formation of the pH value and its measuring methods; ability to explain variable relevance of the pH value of different building materials	

Neutralisation	Knowledge of the basics of neutralisation and its application in construction	
Chemical reaction		7
Essence of chemical reaction	Recognition of the essence of a chemical reaction	
Energy conversions in chemical reactions	The student can explain energy transformations in chemical reactions and relate these to essential building examples	
Reaction rate	The student shall be able to interpret the significance of reaction rates on the properties of building materials and to apply this knowledge accordingly	
Chemical balance	The student will understand the basics of chemical equilibrium and its effects	
Redox reactions	Knowledge of the nature of a redox reaction and its application in building	4

Essence of redox reaction	Knowledge of an electrochemical redox reaction and its relevance	
Electrochemical redox reactions		
Stoichiometry		14
Basic laws	The student will learn about different basic laws of stoichiometry	
Stoichiometric calculations	Ability to relate these basic laws to the construction industry and to perform and explain stoichiometric calculations	
Building material parameters and substance-specific test methods	Overview of the most important building material parameters; ability to apply these building material parameters to all construction materials and to describe and evaluate their interactions with each other	10
Densities and porosities		
Moisture content		
Mechanical engineering parameters		

Resistiveness		
Impermeability		
Thermal transition characteristics		
Water	Overview of the critical relevance of water to life and especially in construction engineering; the student shall explain the water cycle and its relevance; he shall know the different types of water and be able to name their essential characteristics and their relation to construction engineering; ability to enumerate specific water constituents and to explain their impact on construction engineering; overview of some methods of water analysis	8
Water cycle		
Relevance of water		
Types of water		
Water properties		
Water components and their relevance		
Natural building blocks	Overview of the origin of different natural stones (stone types, including examples)	5

Rock cycle		
Usage characteristics of natural stones	Knowledge of the essential properties of natural stones	
Application in construction		
Damage to natural stone and its elimination	Disposal options and prior explanation of the damage	
Artificially manufactured building blocks	Overview of different types of man-made building blocks, their production, properties and respective fields of application	6
Bricks		
Sand-lime brick		
Aerated concrete block		
Concrete and lightweight concrete block		

Aggregates	Presentation of different types of aggregates for the respective building material quantity	15
Function and types	Knowledge of individual functions of aggregates; ability to identify substance-specific properties of aggregates and to relate them for respective requirements with regard to their use	
Grain structure, assessment and improvement	Ability to produce and assess required grain compositions	
Grain shape and surface condition	Ability to perform required tests	
Hazardous elements		
Building material internships	Ability to perform and evaluate essential building material tests independently, under supervision	10
Water testing		
Mass and void characteristics		

Aggregates		
Mineral binders	Substantial knowledge of the general principles of binders (types, hardening behaviour, hydraulic factors); knowledge of all construction-relevant binders, their manufacture, performance characteristics and fields of application; ability to assign and evaluate binders in terms of their hardening behaviour; ability to perform and evaluate required building material tests	5
Building plasters		
Building limes		
Cements		
Other binders		
Mortar		5
Types, production and characteristics	Knowledge of different mortar types, their production, properties and resulting application options (masonry mortar, plasters)	

Hazardous components	Knowledge of relevant harmful mortar components that may significantly affect its properties	
Mortar tests	Knowledge of key mortar tests and how to perform their evaluation	
Concrete (normal concrete)		12
Definition, composition, classification	The student shall explain the term "concrete" with reference to its different types and be able to perform respective type classification	
Concrete properties	Basic knowledge of functional properties and resulting application conditions	
Factors influencing concrete properties		
Solid space calculation	Ability to perform and evaluate solid space calculations of materials	

Concrete planning	Competence to calculate and evaluate various concrete projects; competence to identify reference to building material topics related to concrete (water, aggregates, cements)	
Concrete tests	Knowledge of concrete tests and the competence to autonomously perform and evaluate essential tests; competence to detect, avoid or correct basic concrete damage	
Other concrete types	Special knowledge of other concrete types with regard to their production, properties and respective fields of application	4
Aerated concrete		
Heavy concrete		
Special concrete		
Construction metals		6

Basic fundamentals	Overview of the general building metal structure and resulting properties	
Iron and steel	Knowledge of key metals in construction engineering (Fe, Cu, Zn, Al), their production, substance-specific properties and fields of application	
Aluminium		
Zinc		
Copper		
Other construction metals		
Corrosion and corrosion protection	Ability to identify and explain different types of corrosion; ability to name and apply active and passive corrosion protection measures	
Construction glass	Knowledge of glassmaking; knowledge of key glass properties and the resulting	3
General glass properties		

Construction glass products	application areas for construction engineering	
Lumber		7
Structure of wood	Overview of wood structure (macro- and microstructure); wood species	
Wood properties		
Wood defects	Ability to identify various wood defects and to draw conclusions on their application	
Wood types		
Wood damage and wood preservation	Ability to detect typical wood pests and to perform proper wood preservation; basic knowledge of main wood protection groups; overview of their environmental impact	
Lumber products	Knowledge of resulting timber products	

Polymeric materials		2
Chemistry of polymeric materials	Basic knowledge of plastics (chemistry and production)	
Properties of polymeric materials	Explanation of resulting properties and applications for construction engineering	
Use of polymeric materials in construction		
Bituminous building materials		2
Origin of bituminous building materials	Overview of the bitumen origin	
Properties and characteristics of bitumen	Knowledge of key properties and ranges	
Bitumen range	Knowledge about the application of bitumen ranges in construction	
Bitumen application in building protection		
Bituminous mixtures in road construction		
Insulation materials		4

Resilient lightweight construction materials	Overview of different types of insulation; presentation of different artificial and natural insulation materials; emphasizing the importance of natural insulation materials for the environment and construction engineering	
Self-supporting lightweight construction materials		
Non-load-bearing fibre insulating materials		
Loose fillers		
Artificial and natural insulation materials		
Building material internships	Ability to conduct and evaluate essential building material tests, independently under guidance	14
Building plasters		
Cements		
Concrete		
Construction steel		
Wood / wood protection		

