

Technische und gewerbliche Lehranstalten
Technical and Vocational Schools and Colleges

**Lehrplan der Höheren Lehranstalt für Bautechnik/
Curriculum of the Secondary College of
Construction Engineering**
(BGBl. II Nr. 302/1997)

English Edition – October 1998

Höhere technische Lehranstalten mit Bautechnik - Abteilungen/

Secondary Technical Colleges with Departments of Construction Engineering

Burgenland/Burgenland:

HTBLA Pinkafeld, Meierhofplatz 1, A-7423 Pinkafeld, +43-(0)3357-424 91

Kärnten/Carinthia:

HTBLVA Villach, Tschinowitscher Weg 5, A-9500 Villach, +43-(0)4242-370 61

Niederösterreich/Lower Austria:

HTBLA Krems, Alauntalstraße 29, A-3500 Krems/Donau, +43-(0)2732-831 90

HTBLVA Mödling, Technikerstraße 1-5, A-2340 Mödling, +43-(0)2236-408

HTBLVA Wr. Neustadt, Dr.-Eckener-Gasse 2, A-2700 Wr. Neustadt, +43-(0)2622-27 871

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HTBLA Linz, Goethestraße 17, A-4020 Linz, +43-(0)732-66 26 02

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HTBLA Saalfelden, Almer Straße 33, A-5760 Saalfelden, +43-(0)6582-72 5 68

HTBLA Salzburg, Itzlinger Hauptstraße 30, A-5022 Salzburg, +43-(0)662-45 36 10

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HTBLA Graz, Ortweingasse 4, A-8013 Graz, +43-(0)316-60 84

HTBLVA Zeltweg, Hauptstraße 182, A-8740 Zeltweg, +43-(0)3577-245 00

Tirol/Tyrol:

HTBLVA Innsbruck, Trenkwaldstraße 2, A-6020 Innsbruck, +43-(0)512-28 15 25

HTBLA Imst, Brennbichl 25, A-6460 Imst, +43-(0)5412-66 388

Vorarlberg/Vorarlberg:

HTBLVA Rankweil, Negrellistraße 50, A-6830 Rankweil, +43-(0)5522-42 190

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HTBLVA Wien-3, Leberstraße 4 c, A-1030 Wien, +43-(0)1-799 26 31

CURRICULUM OF THE SECONDARY COLLEGE OF CONSTRUCTION ENGINEERING

Program Codes:

- 8340 ... 1st and 2nd Year
 8341 ... 3rd to 5th Year, Building Construction
 8342 ... 3rd to 5th Year, Civil Engineering
 8343 ... 3rd to 5th Year, Restoration and Urban Renewal
 8344 ... 3rd to 5th Year, Environmental Technology
 8345 ... 3rd to 5th Year, Construction Industry

I. SUBJECT TIME TABLE ¹⁾

(Total number of lessons and number of weekly lessons of the different subjects)

A. COMPULSORY SUBJECTS	Lessons per Week					Sum	Teaching Assignment Group
	1	2	Year 3	4	5		
1. Religious Instructions	2	2	2	2	2	10	(III)
2. German	3	2	2	2	2	11	(I)
3. English	2	2	2	2	3	11	(I)
4. History and Political Education	–	–	–	2	2	4	III
5. Physical Education.....	2	2	2	1	1	8	(IVa)
6. Geography and Economics	2	2	–	–	–	4	(III)
7. Economy and Law	–	–	–	2	3	5	III
8. Applied Mathematics	4	3	2	2	–	11	(I)
9. Applied Physics	2	2	2	–	–	6	(II)
10. Applied Chemistry and Ecology	3	2	–	–	–	5	II
11. Descriptive Geometry ²⁾	2	3	–	–	–	5	(I)
12. Applied Computer Science	–	2	2	–	–	4	I
13. Technology	2	2	–	–	–	4	I
14. Building Construction.....	2	2	2	2	–	8	I
15. Statics.....	–	2	2	2	–	6	(I)
16. Freehand Drawing	2	–	–	–	–	2	(IV)
17. Laboratory.....	–	–	4	–	–	4	I
18. Constructional Practice	3	3	3	3	–	12	I
19. Practical Training in Construction Engineering	8	8	–	–	–	16	(Va)
Compulsory Subjects of School-autonomous Special Training Focuses“ in compliance with section B.	–	–	14	19	26	59	
Total number of lessons per week.....	39	39	39	39	39	195	

B. COMPULSORY SUBJECTS OF SCHOOL-AUTONOMOUS SPECIAL FOCUSES	Lessons per Week			Sum	Teaching Assignment Group
	3	Year 4	5		
B.1 Building Construction					
1.1 Building Construction.....	2	2	4	8	I
1.2 Statics ³⁾	–	–	2	2	(I)
1.3 Reinforced Concrete Construction ³⁾	–	3	2	5	(I)
1.4 Steel and Timber Construction ³⁾	–	2	2	4	I
1.5 Buildings and Design Theory ⁴⁾	3	2	–	5	I
1.6 Architectural Styles	–	–	3	3	I
1.7 Civil Engineering.....	–	4	–	4	I
1.8 Construction Management.....	2	4	3	9	I
1.9 Survey ⁵⁾	3	–	–	3	I
1.10 Sketching ⁶⁾	–	–	7	7	I
1.11 Constructional Practice.....	–	2	3	5	I
1.12 Practical Training in Construction Engineering	4	–	–	4	(Va)
Total number of weekly lessons B.1.....	14	19	26	59	