Reinforced concrete construction		40
Introduction to reinforced concrete construction	Knowledge of the properties of the composite material "reinforced concrete"; insight into the required civil engineering documents for reinforced concrete structures	
Knowledge of reinforced steels	Reinforcing bars and welded steel mesh	
Reinforcement of reinforced concrete components	Acquisition of skills in the representation of reinforcements; ability to detect concrete coverages; knowledge of spacers and their distances	
Calculation of reinforced concrete components	Knowledge of limiting crack width and deflection	
Bending stressed components	Ability to determine the cross-section of reinforcement with the aid of dimensioning	

	tables; knowledge of types of shear reinforcement	
Reinforced concrete slabs	Ability to dimension uniaxially tensioned single-span slabs	
Reinforced concrete slabs and beams	Ability to dimension reinforced concrete rectangular beams (single-span beams)	
Pressure-prone components, supports	Knowledge of the arrangement of reinforcement on pressure-prone components	
Walls	Knowledge about the use of reinforcement in walls; ability to calculate reinforcement	
Foundations	Knowledge about the use of reinforcement in foundations; acquisition of the skill to calculate reinforcement	

Subject didactics

Hereby, students shall gain insight into the structure and properties of materials as well as insight into essential chemical reactions and their resulting changes in properties. The subject shall indicate the essential functional properties of building materials and substance-specific test methods. Students shall acquire the ability and skill to select proper building materials, taking into account substance-specific, economic and environmental considerations. To this end, lessons in seminar form with a high practice share are especially suitable. The subject is supplemented by demonstration experiments, construction material internships and targeted excursions. The use of digital media will support student learning.

B5 Building law

Course contents

Learning objectives

*Time
guideline*

Functions of the construction industry	Knowledge of the construction industry	5
Construction volume		5

System	Knowledge of the construction industry	5
Business forms	Knowledge of the complexity of construction preparation and implementation	
Main features of the execution of construction projects		
Tasks of the participants in the construction process	Knowledge of the complexity of construction preparation and implementation	5 10
Planning preparation and implementation (land, financing, etc.)	Basic knowledge of building planning law	
<i>Public construction law</i>		
<i>Construction planning law</i>	Basic knowledge of building planning law	10 5
<i>Building regulations</i>	Knowledge of the building code; safe handling of selected legal articles; ability to complete construction	

	contracts; knowledge of urban land-use planning		
Bylaws	Knowledge of the building code; safe handling of selected legal articles; ability to complete construction contracts; knowledge of urban land-use planning Knowledge of environmental protection in the construction of buildings and facilities		
Environmental legislation			
<i>Private building law</i>	Knowledge of selected legal terms		
Contracts	Knowledge of selected legal terms Reliable knowledge of the performance areas (work stages) as a basis for the construction	5	
Legal dunning procedures			2
<i>Fee arrangement for architects and engineers</i>			

	preparation and the construction process	
Organisation	Reliable knowledge of the performance areas (work stages) as a basis for the construction preparation and the construction process	2
Principles on the application		
Service sectors		
Types of costing as a service of the planner	Ability to apply certain DIN standards	5
Cost estimate	Ability to apply certain DIN standards	5
Cost calculation		
Quotation		
Cost statement		
Construction contracts as a basis for price determination		
	Knowledge of legal bases; ability to handle German VOB, Part A	15

Legal basis of construction contracts	<p>Knowledge of legal bases; ability to handle German VOB, Part A</p> <p>Ability to evaluate price comparisons</p>	<p>15</p> <p>10</p>
<i>Construction contracts according to the Civil Code (German BGB)</i>		
<i>Construction contracts according to the regulations for contracting terms for supplies (VOB)</i>		
Bidding and tender procedure		
Evaluation of offers		
Assignment of construction works	Knowledge of bidding documents	
Performance description and quantity calculation	<p>Knowledge of different specifications; ability to set up a bill of quantities using a standard service book; ability to perform quantity calculations; knowledge of measurement provisions</p>	

Types of service description (specification of services, standard service catalog, functional description of services)	<p>Knowledge of different specifications; ability to set up a bill of quantities using a standard service book; ability to perform quantity calculations; knowledge of measurement provisions</p>	
Process engineering	<p>Ability to plan and monitor operations for individual construction work; ability to identify and coordinate equipment and machine performance and perform cost-benefit comparisons; knowledge of the principles of occupational safety</p>	<p>10 10</p>
Construction machinery and equipment	<p>Ability to plan and monitor operations for individual construction work; ability to identify and coordinate equipment and</p>	<p>10 5</p>
Earthworks (earth excavation, refilling)		
Formwork		

Reinforcements	machine performance and perform cost-benefit comparisons; knowledge of the principles of occupational safety	
Concrete building		
Scaffolding		
Wall construction		
Prefabricated building		
Occupational safety, accident prevention		
Site setup		
Elements of the construction site setup	Competence to design a site plan	5 4
Assignment of equipment parts		
Planning of the construction site setup		
Building sequence planning	Ability to draft a construction schedule	

Setting up work directories	Ability to draft a construction schedule Knowledge of billing of construction works	4 2
Gantt chart		
Path-time diagram		
Critical path analysis		
Billing of construction works		
<i>Site measuring according to German VOB</i>	Knowledge of billing of construction works Deepening of knowledge	2 2
Financial reporting		
Budgeting		
Target-actual comparison		
Selected practical examples for a construction contract		
Approval	Deepening of knowledge	2 80
Warranties		

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Subject didactics

Students learn major laws and regulations relevant for planning and building. Priority is given to the use of sample forms. Students are to achieve the ability to draft performance descriptions as well as to plan and monitor operations. It is especially essential to draw associations to subject C1 (Basics in business administration).

B6 Construction

<i>Course contents</i>	<i>Learning objectives</i>	<i>Time guideline</i>
Basics of business management		10
Basic technical terms	Knowledge of basic concepts	

Standards in business management	Knowledge of economic principles	10
Cost-theoretical basics	Ability to calculate the break-even-point	
Operational production factors Business management operating principles	Knowledge of operational production processes	
Object of business activity		
Legal forms of business	Knowledge of key differences in legal forms	
Company concentration and cooperation	Ability to characterise company mergers	
Operational business management	Knowledge of management levels and managerial styles	10
Management levels		
Management systems		

Operational planning		
Business structure and workflow of a construction company	Knowledge of the structure of a construction company	10
Work methods		
Structuring a business organisation		
Organisational chart of a construction company		
Entrepreneurial evaluation		
Use of human labour in business organisations		10
Principles of business labour	Knowledge of the basics of human labour	
Payroll accounting in the construction industry	Knowledge of payrolling in the construction industry	
Resource deployment and engagement		10

Types of operating equipment	Knowledge of the definition and types of operational resources	
Cost of used resources		
Depreciation methods	Knowledge of different depreciation methods	
Overview of award procedures		
National / international procedures, EU threshold amounts	Knowledge of different procurement procedures for construction works	
Contents of service description, supplements	Ability to enumerate and describe construction services	
Legal protection of the tenderer		
Materials management		
Essence of materials management	Overview of the areas of materials management	
		10

Needs assessment	Ability to perform materials requirements planning	
Procurement	Knowledge of the nature of procurement	
Warehousing and storage	Knowledge of types of warehousing and storage	
Transport	Calculation of transport services	
Control system of materials management		
		40
Costing		

In conjunction with subject C1, students learn how to calculate construction costs, how to plan staff, machines and materials, and how to act economically in the area of procurement. The students shall know the correlation between production and business administration. Case studies, practical examples and problem solutions illustrate to the students procurement-, production-, and sales methods. By predetermined criteria, students shall be able to draft offers and to evaluate them. A sound mixture of classical lectures, group work and seminar classes will empower students in the area of action competence.

B7 Technical mechanics

Course contents

Learning objectives

Time guideline

Building structure from a static point of view	Insight into functions of statics and strength theory	4
Load-bearing structures		
Tasks of the theory of statics and strength		

Dynamics	Developing skills in graphic and mathematical determination of forces; ability to determine moments	20
Combining forces		
Decomposition of forces		
Balance of forces		
Moments		
Load assumptions	Insight into the load types; performing load calculations	16
Classification of loads		
<i>Standard DIN 1055</i>		
Static-specific systems	Insight into the types of support; ability to determine support forces and internal forces, and to represent the N, M, and Q area	30
Basics		
Internal forces		

Beam on two supports		
Beam with cantilever arm		
Cantilever beam		
Trussed rafter	Basic knowledge of different constructions of trusses; ability to determine bar forces of trusses following the Cremona method Safe knowledge of the technical terms "tension", "deformation" and "strain"	16
Rules for trussed frames		
Load conditions		
Rules for recognising zero bars		
Cremona diagram		
Introduction to strength theory	Safe knowledge of the technical terms "tension", "deformation" and "strain" Identifying aspects of a realistic calculation	10
Stress		
Deformation		

Tensile stress	Identifying aspects of a realistic calculation of components subject to tensile stress	4
Compressive stress, surface pressure	Developing an understanding of proofs of compressive stress	10
Shear stress	Demonstrating the ability to conduct shear stress tests	4
Bending stress	Knowledge of physical values and dependencies; ability to determine area moments and resistance moments; ability to provide evidence of flexural strength and flexural rigidity, including the ability to performing structural calculations	30
Reference stresses	Safe knowledge of the conditions when determining reference stress and the	10

	ability to provide evidence of reference stress	
Torsional stress	Knowledge of torsion-stressed components and the ability of performing torsion stress tests	16
Buckling stress	Detailed knowledge of components subject to buckling; insight into buckling according to Euler's equation; acquiring the ability of performing measurements and conducting buckling proofs	20
Tensions at longitudinal force with bending	Knowledge of components that are simultaneously subjected to a longitudinal force and to a bending moment; ability to perform stress proofs	20

Ground pressure on foundations	Knowledge of off-centre pressure on foundations; ability to determine the existing footing pressure and to compare it with the permissible value	10
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220

In italic lettering: country-specific design required!

Subject didactics

Imparting methods to allow an independent analysis of the task content. Students learn about solution algorithms that are used in exercises. The load effect on components is explained by visual and colour design. The students attain the ability to identify the type of stress of a component in the respective cross-section, and know how to perform dimensioning and verification. Following all exercises, the student will receive a result review.

B8 Construction machinery and equipment

Course contents

Learning objectives

*Time
guideline*

Concrete construction machinery		4
Formwork		2
Cranes		4
Earth moving machines		4
Cost calculation		2

16

B9 Surveying technology

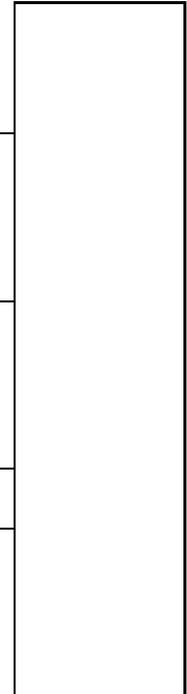
Course contents

Learning objectives

*Time
guideline*

Introduction to construction surveying		4
Surveying tasks for the building technician	Knowledge of the surveying work on the construction site	
Official documents	Insight into the most common official documents in surveying	
Official maps	Ability to read cards	
Measurement units and surveying elements	Knowledge of length and angle measurement	
Position measurement		15
Marking of products	Knowledge about marking points in the building	
Gauss-Krueger coordinates	Insight into the Gauss-Krueger coordinate system	
Basics of length measurement	Ability to measure length	

Stakeout and measuring of straight lines	Knowledge of right-angle devices; ability to stake straight lines; ability to apply different procedures
Indirect radiation measurement using helper lines, parallel shift, auxiliary triangles	Knowledge of possibilities of indirect distance measurement; ability to apply direct and indirect distance measurement in a practical exercise
Stakeout and recording procedure	Knowledge of staking of building structures; ability to perform simple building stakeouts; overview of recording procedures
Field accounting	Competence of exact field accounting
Official site plans	Knowledge of mapping scales; knowledge of key information on an area map as well as the ability to draw diagrams of site plans



Application of the Heronic formula	Knowledge of area calculations	
Height measurement		20
Ordnance survey directory	Overview of the structure of the national elevation network	
Levelling instruments and devices	Knowledge of height measuring devices and their use capabilities	
Area levelling in the square grid process	Ability to determine height differences of adjacent points	
Recording of longitudinal and transverse profiles	Competent use of a levelling device in practical work; bookkeeping competence	
Fixed point levelling		
Staking out through-cuts and embankments		
Field accounting		
Angle measurement and stakeout		15

Scale readings on the theodolite	Competence of staking buildings and structures using polar methods; competent handling of a construction theodolite	
Horizontal angle measurement and staking out required angles and distances		
Application of the polar method		
Road course measurement		6
GPS + Total stations		5
Location of building structures		5

70

Subject didactics

Most suitable for this subject is the classic apprenticeship contract, which is well suited for explaining different work processes, including a device demonstration. Students receive practical training in exercises on proper devices, they can easily perform position and altitude measurements and execute

stakeouts of buildings and structures, sketches, geodetic and area calculations. This subject is about deepening methodological competence and handling of industry-specific devices.