B. COMPULSORY SUBJECTS OF SCHOOL-AUTONOMOUS SPECIAL FOCUSES	Lessons per Week			Sum	Teaching Category
	III.	Year IV.	V.		
B.2 Civil Engineering					
2.1 Building Construction.....	–	–	2	2	I
2.2 Statics ³⁾	2	–	2	4	(I)
2.3 Reinforced Concrete Construction ³⁾	–	3	3	6	(I)
2.4 Steel and Timber Construction ³⁾	–	2	2	4	I
2.5 Bridge Construction ⁷⁾	–	2	2	4	(I)
2.6 Transport Ways Construction ⁷⁾	–	4	2	6	(I)
2.7 Soil and Hydraulic Engineering ⁷⁾	2	4	5	11	(I)
2.8 Construction Management.....	2	4	3	9	I
2.9 Survey ⁵⁾	4	–	–	4	I
2.10 Constructional Practice and Project ⁶⁾	–	–	5	5	I
2.11 Practical Training in Construction Engineering.....	4	–	–	4	(Va)
Total number of weekly lessons B.2.....	14	19	26	59	
B.3 Restoration and Urban Renewal					
3.1 Building Construction.....	–	–	2	2	I
3.2 Statics ³⁾ ¹³⁾	–	2	2	4	(I)
3.3 Building Maintenance and Restoration, Monument Preservation.....	2	4	3	9	I
3.4 Examination, Documentation and Surveying of Buildings ⁵⁾	4	2	–	6	I
3.5 Architectural Styles.....	2	2	2	6	I
3.6 Historical Urban Development and Renewal.....	–	3	3	6	II
3.7 Construction Management.....	2	2	2	6	I
3.8 Modelling ¹⁰⁾	–	–	2	2	V
3.9 Laboratory.....	–	4	5	9	I
3.10 Constructional Practice and Project ⁶⁾	–	–	5	5	I
3.11 Practical Training in Construction Engineering.....	4	–	–	4	(Va)
Total number of weekly lessons B.3.....	14	19	26	59	
B.4 Environmental Technology					
4.1 Building Construction.....	–	–	2	2	I
4.2 Statics ³⁾ ¹³⁾	–	–	2	2	(I)
4.3 Applied Biology.....	2	2	–	4	II
4.4 Ecology, Construction Ecology, Meteorology ⁸⁾	2	4	3	9	II
4.5 Basics of Electrical and Control Engineering.....	3	–	–	3	I
4.6 Technical Building Installation and Energy Planning ⁸⁾	–	5	4	9	I
4.7 Hydraulic Engineering and Water Pollution Control.....	3	3	3	9	I
4.8 Air Pollution Control.....	–	2	2	4	I
4.9 Waste Management and Recycling.....	–	–	2	2	I
4.10 Workshop.....	4	–	–	4	Va
4.11 Laboratory.....	–	3	3	6	I
4.12 Constructional Practice and Project ⁶⁾	–	–	5	5	I
Total number of weekly lessons B.4.....	14	19	26	59	
B.5 Construction Industry					
5.1 Building Construction.....	–	–	2	2	I
5.2 Statics ³⁾	–	–	2	2	(I)
5.3 Reinforced Concrete Construction ³⁾	–	3	2	5	I
5.4 Steel and Timber Construction ³⁾	–	2	2	4	I
5.5 Accountancy.....	–	3	4	7	I
5.6 Company Organization.....	3	–	–	3	II
5.7 Project Development ⁹⁾	–	3	5	8	I
5.8 Civil Engineering.....	–	4	–	4	I
5.9 Construction Management.....	4	4	4	12	I
5.10 Survey ⁵⁾	3	–	–	3	I
5.11 Constructional Practice and Project ⁶⁾	–	–	5	5	I
5.12 Practical Training in Construction Engineering.....	4	–	–	4	(Va)
Total number of weekly lessons B.5.....	14	19	26	59	

Mandatory Work-Placement: Minimum of 8 weeks during vacation before 5th year.

C. OPTIONAL SUBJECTS, NON-OBLIGATORY PRACTICE, TUTORIALS	Lessons per Week					Sum	Teaching Assign- ment Group
	1	2	Year 3	4	5		
C.1 Optional Subjects							
Second Modern language ¹¹⁾	–	–	3	3	3		(I)
C.2 Non-obligatory Practice							
Physical Education	2	2	2	2	2		(IVa)
C.3 Tutorials ¹²⁾							
German							
English							
Applied mathematics							
Relevant Theoretical Compulsory Subjects							

¹⁾ Within the framework of section III deviations from subject-table are permitted by school-autonomous provisions for curricula.

²⁾ In combination with relevant practice of 1 weekly lesson in “Applied Electronic Data Processing”.

³⁾ In combination with practice of ½ weekly lesson in the 5th year.

⁴⁾ In combination with practice of 1 weekly lesson in the 4th year.

⁵⁾ In combination with practice to the extent of ½ weekly lesson in the 3th year.

⁶⁾ In combination with practice partly with Applied Electronic data processing.

⁷⁾ In combination with practice of ½ weekly lesson in the 4th and 5th year, respectively.

⁸⁾ In combination with practice of 1 weekly lesson in the 5th year.

⁹⁾ In combination with practice of ½ weekly lesson in the 4th and 4 weekly lessons in the 5th year.

¹⁰⁾ In combination with relevant practice.

¹¹⁾ Name of language has to be mentioned in official papers.

¹²⁾ Parallel to the respective compulsory subject up to 16 lessons per year, classification like corresponding compulsory subject.

¹³⁾ Including Reinforced Concrete Construction, Structural Steel and Timber Engineering.

II. GENERAL EDUCATION OBJECTIVES

Within the framework of the Austrian school system Secondary Technical and Vocational Colleges are designed to provide students with both general education and vocational training, which

- will enable them to pursue a highly qualified occupation and carry on a business in trade and industry.
- grants university access.

In order to meet the needs and requirements of everyday and professional life and in order to be prepared for the challenge of an academic career the graduate of a Secondary Technical and Vocational College will be equipped with professional skills (theoretical and practical knowledge of business-relevant and related topics), methodical competence (capability of gathering information, planning solutions to problems and selecting and applying suitable methods), social consciousness (ability of co-operation, communication and working in teams) and individual creativity (capacity to organise his personal and professional life and his own personality activity, to show self-initiative and interest in further education).

In accordance with this comprehensive conception of competence the graduate of a Secondary Technical and Vocational College will acquire the following qualifications:

- He will get a sound engineering knowledge up to date required for everyday and professional life and an academic career. He will know business-relevant legal regulations, standards and practices and be able to employ and operate commonly used devices.
- He will observe and evaluate routines, facts, processes and strategies and be able to describe them in correct German and in at least one foreign language, written and orally. He will also be able to represent them by symbols used in mathematics and information science. The graduate will further be able to gain information from the media, evaluate it critically and relate it to other ideas.
- He will gain an insight into processes of political and managerial economy and will be informed about business administration and law, which will enable him to pursue a trade, a craft or a career in industry. He will further be able to further develop and utilise his skills in business life.
- He will be provided with fundamentals of engineering and science, basic concepts of mathematics and science in order to be ready to deal with issues relevant to everyday life and ecology. Complementary to business training he will further develop general interdisciplinary skills.

- He will be prepared to participate in public and cultural life; he will declare himself to co- and self- determination in democracy and show responsibility in the presence of ecological and political changes by standing up for international understanding, professional ethos, a critical attitude towards consumption, environmental protection and a conduct of partnership and devote his life to these values. He will recognise the meaning of co-operation within the European Union and with other countries.
- He will support a concept of proficiency consistent with society and environment and preserve this proficiency and health by his own attitude towards the way of life, leisure culture and further education. He will be ready to apply these principles to his staff, and foster them by an open management style.

In the sense of general education schools have to face additional tasks which are summarised in teaching principles. Among them are: Health, media and sexual education, political awareness, an acceptance of the equality between men and women, concern for the environment, traffic concepts, a comprehensive national defence as well as an education concerning economy and consumption.

Subject-Relevant Training Objectives:

The Secondary College of Construction Engineering imparts knowledge in sketching, dimensional analysis and designing of buildings, the relevant materials and fabrication methods as well as in construction laws, construction standards, calculation of constructions and construction management.

As a result of the training, which is oriented towards industrial practice, the graduates are being prepared to obtain the necessary qualifications for the corresponding trades and for fulfilling management tasks in construction enterprises, planning offices, in public administration and in the general building industry.

The Secondary College of Construction Engineering, in addition to the general occupation training, offers five school-autonomous special training focuses:

- Special focus on „**Building Construction**“ offers extended specialized training with respect to planning and actual construction of buildings and the different types of construction such as masswall constructions (reinforced concrete, bricks), lightweight construction (steel, timber, pore concrete) or prefabricated construction.
- Special focus on „**Civil Engineering**“ offers extended specialized training with respect to planning, construction and actual realization of projects such as bridges, roads, soil and hydraulic engineering projects.
- Special focus on „**Restoration and Urban Renewal**“ offers extended specialized training with respect to restoration, renovation and redevelopment of single buildings or housing estates.
- Special focus on „**Environmental Technology**“ offers extended specialized training with respect to planning and realization of construction projects under a strictly ecological point of view regarding mechanical services and energy efficiency, protection of water and air, and the recycling industry.
- Special focus on „**Construction Industry**“ offers extended specialized training with respect to planning and realization of construction projects especially considering project management, building economy and business administration.

III. SCHOOL-AUTONOMOUS PROVISIONS FOR CURRICULA

IIIa. General Provisions

School-autonomous provisions for curricula (School Organisation Law §6/1) grant schools independence in the organisation of subject-timetables and curricula-determined teaching-contents (syllabi of the different subjects) and in the choice of training and work forms as well as in the organisation of the training. In order to make efficient use of these opportunities it is essential to be aware of the special needs and problems of the respective school or class at a certain location as well as the resulting ambitions and aims thereof. This independence requires the development of concepts which consider the needs of students, parents and teachers alike as well as the specific characteristics of the school.

School-autonomous provisions for curricula must not only observe the extent of teachers' weekly assignments provided but also institutional facilities such as rooms and equipment.

School-autonomous provisions for curricula have to consider training objectives concerning general education as well as occupation-oriented theoretical knowledge and practical skills. Within the framework of the Austrian school system they also have to provide students with the opportunity to transfer courses.

IIIb. School-Autonomous Deviations from Subject-Tables

School-autonomous provisions for curricula allow schools to work out their own tables of compulsory subjects, which may deviate from the standard ones, provided the following provisions are considered:

1. It is permitted to change the distribution of the total number of compulsory weekly lessons and their respective contents over the years.
2. During the course the number of weekly compulsory subjects can be reduced by up to ten lessons a week, if - in return - additional compulsory subjects are introduced or the number of lessons of curricular compulsory subjects is increased to the same extent. This reduction is limited by the fact that compulsory subjects may only be reduced by one lesson a week. The reductions must not cause a complete loss of a compulsory subject in one year.
3. In each year a compulsory subject can be combined with another methodically and content related compulsory subject to one comprehensive compulsory subject. The new name must refer to the names of the two subjects which the new subject derives from.
4. Instead of the compulsory subject English another modern language can be taught.

If paragraphs 1. or 2. are applied, special consideration has to be given to the fact that the total number of weekly lessons of the course must be preserved and that there must not be more than 40 lessons per week in any year. School-autonomous provisions for curricula may establish extra-curricular optional subjects, non-obligatory practice lessons and tutorials as well as change the number of lessons for corresponding programmes provided by the curriculum.

IIIc. School-Autonomous Provisions for Training Focuses

If curricula include school-autonomous training focuses, these school-specific focuses have to be determined by school-autonomous provisions for curricula. Some focuses can be established as alternative compulsory subjects.

IIId. Provisions concerning Contents of Subjects and Classification of Subjects according to Teaching Assignment Groups

- (1) If extra-curricular subjects are created or if subjects for which the curriculum provides no contents are established within the framework of school-autonomous provisions for curricula, school-autonomous provisions for curricula have to contain relevant directions. If school-autonomous provisions for subjects provide an increase in the number of lessons, additional training and teaching aims, descriptions of contents and didactic principles may be defined.
- (2) If additional subjects are created or existing subjects are changed subject-relevant training objectives of the curriculum and the following directions have to be observed:

Directions for **Training and Teaching Aims**:

The student will acquire general and subject-relevant competences which - under special consideration of regional requirements - emphasise and complete attitudes, knowledge and skills provided in other compulsory subjects.

Directions for **Contents**:

If contents include topics which cannot be covered by increasing the number of curricular lessons the following additional subjects have to be provided:

“Foreign Language“:

Another modern language whose organisation of contents and didactic principles is equivalent to those of the compulsory subject English. (Teaching assignment group I)

“Personality Training“:

Promotion of self-development by teaching offers concerned with general education, humanities and business practice. (For classification into teaching assignment groups see §7 of Teaching Assignment Law for federal teachers)

“Economy and Technology“:

Teaching programmes which emphasise economic training relevant to the specific technical field. (Teaching assignment group I for training areas management engineering, electronic data processing and organisation; otherwise teaching assignment group II)

“Law and Political Education“:

Teaching courses which emphasise political education and subjects concerning law with special regard to independent practice of trade. (Teaching assignment group III)

“Environment“:

Introduction to domains of general science in addition to technical-scientific education. (Teaching assignment group III)

“Special Theoretical Subject Training“:

Supplementary courses with non-encyclopaedic syllabi. (Teaching assignment group I)

“Projects“:

Teaching offers which aim at interdisciplinary strategies within the domain under special consideration of theoretical and practical laboratory assessments. (Teaching assignment group I)

“General Theoretical Subject Training“:

Introduction to engineering disciplines which are not focused on in the rest of the course. (Teaching assignment group II)

Directions for **Didactic Principles**:

Pedagogic concepts should foster the student’s ability to co-operate, his intellectual flexibility and his concern for his social, economic and ecological surroundings. Project teaching - even if involving students from different grades or block tuition- is recommended wherever possible.

DIDACTIC PRINCIPLES

IIIe. Preparations of Contents

In order to reach the general training objectives educational background of students have to be considered and the contents of the subjects have to be selected according to practical requirements of the subject field.

Sound knowledge of essential contents should be preferred to an overall outline. In order to foster motivation new topics have to be introduced with an orientation to practical problems. Cross- references within a subject and between subjects are essential for understanding the subject matter and for the development of interdisciplinary skills.

It is decisive for training success that subject matter is arranged clearly and according to the age of the students. Teaching - and understanding aids, especially those prepared by the teachers themselves, contribute to this success.

In order to provide the students with skills in due time and to avoid parallelisms teachers will have to work in teams. It is recommended to build up a network of related subjects in the form of co-ordinated content-distribution-plans.