B10 Project work

Course contents

Learning objectives

*Time
guideline*

Processing a multidisciplinary technician-appropriate project	"Students shall analyse a defined sector-specific problem, independently develop solutions, document their work in an appropriate form, followed by presenting their results. Students will inform themselves about the project goals, analyse them and draft a solution strategy. In proper contact with their client or tutor, they will work out all required steps and, if necessary, carry out	120
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	further studies. Students will independently search for essential specialist information, perform any needed calculations and drawings, and will offer potential solutions.	
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C1 Determining corporate competitiveness

Course contents

Learning objectives

Time guideline

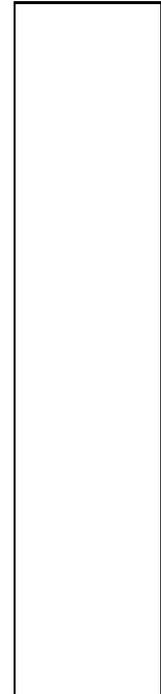
Corporate goals	<p>Understanding key goals and target relationships; setting up a target system</p>	<p>2</p>
Performance targets		
Financial targets		
Social goals		
Target relationships.		

Complementary goals		
Conflicting targets		
Indifferent goals		
Corporate culture	Describing features of the corporate culture	2
Symbols and rituals	Pointing out the relevance of corporate culture via personal or social goals	
Norms and values	Communicating social responsibility of the company in the corporate image	
Analysis of past and future development	Understanding the relevance of process and areas of corporate planning	8
Planning	Describing strengths and weaknesses of a company on the market with reference to the target system	

Planning areas and their harmonisation	Estimating market opportunities and risks	
Planning stages	Assessing business risks	
Risk assessment		
Subsystems of company accounting	Ability to distinguish subsystems of business accounting; understanding their inter-action and assigning calculated values	39
- Balance sheet processing	Structuring the impact of typical business transactions in the subsystems	
- Cost and revenue accounting	Understanding the basic principles and concepts of double entry accounting	
- Financial statement	Explaining the tasks of accounting and balance sheet	

<p>- Social balance sheet and calculation of potentials</p>	<p>Explaining options and benefits and disadvantages of outsourcing accounting tasks based on quality criteria</p>	
<p>Bookkeeping</p>	<p>Explaining the structure and relevance of financial statements and business evaluations (German BWA) and of further typical documents</p>	
<p>- Tasks and legal regulations</p>	<p>Recording and assessing key types of assets and liabilities</p>	
<p>- Double entry system</p>	<p>Considering valuation margins, value adjustments, provisions and hidden reserves in the analysis of external accounting indicators</p>	
<p>- Inventory and completion of inventory</p>	<p>Describing types of depreciation and considering them in the accounting subsystems</p>	

- Process techniques (e.g. EDP)	Performing industry, period and target/actual comparisons and explaining findings
Annual financial statement/period-end closing	Determining corporate profit or loss also during the year
- Structure of the balance sheet and profit and loss statement	Performing of simple periodic financial planning and understanding criteria for critical liquidity situations
- Flexibilities with respect to recognition and measurement	
+ Accounting principles	
+ Stock valuation	
+ Depreciation	
+ Accruals	



Fundamentals of the evaluation of annual financial statements		
- Balance sheet figures		
- Performance indicators		
- Forms of control		
+ Industry comparisons		
+ Time comparisons		
+ Target-actual comparisons		
Costs and revenue accounting	Characterising goals and tasks of cost type, cost centre and cost unit accounting	17
- Tasks and structure	Illustrating the impact of cost and revenue changes on financial and	

	accounting statements and considering them for decision-making
- Cost type accounting	Making decisions with respect to new investments based on standard costing
- Cost center accounting	Justifying the decision of accepting (additional) orders by means of standard costing
- Cost-unit accounting	Determining bottom price using cost unit accounting determined on a partial cost basis
+ Division calculation	Calculating break-even thresholds and thus deriving pricing and conditions policy
+ Surcharge calculation	Justifying decisions based on the production program

- Profit and loss accounts
+ Piece rate costing
+ Calculation of loss or profit per period
- Cost accounting systems
+ Actual and planned costs calculation
+ Full and partial cost accounting
+ Contribution margin calculation
- Application of cost accounting
+ Cost planning and control
+ Decision-making support
+ Break-even analysis



Craft and trade law	Verifying legal requirements to carry on a craft autonomously.
- Craft as a special form of a trade	Knowing about legal consequences of unauthorised practice and moonlighting
- Entry in the crafts register	Knowing relevant contact points when founding, changing or taking over a craft business, as well as initiating and handling administrative procedures
- Unauthorized practice of craft and moonlighting	Considering regulations regarding the company name, merchant status, obligation to register and subsequent commercial legal consequences for drafting of concepts
Commercial and corporate law	Outlining impacts of special obligations of a proper merchant for the design of operational processes

- Qualification as a merchant	Verifying feasibility / legal admissibility of market strategies against the background of competition rules
- Company	
- Commercial register	
Competition law	
- Act against restraints of competition	
- Law against unfair competition	
- Quotation of prices act	
- Shop closing law	
- Copyright law	

Course contents

Learning objectives

*Time
guideline*

Requirements to be met by an entrepreneur	Identifying relevant requirements for successful entrepreneurship	2
Personal requirements	Identifying and assessing own ability to independently manage a craft business	
Requirements with regard to families		
Functional requirements		
Role of crafts in economics	Researching craft and industry-specific information on the development of the economy as a whole, presenting relevant data and comparing them with other sources	2
Economical	Explaining the macroeconomic context in which a craft company operates	

Social relevance	Establishing a self-image and personal affiliation to the craft	
Cultural relevance	Structure of the craft organisation and tasks and services offered by individual organisations	
Craft organisations	Understanding and evaluating the benefits of memberships in craft organisations	
- Tasks		
- Structures		
- Services		
Firm births consultation	Addressing contact points of set-up consultation and evaluating their range of services	8

- Legal aspects	Knowledge of public support programmes, justifying implementation of a certain form, and understanding key prerequisites thereof; knowledge of contact points	
- Conceptual aspects		
- Financial aspects		
Financing and funding support services		
- Offers for business start-ups		
- Special offers for crafts and SME		
Market and location study	Understanding the relevance of key location factors	
- Sales territories and sales opportunities	Assessing suitability of sites for operational purposes	

- Customer structure	Understanding the determining factors with regard to personnel and company size	
- Location assessment (factors and comparison)	Identifying optimum staffing needs	
Business foundation planning	Determining demand for fixed and current assets	
- Operating equipment		
Company size (turnover, personnel)		
Marketing	Estimating the type and size of potential customer groups and needs, as well as potential order and turnover figures	12
Concept of marketing	Proposals on drafting of products, prices, means of communication and distribution channels when entering the market	

Sources of information to estimate the market potential	Formulating the business model based on customer benefits and unique selling points	
Market entry marketing mix		
Social security systems	Estimating the gap in old-age provision, comparing and evaluating alternative private provisioning instruments	6
Private personal, property and damage insurance	Planning protection against economic consequences of entrepreneurial problems	
Retirement provision for the self-employed craftsman	Planning social protection in the event of accidents, illness and reduced earning capacity	
Business concept	Verifying and adapting consistency in plans and analyses for preparation of a business concept	12

- Mission statement/business objectives	Summarising and presenting results in a business plan	
- Product and service program	Developing concepts for founding or taking over a business, taking into account general framework conditions	
- Target groups	Understanding the purpose and structure of a corporate mission statement	
Company takeover or participation	Weighing up design options of an acquisition agreement	
- Company grandfathering	Knowing legal obligations with respect to company takeovers	
Purchase price determination criteria	Knowing important influencing factors on the purchase price	

- Design of the acquisition or partnership agreement (purchase, lease, annuities, etc.)		
Financing		10
Determining capital requirements for business creation and for larger investments	Determining capital requirements for business creation and for larger investments	
Creating and justifying a liquidity plan for the first five years based on possible scenarios	Creating and justifying a liquidity plan for the first five years based on possible scenarios	
Use of forecasting and monitoring tools to avoid liquidity problems	Use of forecasting and monitoring tools to avoid liquidity problems	
Formulating and justifying sales and profitability forecasts	Formulating and justifying sales and profitability forecasts	
Justifying the financing structure	Justifying the financing structure	
Preparing financing talks	Preparing financing talks	

Legal forms		10
- Incorporated companies	Familiarity with legal forms and their consequences for corporate management	
- Partnerships/private companies	Justifying selection of a legal form	
- Individual company	Verifying provisions in the articles of association and, if necessary, adapting them according to the corporate concept	
Criteria for choice of legal form		
Company agreement		
Statutory provisions		24
Classification of the legal system	Explaining the fundamentals of the national legal system	

- Private and public law	Distinguishing legal capacity, business ability and responsibility for civil wrongs	
- System of the Civil Code	Explaining the legal meaning of a declaration of intent, of representation and mandating as well as "consent" and "approval"	
	Concluding contracts and assessing their legal validity	
General part of the Civil Code	Considering options of contesting contracts	
Legal personality and capacity	Understanding performance obligations and liability consequences (also for vicarious agents or assistants)	
Legal transactional capacity	Creating legal documents of business transactions	

Contract law	Assessing rights and obligations pursuant to general terms and conditions and verifying the use thereof according to the corporate concept	
- General contract law	Organising legal representation of the management	
- Sales contract	Knowledge of basic concepts of property law and security rights	
- Service contract and contract for labour and materials	Setting up operating sites in compliance with legal regulations	
- Rental and lease contract	Understanding key principles of taxation	
- Security	Timely preparation of interim VAT return and income tax return	

- property law (property, ownership, security interests)		
Foundation-relevant legislation		
- Construction, environmental and waste regulations		
- Craft, commercial and tax law		
- Workplace ordinance		
Tax law		
- VAT		
- Trade tax		
- Assessed income tax		
- Corporate tax		
- Taxation procedure		

C3 Developing corporate government strategies

Course contents

Learning objectives

*Time
guideline*

Organisation		4
Organisational structure	Knowing areas, instruments and principles of business organization	
- Task analysis and synthesis	Documenting business processes, taking into account the organisational structure and process organization	
- Job creation	Creating organisational charts and job descriptions	

- Organisational forms (functional, divisional, project)	Suggestions for adjustments to the organisational structure of business processes	
- Organisation development	Identifying the effects of planned company development measures on the company organisation	
Process organisation		
- Process analysis and design		
- Logistics		
- Quality management		
- Work time models		
- Group organisation		
Administrative and office organisation		

- Document Management		
- Use of modern information and communication technologies		
- Organisation of accounting		
Product development		8
Analysis of the sales and procurement market	Systematically exploring sources of information on product and service trends, evaluating and documenting them taking into consideration company and market conditions	
- Methods of market analysis and market research	Weighing up and selecting methods of market research with regard to their potential application	
- Objects of market analysis and market research	Evaluating customer data	

+ Customers	Preparing and conducting customer surveys	
+ Public	Conducting SWOT analyses and deriving strategies	
+ Suppliers	Conducting pro-contra analyses and value analysis and deriving decisions	
+ Competitors (benchmarking)		
+ Products		
Decision preparation and decision-making methods		
Marketing tools		8
Marketing functions and tools relevant to sales	Presenting an overview of marketing areas and marketing instruments; outlining similarities and differences in marketing with respect to procurement and sales markets	

- Customer orientation and customer care	Determining the consequences of sales policy decisions and justifying decisions for a marketing mix	
- Communication and advertising policy	Explaining procurement processes and performing a weak points analysis	
+ Advertising		
+ Public relations		
+ Sales promotion		
- Price and terms policy		
Procurement		
- Procurement planning (supplier selection and relationship)		
- Shipping and payment		

- Material and invoice control		8
- stockpiling and warehouse scheduling		
Investment, financial and liquidity planning	Distinguishing between various forms of payment transactions	
Types of financing	Deriving options of raising capital based on the financial standing of the company	
- Equity-financing	Differentiating types of collateral and understanding their relevance	
- Self-financing		
- Debt financing (types of loans and collateral)		
- Alternative forms of financing		
Payment transactions		