As general education and training aims require training to be up to the state of the art, teachers are expected to improve their specific knowledge and skills continuously. The curriculum presents a directive framework for this purpose.

IIIf. Organisation of Lectures

Working on projects in groups simulates practice in business situations and emphasises the students’ communicative competence. The student will profit by the fact that his fellow students encourage and criticise his way of solving problems and his self analysis, which is essential for training progress and future professional work forms.

Excursions, field practice, lectures of industrial experts and work placement grant an insight into relations between technology and business organisation as well as into social aspects of professional life.

All lectures listed in the subject-table can partly or completely be given in block tuition (1 lesson per week corresponds to 40 lectures a year).

Different themes of a subject can be taught by different teachers according to the teachers’ skills and special knowledge; teachers should aim at good co-operation with respect to their common assessment of the students’ proficiencies.

For pedagogic and organisational reasons different subjects can be combined to form concentrated training units. (School Time Law 1985, §4/2, Federal Law Gazette 77, as amended)

IV. SYLLABUS FOR RELIGIOUS KNOWLEDGE LESSONS

- a.) Roman Catholic Instructions
See promulgation of Federal Law Gazette 30/1984
- b.) Protestant Instruction
See promulgation of Federal Law Gazette 515/1991
- c.) Old Catholic Instructions
are generally given in groups according to the Law of Religious Instructions §7 as amended. Consequently the syllabus for the upper level of Secondary Academic Schools is to be applied.
- d.) Islamic Instructions
See promulgation of Federal Law Gazette 421/1983.
- e.) Israelite Instructions
Promulgation of Federal Law Gazette 88/1985 as amended shall analogously be applied.
- f.) New Apostolic Church Instructions
See promulgation of Federal Law Gazette 269/1986.
- g.) Instructions of The Church of Jesus Christ of the Latter Day Saints
See promulgation of Federal Law Gazette 239/1988.
- h.) Syrian-Orthodox Instructions
See promulgation of Federal Law Gazette 467/1988.
- i.) Greek-Orthodox Instructions
See promulgation of Federal Law Gazette 441/1991.
- j.) Buddhist Instructions
See promulgation of Federal Law Gazette 255/1992.

V. TRAINING AND TEACHING AIMS OF SUBJECTS; DISTRIBUTION OF CONTENTS OVER THE YEARS

A. COMPULSORY SUBJECTS

2. GERMAN

Training and Teaching Aims:

The student will

- have command of the standard German language in speech and writing,
- be able to make efficient use of means providing information on pronunciation, orthography grammar and style and gather relevant information on cultural and professional affairs,
- be able to develop and master personal and professional communicative situations in speech and writing state and present facts adequately to addressee and situation and evaluate business-oriented texts independently and critically,
- comprehend the quality of literary works, be able to evaluate it and gain an insight into the contents of other art forms,
- be able to participate on public and culturel life and to take part in designing it in speech and writing state,
- understand the function of the media as institutions, economic factors as well as educational, entertainment and information facilities. Within the range of his activities he will further be capable of dealing with media consciously, critically and participatingly.

Contents:

1st Year:

Correctness of Language:

Practice-oriented application of orthography and punctuation. Spelling and meaning of frequently used foreign words, technical terms. Language structures (identification, application).

Oral Communication:

Presentation of facts (that have been experienced, heard, seen or read) in standard language. Phone calls, reports, discussions.

Written Communication:

Practice-oriented textforms (report, summary curriculum vitae, letter of application). Creative text forms.

Literature, Art and Society:

Topics from the student's experiences treated in literature and other art forms (themes, motifs, formal aspects, descriptions, explanations, evaluation of texts). Literary genres.

Media:

Mass media (kinds and functions); advertising and consumption; sources of information (reference books, institutions, use of libraries)

2nd Year :**Oral and Written Communication:**

Presentation of facts and the course of events, characterisations, analysing, commentaries. Presentation, making appeals, petitions, excerpts, minutes. Basic concepts of communication. Free creative writing.

Language Standards:

Training and improvement, orthography, punctuation, vocabulary and language structures.

Literature, Art and Society:

Society relevant topics in literature and other art forms (themes, motifs, formal aspects, description, explanation, evaluation of texts)

Media:

Styles in journalism and advertising.

3rd Year :**Oral and Written Communication:**

Argumentation, commentaries, subject-relevant reports, technical texts, statements, interviews, conversation and discussion techniques. Communication techniques. Creative writing.

Language Standards:

Training and improvement. Orthography, punctuation, vocabulary and language structures.

Literature, Art and Society:

History of civilisation up to the beginning of the 19th century (époques in the light of intellectual history). Text commentaries and evaluations.

Media:

Creative criteria and means of manipulation of mass media.

4th Year :**Oral and Written Communication:**

Speech and lecture. Analysing and comments. Written reports. Creative writing.

Language Standards:

Training and improvement. Orthography, punctuation, vocabulary and language structure.

Literature, Art and Society:

History of civilisation of the 19th century (époques in the light of intellectual history); evaluation of texts. Relations to other art forms.

5th Year :**Oral and Written Communication:**

Job interview, letters of application, negotiations, debates, analysis and evaluation. Written report. Presentation techniques. Free writing.

Language Standards:

Training and improvement. Orthography, punctuation, vocabulary and language structures.

Literature, Art and Society:

History of civilisation of the 20th century (époques in the light of intellectual history); evaluation of texts. Commentaries on cultural works and contemporary developments.

Media:

Evaluation of media contents, analysis of effects.

In each year two to four written tests, which may require one or more lessons.

3. ENGLISH

Training and Teaching Aims:

The student will

- be able to master general and business-relevant communicative situations in the foreign language by showing skills in listening and reading comprehension and speech and writing; emphasis is laid on communicative skills and understanding,
- be able to transfer information precisely from his mother tongue into the target language and vice versa and comment on it,
- be able to deal with practical business events in speech and writing under special consideration of commonly used communication forms; he will also be able to join business-relevant group activities with English as a working language,
- be able to employ technical tools for communication and information suitable for the specific situation and make use of modern presentation and moderation techniques.

Contents:

1st Year :

General Communication Topics:

Integration of previous experiences in communication; topics adequate to the student's knowledge, skills and interests.

Business-Relevant Communication Topics:

Elementary technical facts of the subject discipline; basic scientific and mathematical concepts.

Vocabulary and Language Structures:

Integration of previously acquired skills. Repetition and supplementation of grammatical skills and vocabulary required for idiomatic expression in the fields of relevant communication topics.

2nd Year .

General Communication Topics:

Themes taken from the student's social surroundings. Current issues.

Practice-Relevant Communication Topics:

Applications of scientific and basic technical subjects.

Vocabulary and Language Structures:

Extension of vocabulary and language structures required for expressing facts of relevant communicative themes.

3rd Year :

General Communication Topics:

Topics with special focus on Austria; current issues.

Practice-Relevant Communication Topics:

Products and processes of the subject area.

Vocabulary and Language Structures:

Training and improvement of vocabulary and language structure required for expressing facts of relevant communicative themes.

4th Year :

General Communication Topics:

Topics related to countries of the English speaking world and the European Community; current issues.

Business-Relevant Communication Topics:

Topics relevant to business administration and management engineering.

Vocabulary and Language Structures:

Complex contents of grammar and vocabulary.

5th Year :

General Communication Topics:

Topics of international relevance; current issues.

Business-Relevant Communication Topics:

Complex themes of business practice; business management and business organisation.

Vocabulary and Language Structures:

Applications of acquired structures and vocabulary; summarising survey.

In each year two to four written tests, which may require one or two lessons.

4. HISTORY AND POLITICAL EDUCATION

Training and Teaching Aims:

The student will

- be provided with historical knowledge relevant to everyday and business life under special consideration of Austrian history and he will be able to make use of this in his political and social activities,
- be able to gather and evaluate information required for an understanding of the contemporary situation of the world and the interactions of politics, economy and culture,
- be able to analyse and assess contemporary political, social, economic and cultural situations and processes relying on historical models,
- know the historical development of the branch of trade he has been trained for and relate it to the general historical development as well as affirm the preservation of cultural heritage,
- be prepared to participate actively in public and cultural life and show political and social responsibility; he will affirm the principles of the Austrian federal constitution and he will also be ready to meet different cultures and settle conflicts peacefully,
- be informed about development tendencies of the contemporary society,
- be conscious of environment and critical of consumption.

Contents:

4th Year :

Classical Antiquity:

Cultural and scientific heritage (democratic tendencies, religious heritage).

Middle Ages:

Culture and society in feudalism; development in Austria (formation of Austrian lands); from the theocentric to an anthropocentric view of the world.

Early Modern Times:

Inventions and discoveries; economy (from feudalism to early capitalism); culture, society and science (Renaissance, humanism, reformation; foundation of modern territorial states); developments in Austria.

Age of Reason and the Civil Revolution:

Basic spiritual concepts, state theories, revolution and Restoration, foundation of the United States; Napoleon and Europe; nationalism and liberalism; (human rights, separation of powers, development of parliamentarism); Industrial Revolution and social issues; society, economy, culture, science and technology. Development in Austria.

Age of Imperialism:

National unification endeavours; Europeanising of the world; Europe before the First World War; First World War; society (haute bourgeoisie, industrial society, women's liberation); ideologies and political movements (mass parties, right to vote); economy, science (evolution), technology, culture; development in Austria.

5th Year :

Tendencies and Developments in the 20th Century - the Period before 1945:

Russian revolution. Reorganisation of Europe; totalitarian ideologies and systems (politics, persecution, resistance); crises of democracies; League of Nations; non-European developments; Second World War; society, economy, culture (inflation, world depression, governmental control, science, technology); development in Austria (domestic and foreign policy of the First Republic, time of national socialism).

Tendencies and Developments in the 20th Century - the Period after 1945:

United Nations and international organisations; east-west-conflict (formation of blocks, political centres of conflict), unification of Europe (EEC, Council of Europe, European Community, European Economic Area, EU); de-colonisation and movement of the non-aligned countries; north-south-conflict; racism, alternative movements, terrorism, social conflicts; peace initiatives; society, culture, economy (economic growth and ecology, science, technology); developments in Austria (domestic and foreign policy of the Second Republic, neutrality, social partnership between employers and employed)

Contemporary Social and Political Developments:

Changes and conflicts in Eastern and Southern-eastern Europe. Nationalism. Migration and multicultural society. Political dimension of European integration.

Basic Concepts of Politics:

Democracy (direct and indirect democracy; parliamentarism). Formation of political will in democracy (elections, parties, representations of interest). Areas of the Austrian political system. International politics. Basic constitutional rights, rights of freedom and human rights.

5. PHYSICAL EDUCATION

See Federal Law Gazette 37/1989.

6. GEOGRAPHY AND ECONOMICS

Training and Teaching Aims:

The student will

- be provided with regional and global topographic knowledge relevant to business and leisure time,
- be able to gather, evaluate and present information necessary for the investigation and assessment of living spaces.
- display a knowledge in economic geography,
- be able to explain geofactors and comment on their networking in ecological and economic systems,
- be informed about the limitations of the earth's resources and be able to explain the conflicts caused by their exploitation and distribution,
- be able to analyse individual and social demands for geographic space and recognise social aspects,
- understand the meaning of regional development and area development planning for securing quality of life,
- be ready to participate responsibly in the arrangement and preservation of living space.

Contents:

1st Year :

Landscape and Human Ecology:

Ecological structure of economy concerning geofactors; regional belts of the earth; interaction between ecosystems and working human beings.

Population:

Representation of processes concerning population; demographic structures and processes; limits of capacities.

Social and Economic Orders:

International economy; global interactions; alliances (EU and non-European alliances).

2nd Year .

Developing Countries:

Features; problems, development theories and strategies.

Industrial countries:

Sectoral change; urbanisation; economic regions; regional development and area development planning.

7. ECONOMY AND LAW

Training and Teaching Aims:

The student will

- be aware of the meaning of managerial economic considerations and concepts of political economy for the subject area,
- know legal regulations relevant to business administration and apprenticeship training,
- know the fundamentals of business accounting and contracting,
- know civic and constitutional principles and attitudes and be able to practise them.

Contents:

4th Year :

Political Economics:

Economic systems, Austrian economic order; production factors; market and price; money and currency; economic situation and growth; budget policy; income and consumption; foreign trade and balance of payment; international economy, European integration, bilateral economic relations, development aid.

Accounting:

Fundamentals of double entry book-keeping, internal index figures.

Law:

Outline of essential legal sectors. Fundamental concepts of the Civil Code with special focus on contracting business; payment transactions, cheque and exchange law. Basic concepts of trade law, environment law and European law.

5th Year :

Accounting:

Fundamentals of cost accounting (full and variable costing) in trade and industry. Controlling.

Management and Entrepreneurial Law:

Basics of planning and control, organisation; sale, supply, logistics, in-plant training and further education. Financing. Commercial law, insurances against possible risks, insolvency law, tax law.

Labour Legislation and Social Law:

Basic concepts of labour legislation and social insurance law. Fundamentals of personnel accounting. Legal, pedagogic and psychological basics of apprenticeship training.

Austrian Legal System and Federal Constitution:

Basic concepts of federal constitution (democratic, republican, constitutional state and federal principles, separation of powers). Parliament, federal government, federal president. Legislative of confederation and federal countries, administration (organisations, autonomous corporations), judicature (instances, legal proceedings), checks of public authority,(parliamentarian checks, supreme courts, people's advocate, court of audit), written and practised constitution.