Human resource planning	Determining personnel requirements on the basis of corporate planning, including specifying job descriptions	8
- Staff demand analysis	Assessing recruitment opportunities, advertising vacancies and conducting job interviews	
- Recruitment and selection	Determining advanced training needs for employees and setting up concepts for needs-based qualification	
- Personnel placement and staffing	Knowledge of employee motivation and staff loyalty	
- Work time models	Evaluating possible applications of different work time and remuneration models	
- Personnel development	Conducting feedback interviews with employees	

Personnel management	Motivating the significance of corporate climate	
- Personnel files		
- Archiving, data protection		
Remuneration		
- Time recording		
- Job assessment		
- Wage payment types		
- Corporate pension scheme		
Personnel management		
- Management styles and resources		
- Working atmosphere		

- Social relationships		
- Care (occupational, accident and health protection)		
Representing opportunities and risks of inter-company cooperation		6
Inter-company cooperation	Analysing value chains for prospective cooperations and weighing up opportunities and risks	
Value chains	Selecting and addressing suitable cooperation partners, bearing in mind common goals	
Forms of cooperation		
Controlling		16
Controlling	Describing controlling instruments and their use for situation analysis, for	

	detecting undesirable developments as well as for uncovering future potentials	
- Tasks and goals	The use of controlling tools to maintain liquidity and to ensure profitability	
- Weak point analysis	Monitoring the achievement of company goals, adjusting company goals, if necessary, and justifying measures for achieving them	
- Key figure and key figure target systems		
- Budgeting		
- Scenario technique		
- Control and control of costs and revenues		
Labour and social security law		24

Labour law	Setting up and terminating legally effective employment contracts	
- Employment contract	Observing rights and obligations arising from employment contacts	
+ Contract types	Considering in contracts and in work design SME-relevant regulations on collective bargaining, codetermination and occupational safety	
+ Contractual obligations of the employer and employee	Analysing basic elements of the social security system with regard to company-related duties and options; characterising key regulations on statutory insurance, premiums, benefits and reporting obligations	
+ Termination of the employment relationship	Exploring and assessing payroll accounting-relevant tax categories, the form of payment of income tax and the	

	employer's liability as well as allowances options and reimbursement of expenses	
- Dismissal protection		
- Collective labour agreement		
+ Collective bargaining parties		
+ Bargaining coverage		
- Works constitution		
+ Works councils		
+ Works agreement		
- Occupational safety		
+ Occupational health and safety regulations		

+ Maternity protection		
+ Severely disabled protection		
- Labour jurisdiction		
Social security law (insurer, mandatory insurance, free choice of insurer, insurance premiums, benefits, reporting obligations)		
- Medical and nursing insurance		
- Unemployment insurance, employment promotion		
- Pension insurance		
- Statutory accident insurance		
Payroll tax		
- Correct calculation and payment		

- Payroll tax liability		
Accounts receivable management		6
Receivables management and payment arrangements	Assessing risks of defaults and providing options for monitoring incoming payments	
Dunning and lawsuit proceedings	Considering measures to enforce claims and accelerate payments	
Debt collection and execution	Knowledge of processes and costs of legal proceedings (especially judicial dunning and enforcement)	
Business succession		10
Family and inheritance law	Knowledge and understanding of statutory inheritance regulations	
Matrimonial property rights	Weighing up design options given by an inheritance contract or testament	

Line of succession	Knowledge of basic allowances and tax classes in inheritance and gift tax and legal design options	
Inheritance and gift tax	Knowledge of differences between the "shared gains accrued" model and property separation	
Insolvency		
insolvency proceedings	Understanding the duty to report insolvency proceedings pursuant to a legal form and representing consequences of corporate and private insolvency	
- Early indicators of pending insolvency	Describing the process of insolvency proceedings and assessing options arising with respect to business continuation and liquidation	

- Insolvency code	Knowledge of options and conditions for a residual debt discharge	
- Reorganisation and winding up		

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C4 Basic computer skills, bookkeeping using commercial software

Course contents

Learning objectives

Time guideline

Operating systems, data organisation		3
Configuring basic settings in the EDP	Command of operating systems, data organisation, data security and protection	
Familiarity with operating systems	Use of information and communication technologies for business purposes	

Familiarity with data organisation, data security and protection	Ability to carry out systematic searches	
Getting an overview of information and communication technologies and testing them		
Implementing accounting in a craft business using industry-standard software		20
Accounting system, chart of accounts, account categories, company codes	Ability to record and check accounting transactions, both, manually and electronically	
Entering company data and bookkeeping vouchers in the EDP		
Processing, checking and assigning vouchers		
Creating, maintaining and verifying a cash ledger		
Organising payroll procedures		

Crediting/debiting of balance sheet and P&L accounts		
Posting business transactions		
Understanding the cash ledger structure and creating a cash ledger	Understanding the cash register structure, recording all entries and performing checks	7
Familiarity with relevant software; testing alternative software	Understanding basic legal requirements	
Entering all records	Mastering relevant software and managing the cash journal directly and online	
Maintaining an online cash ledger		
Performing checks		
Payrolling and payroll accounting		10

Maintaining master data of employees	Executing EDP-compliant payroll and payroll accounting	
Recording of working hours	Ability to assess advantages and disadvantages of alternative solutions and systems	
Creating gross and net payrolling		
Creating health insurance lists and PAYE tax notices		
Exchange of data volumes on salaries, asset accumulations and other transfers		
Registrations and cancellations of employees		
Simple wage booking		
- Proper wages and salaries account		
- Recording of payroll bookings		

Annual financial statement		12
Revaluation to the end-of-year procedure	Ability to comprehensively prepare a financial statement and to be able to record closing entries	
- Preparation of the booking list of annual accounts	Mastering all regulations and submit required reports	
- Rectification by general reversal	Carrying out well-founded business analyses, deriving consequences and developing conclusions for entrepreneurial strategies	
- Compilation of an asset schedule - depreciation		
- Accrued income bookings and provisions		
- Bad debt, general bad debt allowance		
Evaluations:		

- Prima nota sales tax pre-announcement		
- Summary statement		
- further evaluations (movements balance)		
Preparation of the financial statements		
- Updating balance sheet values		
- Applying current official tax depreciation tables		
Statistical analyses on the annual financial statements		
- Business evaluations		
- Evaluations (balance sheet, profit and loss account)		

Course contents

Learning objectives

*Time
guideline*

Definition of innovation	Establishing references and effects on corporate strategy	60
Types of innovation	Considering possibilities of operational management	
Role of the engineer in the innovation process	Considering perspectives for developing business strategies	
Innovation management	Ability to present own innovative ideas	
Protecting innovation (patents, trademark protection)		
Success factors and deficits		
Consultation and support services		
Innovation and promotion of technology		

D1 Review of training requirements and training planning

Course contents

Learning objectives

*Time
guideline*

Advantages and benefits of in-company training	Highlighting the objectives and tasks of vocational training, in particular, the relevance of vocational competence for industries and companies	2
Objectives and tasks of vocational training	Characterising advantages and benefits of education for young people, for the economy and society	
Relevance of education for young people, as well as for the economy and society	Highlighting the benefits of training also with respect to the company's expenses	
Corporate training - cost and benefits		

Corporate occupational training needs	Identifying training needs based on company development and operational boundary conditions	3
Framework conditions of education	Emphasising the relevance of training within the context of human resources development	
Personnel planning and training needs	Considering framework conditions such as legal and collective wage agreements for training decisions	
Legal framework of education, especially the vocational training act		
Crafts code, youth health and safety at work act		
Structures and interfaces of the VET system	Describing the integration of the VET system into the education system structure	2

Classification of the VET system in the national education system	Outlining the requirements for VET education system.	
Key requirements for the education system, in particular: equal opportunities, permeability, transparency, equivalence	Characterising the dual system of vocational education by structure, powers, responsibilities and control	
A dual system of vocational training: structure, responsibilities, areas of responsibility and control		
Selection of training professions	Describing the emergence of state-recognised training professions	2
Formation and list of officially recognised training professions	Observing and presenting the structure and binding nature of training regulations	
Structure, functions, goals of training regulations	Describing the functions and goals of training regulations	
Training opportunities in the company	Defining company-relevant training professions in view of the training	

	regulations via the flexible options given	
Company		8
Suitability for training	Clarifying personal and professional aptitude for hiring and training, and identifying ways to eliminate training barriers	
Personal and professional qualification according to the Vocational Training Act and Craft Code, training obstacles	Checking the suitability of the training facility with regard to proper conducting of the training and, if necessary, indicating necessary measures to restore proper suitability	
Suitability criteria of the training facility	Identifying possible need for training outside the training facility and indicating appropriate opportunities	

<p>Out-of-company training and combined training</p>	<p>Characterising options of chambers and guilds to support companies in training matters</p>	
<p>Tasks of the craft organisations (chamber, guild) with respect to supporting the training</p>	<p>Outlining the responsibilities of competent bodies to monitor training fitness, review the consequences of non-compliance and being aware of the reasons for a withdrawal of training authorisation</p>	
<p>Administrative offenses and withdrawal of the training authorisation</p>		
<p>Career preparation measures</p>	<p>Outlining target group-specific pre-employment measures for training planning and justification of a certain choice</p>	<p>2</p>
<p>Target groups, requirements and legal basis for pre-employment measures</p>	<p>Evaluating the relevance of pre-employment measures for recruitment</p>	

	of young talents and indicating state funding opportunities	
Relevance of pre-employment measures and funding opportunities	Clarifying possibilities of operational implementation of pre-employment measures	
Content structuring of pre-employment measures (qualification modules)		
Tasks and responsibilities of the training participants	Determining tasks and responsibilities of the training participants	6
Conceptual delineation: trainer, instructor, educational officer	Functions and tasks of the instructor in view of differing expectations	
Function and tasks of the instructor	Matching tasks of contributing invited specialists and harmonising their integration into the training	

Function, tasks and requirements of the participating educational officer



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D2 Training preparation and assisting in recruiting prospective trainees

Course contents

Learning objectives

Time guideline

Company training plan	Motivating the relevance, purpose and content of an in-company training plan with respect to proper education	5
Legal basis, planning needs and training planning boundaries	Highlighting the contents of the training-relevant regulations of the training planning	
Training regulations as the basis of the company training plan	Establishing a context between a subject-specific and timely scheduled organisation of the training framework	

	and the workflow and business processes of the company	
Significance of typical work and business processes and individual learning prerequisites for achieving the training goals	Drafting a company training plan, taking into account specific business operational requirements and individual learning dispositions; observing schedule-related and organisational conditions of altering learning locations	
Drafting and adaptation criteria for of a company training plan	Monitoring implementation of training plans and adjusting plans, if necessary	
Participation rights in VET	Outlining possibilities of workplace representation in VET	2
Co-determination rights of the company workforce interest representation	Outlining participation opportunities of youth and trainee representation in vocational training	

Participation possibilities of the youth and trainee representation		
Cooperating parties in training	Presenting benefits of cooperation networks, in particular, with vocational schools, central training facilities, with advisers in chambers and guilds as well as with employment agencies	4
Network of key cooperating training partners	Examining possibilities of cooperation with partners involved in the training	
Options of inter-centre cooperation		
Planning and implementation of recruitment procedures	Presenting and evaluating opportunities for recruiting prospective trainees.	4
Recruitment options of prospective trainees	Identifying as selection criteria requirements and qualifications of the training profession	

Selection criteria for candidates	Applying proper procedures in selecting prospective trainees by taking into account different groups of applicants, and by observing legal rules	
Selection procedure for candidates	Highlighting to prospective trainees vocational career perspectives associated with training	
Career path and career opportunities		
Conclusion of a training contract	Illustrating essential contents items of a training contract; concluding a training contract	6
Legal basis and content of the training contract	Representing rights and obligations of the trainer and trainee under the contract	
Rights and obligations of the trainer and trainee	Explaining the prerequisites for entry of the training contract with the register of	

	apprentices; applying for entry in the training register	
Enrolment in the apprentices' register	Registering apprentices with the vocational school	
Registration with the vocational school	Outlining legal options and boundaries regarding termination, in particular, termination of an apprenticeship relationship	
Legal options of termination and discontinuation of training		
Components of training spent abroad	Checking benefits and possible risks regarding training sections abroad, both, for trainees and the company	2
Advantages, possible risks and legal basis for training abroad	Use of legal foundations for decision-making regarding implementation of training sections abroad	

Vocational training in other European countries	Paying attention to forms of vocational training in other European countries when planning a stay abroad	
Advice and support on the realisation of training components abroad	Providing advice and support for implementation of stays abroad	
Documentation of stays abroad	Understanding respective documentation of stays abroad	