8. APPLIED MATHEMATICS

Training and Teaching Aims:

The student will

- know the mathematical terminology, theories and methods relevant to practice and further academic studies and will be able to apply them,
- be able to analyse basic facts and proceedings of nature, technology and economy and describe them by mathematical models, find model solutions and evaluate them,
- be able to employ mathematics as a tool for gaining information and for communication in business, engineering and science,
- be able to present mathematical concepts and demonstrate algorithms,
- be able to employ modern aids efficiently.

Contents:

1st Year :

Algebra:

Number systems; operations with variables and terms; vectors (representation, magnitude, addition, subtraction, multiplication by a scalar); linear equations and inequalities; solving of formulas, systems of linear equations.

Numerical Computations:

Representation of numbers; errors of representation; estimation of results.

Functions:

Concepts, representation in co-ordinate systems; linear function; evaluation of tables, interpolation; direct and inverse proportionalities.

Geometry:

Plane geometry (similarities; triangle, rectangle, circle; Pythagorean Theorems); stereometry; trigonometry of right triangles.

2nd Year :

Algebra and Geometry:

Vectors (dot product, orthogonality, vector product). Quadratic equations; exponential equations. Complex numbers (representation, operations). Trigonometry of the oblique triangle.

Functions:

Properties; inverse functions; quadratic functions, power and radical functions, exponential and logarithmic functions; general sine function, addition theorems, evaluation of functional graphs and functional equations; parametric representation.

Business Mathematics:

Compound interest calculations, linear optimisation.

Theory of Probability and Statistics:

Frequency distributions; characteristics; probability (addition and multiplication rules).

3rd Year :

Analysis:

Sequence of numbers, limit, differential calculus (quotient of differences and derivative, differentiation rules); Integral calculus (definite and indefinite integral, integration of elementary functions); application of differential and integral calculus.

Numerical mathematics:

Error approximation and continuation; condition problem, numerical methods to solve equations, numerical integration.

4th Year :

Analysis:

Subject-specific applications.

Linear algebra and analytical geometry:

Matrixes (operations, applications) determinants; lines and planes; principal conic sections

Theory of probability and statistics:

Probability distributions; principles of parameter estimation and tests of significance.

3st and 4th Years :

Subject-specific applications; use of the calculation tools used in practice, the use of computers in mathematics.

In the grades with three weekly hours four written tests, else two written tests.

9. APPLIED PHYSICS

Training and Teaching Aims.

The student will

- watch and describe processes in nature and relate them to special branches of physics,
- experience important physical connexes of experiments and simulation by contemplorary aid,
- understand and apply physical methods and relate them to physical-technological assignments using (simple) mathematical symbols,
- be able to describe connections in words, in symbolic language and scientific terminology as well as graphically and in tables and formulas,
- be able to estimate dimensions and assess the plausibility of results,
- know and be able to apply the physical laws which are relevant to the production and application of materials, devices, machines, plants and processes commonly used in business practice. He will display a sound knowledge of technologies applied in energy utilisation and will be able to describe their effects on environment,
- know the modes of thinking and working of classical modern physics; he will be aware of the nature of conceptions of physical models and their limitations; he will further be able to comment critically on current scientific issues.

Contents:

1st Year :

General Physics:

Meaning and methods of physics; international units (SI- system).

Kinematics and Dynamics:

Velocity, acceleration, composite motions. Newton's laws, force, work, energy, power, efficiency, momentum, conservation theorems of mechanics; rotation, central forces, gravitation.

Aeromechanics and Hydromechanics:

Pressure, buoyancy, flows. Molecular forces.

2nd Year :

Electricity and Magnetism:

Electric and magnetic field; mechanisms of conduction; magnetic characteristics; induction; electric circuits, energy supply.

Oscillations and Waves:

Oscillations and waves in mechanics, optics and electromagnetism; resonance; wave propagation, standing waves, interferences, diffraction and scattering; modulation; acoustics.

Optics:

Reflection, refraction, total reflection, light velocity, imaging by optic systems. Diffraction at gap and grid, capacity of resolution of optic devices, interferences of thin layers, polarisation, photo elasticity, scattering. Light and colours, spectra, emission and absorption of radiation; photometry.

3rd Year :**Thermodynamics:**

Temperature; heat energy, heat transfer, thermal insulation; state equations of ideal gases (states of aggregation, temperature-concentration diagram); theorems of heat theory, gas kinetics, diffusion.

Fundamentals of Quantum Mechanics:

Wave-part-dualism, quantisation of energy, uncertainty principle, material waves.

Fundamentals of the Theory of Relativity:

Constancy of light velocity, equivalency of mass and energy, space-time-continuum, experiments in thought.

Atomic and Nuclear Physics:

Structure of atoms and nuclei, radioactivity; fission, nuclear fusion, effects of radioactive radiation, radiation protection, applications of radioactive isotopes.

Energy Utilisation:

Technologies for energy utilisation and conversion; energy supply; entropy and ecological balance; energy budget of the earth.

The contents of this subject may be modified in scope depth in accordance to the special focus.

10. APPLIED CHEMISTRY AND ECOLOGY

Training and Teaching Aims:

The student will

- observe and describe proceedings as well as phenomena of nature and technology and relate them to special branches of chemistry,
- know the concepts and methods applied in chemistry,
- be able to comment on current scientific issues,
- know the laws and methods of chemistry relevant to personal life and business practice and estimate dimensions; he will also display a knowledge in relevant chemical production and disposal technologies,
- show responsibility in the exploitation of materials by considering ecological and health factors,
- realise the opportunities and limitations of technological, economic and ecological assessments of products,
- recognise the meaning of soil, air, water and natural cycles as well as their changes caused by anthropogenous influences,
- know how to gain further information.

Contents:**1st Year :****Structures of Matter:**

Pure substances, mixtures, elements, compounds, atomic models, nuclides, radioactivity, periodic system, chemical compounds, formula representation and nomenclature.

Chemical Reactions:

Reaction equations, energy budget, chemical balances, catalysis, stoichiometry.

Types of Reactions:

Protolysis acids and bases, pH-value, indicators) Redox-reactions.

Electricity-chemistry:

Electrochemical series, Galvanic elements, electrolysis, corrosion, protection against corrosion.

Inorganic Basic Materials:

Production, use, cycles and residual utilisation.

Ecology:

Ecosphere and ecosystems (air, water, soil), cycles, balances, pollution, environmental protection.

2nd Year :

Carbon:

Bond types, modification, inorganic carbon compounds, (oxides, carbon acid), hydrocarbon, petroleum chemistry (petroleum, recovery, refining, products), hydrocarbon derivatives containing halogen, oxygen or nitrogen; macromolecules (natural substances and plastic materials), production, applications, residual utilisation.