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D3 Conducting trainings

Course contents

Learning objectives

Time guideline

Learning preconditions, learning support and learning culture	Considering individual requirements of trainees in the structuring of learning processes	8
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Learning, learning competence, learning culture of self-driven learning	Supporting a learning culture of self-driven learning and reflecting on the role of the trainer as a learning companion	
The instructor as learning companion	Encouraging learning by observance of basic didactic principles	
Didactic principles of learning support		
Stages and opportunities of the learning process, agreeing upon learning objectives, strengthening motivation	Supporting learning processes by goal-setting, by strengthening motivation and by ensuring knowledge transfer	
Learning and working techniques, framework conditions	Encouraging learning by imparting proper learning and working techniques as well as by proper framework conditions	
Feedback	Determining learning outcomes and showing the trainee his skills progress by proper feedback as well as by receiving feedback	

Arrangement of the probationary period	Determining content and organisational structure of the probationary period and observing legal requirements	4
Familiarisation of the apprentice with the company	Selecting learning tasks to determine the trainee's suitability and disposition in the probationary period	
Relevance, arrangement and evaluation of the probationary period	Planning the introduction of the trainee into the company	
	Evaluating the trainee's progress during the probationary period and exchanging the results with the trainee; evaluating the performance and results of the probationary period	
Training in job-typical order and business processes	Emphasizing the relevance of learning with respect to order and business processes	5

Methodology of order and business process-driven training	Analysis of the training plan and of the work and business processes and drafting suitable learning and work tasks following the analysis	
Selection of adequate work tasks and involvement of trainees	Including trainees in work tasks, taking into account individual preconditions	
Setting of learning and work contracts		
Training methods and media	Key training methods and their possible use	8
Overview of training methods and criteria for method selection	Describing criteria for the selection of certain methods; justifying the selected methods	
Planning and implementation of doctrinal consultations and work instructions	Planning and evaluating a tutorial dialogue and work instruction	
Presentation of a training situation	Target group-tailored planning, implementing and evaluating of the methodological setup of the training content	

Functions and selection of training media	Describing the function of educational media and resources and selecting them accordingly, based upon the chosen method	
E-learning in education	Assessing the use of e-learning for training	
Learning difficulties and learning aids	Identifying typical learning difficulties in the course of the training, determining possible causes, verifying learning dispositions	4
Manifestations as well as causes of learning difficulties; matched learning aids and support measures	Individual assistance in case of learning difficulties followed by initiating support measures	
Training-accompanying aids	Recognising the need for training-related assistance and organising measures accordingly	
Extension of the training period	Possibility to extend the training period	
Promotion of outperforming trainees	Recognising special dispositions and talents of trainees and providing them with adequate	

	additional offers such as, e.g. additional qualifications	
Funding programmes for outperforming trainees	Verifying options to shorten the training period and for early admission to the final / journeyman's examination for these trainees, while rescheduling the remaining training period	
Shortening of the training period and early admission to the final / journeyman's examination		
Development of youth and handling of conflicts	Describing developmental tasks of youth in training, considering in drafting of the training development-typical behaviour of trainees and significant social influences	8
development functions with regard to youth and development-typical behaviour of trainees, including social influences	Describing the relevance of the company in terms of socialisation of trainees	

	Designing communication processes during the training, promoting communicational skills of trainees	
Socialisation of the trainee in the company	Recognising in due time conspicuous behaviour and typical conflict situations in training, analysing them and applying strategies for constructive conflict management	
Communication in education	Recognising and avoiding intercultural causes of conflict	
Behavioural problems and conflict situations in education	Reflecting on common causes of pending trainee dropouts and implementing preventive measures	
Conflict avoidance and strategies for constructive conflict management	Use of arbitration options for disputes during the training	
Avoiding intercultural conflicts		

Training dropouts: reasons and approaches for avoidance		8
Conciliation mechanisms in trainee disputes		
Determining training success	Selecting appropriate forms of performance assessment to identify and evaluate achievements in training, while adhering to basic training performance assessment requirements	
Forms and functions of performance reviews in education	Conducting of performance reviews and drawing conclusions on further education	
Core requirements for performance reviews	Regular evaluation of trainees' behaviour based on suitable criteria, and conducting of assessment interviews	
Conducting of in-house performance reviews	Evaluating the results of out-of-house performance reviews	

Evaluation sheet and evaluation discussion	Use of training evidence for controlling and promoting and for aligning with the training plan	
Evaluation of external performance reviews		
Training certificate / record book		
Learning and working in a team	Forming teams based on selected criteria	3
Criteria for the formation of teams	Promoting teamwork in the team	
Team working	Opening up to other cultures and positively addressing cultural differences (intercultural learning)	
Intercultural competences	Specifically promoting trainees with migration background	
Basic cultural differences and intercultural competences		

Specific support for trainees with migration background



D4 Completion of training

Course contents

Learning objectives

Time guideline

Preparation for the final / journeyman examination	Highlighting essential requirements of the interim and final / journeyman examination in training regulations, and conveying particular aspects of an examination situation	6
Examination requirements and examination process	Describing the relevance and course of the final exam	

Stretched final / journeyman examination	Providing appropriate assistance for exam preparation and avoiding exam failure, as well as providing necessary exam aids	
Specific aids and techniques for exam preparation		
Avoidance / reduction of exam nerves		
Registration for the exam	Observing legal requirements for the apprentices' registration for examination and for exemption; observing exam registration	3
Registration, exemption and admission to the exam	Observing legal conditions for early admission to the examination	
Exam-relevant characteristics of trainees	Informing the competent body of exam-specific characteristics affecting apprentices	
Retesting, supplementary examination and extension of the training relationship	If the exam fails, taking into account legal requirements for repeat examination or	

	supplementary examination and extension of the training period	
Issuing certificates	Observing legal and operational requirements and emphasising labour law-specific relevance of certificates for the trainee	3
Relevance, types and content of certificates	Identifying different types of certificates	
Formulation of a certificate	Generating certificates, in particular, taking into account previous performance assessments and observing legal consequences	
Legal consequences to certificates		
Career and training opportunities	Relevance of continuing vocational training	3
Advanced vocational education and training opportunities, master's examination	Describing vocational and occupational promotion and advanced training opportunities, in particular with regard to the master's examination	

Financial support of vocational education	Pointing out funding possibilities for continuing professional vocational education as well as possibilities for outstanding trainees	
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