Silicon:

Pure silicon, silicic acid, natural and technical silicates, organic silicon compounds, production, applications, residual utilisation, building materials.

Ecology:

Influence on ecosphere,(air, water, soil) in the surroundings of carbon and silicon processing plants, environmental analytics and measures of environmental protection in special examples.

11. DESCRIPTIVE GEOMETRY

Training and Teaching Aims:

The student will

- be able to read the structure of an object from a drawing, to interpret and constructively use the information contained in the drawing and to depict the three-dimensional actuality in freehand sketches,
- be able to recognize geometric shapes from technical objects and to capture them with a drawing and to express autonomous technical-constructive thinking in drawings, using appropriate techniques of depiction,
- be able to break down constructive facts into sub-problems by making use of models and to develop algorithms to solve them,
- be familiar with the development and regularity of curves, planes and solids that are important for the subject area,
- be able to depict objects in 3D.

Contents:

1st Year :

Spatial of coordinates system.

Projection methods (types of projection).

Principal projections of simple geometric and technical bodies, as well as axonometry to capture the shape of an object from given projections.

Construction with conjugated normal projections:

Line segment and straight line, plane figure and plane in principal, projecting and general position; length of a line segment, size and shape of a plane figure; projecting a straight line and a plane; orthogonal position of straight lines and planes; intersections of plane bounded objects (roof design); circle in principal, projecting and general position.

2nd Year :

Normal axonometry of plane bounded objects.

Rotations:

Basic concepts; plane intersections (points and tangents).

Penetrations.

Ruled surfaces, translation surfaces and screw surfaces.

Perspective:

Intersection technique; free perspective, application to plane and curved bounded objects; clear central projections of objects.

CAD applications.

In each grade two written tests.

12. APPLIED COMPUTER SCIENCE

Training and Teaching Aims:

The student will

- know the structure, function and possibilities for the range of application of electronic information processing facilities and be able to operate these machines,
- be able to choose and use standard software to solve job tasks,
- be able to procure and pass on information electronically,
- know the societal implications of using electronic data processing.

Contents:

2nd Year :

Information processing systems:

Structure, function, components acting in combination; operating systems; operation.

Standard software:

Word processing, spread-sheet calculation.

Programming:

Solving simple problems using algorithms; translation into programs.

3rd Year :

Program development:

Methods of software design; structured programming, elements of structure; data structures.

Communications technology:

Networks; information procurement.

Standard software:

Graphics and presentation; CAD; databases.

Information and society:

Effects of computer science on humans, the working world, society, culture and environment; protection of data privacy.

13. TECHNOLOGY

Training and Teaching Aims:

The student will

- know the properties of building materials and raw material considering selection, use and processing,
- be able to choose building material and raw material considering ecology and economy,
- use processing methods and machines considering their ecology.

Contents:

1st Year :

Construction material:

Natural stones (kinds, processing, use), calcined building material, (kinds, properties, use), binding agents (cement, lime, gypsum, fire - clay, magnesite binding agents), plaster, rough - cast, stone floor (kinds, properties, use), concrete and concrete products (requirements and properties), anorganic and organic insulating material (properties and use), sealing material (different products, properties, use).

Wood:

Synthesis, kinds, properties, quality standards, defects, diseases, parasites, commercial law, norm profiles, connection and aid materials, wood protection.

2nd Year :

Soil:

Kinds, properties, characteristic values.

Iron and steel:

Production, properties, supply, use, processing, protection.

Non-iron metals:

Production, properties, supply, use, processing, surface - processing.

Synthetic material:

Production, properties, use, processing.

Glass:

Silicate and acryl glass, passive-solar effects.

Protection of the material:

Paints, coats, alloys.

14. BUILDING CONSTRUCTION

Training and Teaching Aims:

The student will

- know perfectly the building construction procedure and the constructions of this special field,
- be able to choose construction systems, kinds of construction, and building material considering function, usefulness, requirements and economy,
- construct building components with regard to physical, human-ecologically and material needs,
- be able to resolve house-technical problems,
- be able to use the specific norms,
- respect ecology (energy, resources).

Contents:

1st Year :

Terms:

Building construction and civil engineering, edifice, different kinds of constructions, executive professions, simple statistical connections, building project run.

Building site:

Measuring, excavations, security.

Foundation:

Soil, improvement, kinds of foundations, packing.

Walls:

Packings, basement, massive and light walls, chimneys, concrete form work.

Ceiling constructions:

Massive ceilings, form work, vaults.

2nd Year :

Roofs:

Roof truss,(Construction systems and statical connections,); roof covering and building plumber, flat roofs, terraces, balconys, lights.

Stairs:

Wood, massive and steel constructions, balustrades.

3rd Year :

Interior works:

Partition walls, plaster and supports, panelling of walls and ceilings, floor constructions, slab and tile laying, painting and wallpapering, windows, doors, portals, metal fittings, glass coverings.

Timber construction:

Walls, ceilings, attic flats.

4th Year :

Construction physics:

Thermal insulation and humidity protection (heating capacity, vapour diffusion, condensation), sound insulation, acoustics, fire protection.

Technical building installation:

Basics of heating, sanitary and electric installations (high and low voltage current), illumination engineering, lightning-protection, ventilations, alternative energy, elevators, waste management, recycling.

Domestic Sewage:

Discharge of the dirty water and rain, small sewage works, cesspools and drains, separator.

15. STATICS

Training and Teaching Aims:

The student will

- solve static problems with drawing and mathematical methods,
- be able to measure buildings and building components with regard to the requirements.

Contents:

2nd Year :

Powers:

Structure, analysis, balance, gravity determination, stability, kinds of strain, norms of strain, load-tabulation.

Girder:

Statically determined girders, supports, cutting conditions.

Framework constructions:

Supports, bar tensions.

3rd Year :

Girder:

Statically determined curved and creased girder, cutting conditions.

Stability:

Center pull and pressure, tension, extension

Flexure:

Moment of inertia and resistance, simple and double flexure

4th Year :

Stability:

Push, buckling, flexure with thrust, torsion.

Variations of the form:

Flexure line, bend, variation of the angle

Systems:

Cantilever girder, flow girder.

16. FREEHAND DRAWING

Training and Teaching Aims:

The student will

- illustrate objects with a draft, especially the proportions and colours, the nature, the models,
- be able to mark in an adequate way the various forms.

Contents:

1st Year :

Design of the drawing area:

Comprehension of the motive, simple composition rules.

Introduction into theory of colours:

Colour circle, colour effects, colour contrasts, exercises.

Three dimensional experience and three dimensional vision:

Horizon, baseline, scale, proportions, natural studies, three dimensional illustrations of interior and exterior rooms.

17. LABORATORY

Training and Teaching Aims:

The student will

- know standardized test procedures of building material, of building components and of soil,
- be able to resolve the most frequent problems of the quality tests.

Contents:

3rd Year :

Testing of the building material:

Sample, quality examination and aptitude test.

Testing of building components:

Aptitude tests, quality examinations, building-physical measurements.

Soil and subsoil test:

Examination of the subsoil and determination of the physical and mechanical characteristic values of the ground.

18. CONSTRUCTIONAL PRACTICE

Training and Teaching Aims:

The student will

- be able to prepare manually or using a CAD standardized building and construction drawings and also concrete work form and reinforcement drafts.

Content of curriculum:

1st Year :

Illustration of a drawing:

Standardized drawing techniques, planning, measurement and marking.

Plans:

Simple constructions.

2nd Year :

Ground plans, sections and views with a scale of 1:100 and 1:50 according to given draft documentation; detail and construction drawings.

3rd Year :

Drawings submitted according to a first draft for a simple construction, drawings of the design, the details and the constructions.

4th Year :

Selected drafts according to a first draft for all phases of the construction.

19. PRACTICAL TRAINING IN CONSTRUCTION ENGINEERING

Training and Teaching Aims:

The student will

- be able to use and maintain the equipment, tools, machines and instruments necessary in this special field,
- know about the properties and the possibilities of processing and use of the raw and the additional materials important for this field,
- get to know practical work on construction sites of the school and know the building process according to economical construction methods, and according to standardized drawings the student shall work properly in an autonomous way and consider the standards,
- note the proceeding of the work in an exercise book,
- be able to judge the construction work according to mechanical, economical and technical points of view,

- know and respect the measures contained in the decree for the protection of construction workers to prevent industrial accidents and occupational diseases in relation with the work.

Contents:

1st Year :

Bricklayer workshop:

Working rules, prevention of accidents, use and maintenance of the tools, machines, instruments, equipments and aids for the work; construction and squaring batter boards, marking out and constructing of walls, preparation of kinds of mortar, brick walls and pillars, waste gas flues and ventilations, marking out, covering of gaps in the wall, scaffolds (kinds, constructive elements), raw and fine plaster for the interior walls, horizontal and vertical packings.

Construction with concrete and reinforced concrete:

Simple workforms, production of concrete, transportation, use, packing and further treatment of the concrete, foundations of reinforced and unreinforced concrete, cut simple reinforcements, binding and bending.

Carpenter workshop:

Use and maintenance of the tools, machines, instruments, equipment and aids for the work, measuring, tracing, sawing, mortising, splitting, tenon cutting, drilling, cutting with the machine, adjusting, planing, production of wood-combinations for the carpenter, combinations with different joint-components (dowels, bolts, nails, glue).

2nd Year :

Bricklayer workshop:

Producing of different walls and masonry of different building material; natural stone masonry, shaping the stones, joining of the masonry, marking out (centerings) and working out of arches and vaults; shifting of pediments of doors and windows or frames, construction of light walls, caulking of perforations or gaps in the masonry, fixing - technique, packing of the masonry, degrease moisture, plaster restoration, production of templates, plastering and pulling of cornices, safeguarding and underpinning of building pits, laying of plats of concrete and natural stone, flooring, terrazzo-works, production of manholes and cleaning shaft, panelling of interior and exterior walls and ceilings, dry walling systems, plastering of walls, ceilings and fronts in several technics, painting work, sound and thermic insulation, adaptation, restoration, demolition, change of supporting walls, of stairs marking out.

Constructions with concrete and reinforced concrete:

Bending and laying of engineering steel according to bending and reinforcement plan; production and shiftment of concrete building components and prefabricated parts, shiftment of stairs, workform systems, reinforced concrete, constructions with reinforced concrete using site-mixed concrete or prefabricated pieces, installations, constructions with pre-stressed concrete.

Carpenter workshop:

Stationary and portable wood processing machines (use, maintenance), mortises, wire edges, shaping, bevelling, sizing and gluing, construction of stairs (scarification, discharging, production of string wreaths).

Roof truss constructions, blooming walls, brick nogging partition, single-plank wall, panel board elements, workforms, floors.

Workshop for wood construction:

Marking with a line, scribing, setting and marking of wood constructions; discharging of wire edges, valleys and shifts, scarification and construction of wood stairs, laying and processing of lightweight building boards, wood ceilings, fire protection, acoustic insulation, thermic insulation, completion of attic storey, block building, constructive and chemical wood protection.

Construction engineering workshop:

Use, care and maintenance of the machines, tools and instruments, simple building locksmithery and weight locksmithery, welding and mounting techniques.

Practice on a construction sites - if possible.

B. COMPULSORY SUBJECTS OF SCHOOL – AUTONOMOUS SPECIAL TRAINING FOCUSES

B.1 BUILDING CONSTRUCTION

1.1 BUILDING CONSTRUCTION

Continuation of compulsory subject „Building construction“ of section A.

Contents:

3rd Year :

See section A and in addition:

Selected special constructions for floors, windows, doors, portals, glazing, sun protection, front systems.

4th Year :

See section A and in addition:

Construction physics:

Acoustic, passive solar systems.

Technical building installation:

Use of ecological energy, ventilation systems, air condition, illumination engineering, information systems.

5th Year :

Adaptation and restoration:

Safety works, under pinning, replacement, drainage, improvements concerning thermal and sound insulation, construction physic problems.

Joints:

Kinds of constructions, settlement joint, structural joints, packings.

Exterior layout:

Surface design, exterior stairs, garden, fence.

Assembly:

Basics of the construction with assembly units, front panelling.

1.2 STATICS

Continuation of the compulsory subject „Statics“ of section A.

Contents:

5th Year :

Systems:

Three-hinged arch, frames.

Walls:

Supporting and retaining walls.

1.3 REINFORCED CONCRETE CONSTRUCTION

Training and Teaching Aims:

The student will

- resolve autonomously the problems of the construction with reinforced concrete statically and constructively,
- be able to dimensionate simple building components according to the stress.

Contents:

Concrete and reinforced concrete:

Compound unites, construction material and stress, standards, steel reinforcement, placing of reinforcement, formwork and scaffolds.

Measuring:

Foundations, supports, walls, rectangle cross section with a simple flexion, plates of reinforced concrete with main reinforcement in one direction., T-beams, moment covering.

5th Year :

Measuring:

Measuring of the shearing force, flexion with thrust, panels, brackets, plates, stairs, proof of the variation of the form.

Pre-stressed concrete and assembly units:

Construction systems, systems, use.

1.4 STEEL AND TIMBER CONSTRUCTION

Training and Teaching Aims:

The student will

- be able to resolve statically and constructively simple girders of steel and wood.

Contents:

4th Year :

Construction with steel:

Raw material, standards, binding agents, welding, tension bars and compression bars, bending bars, thrusts, framework girders.

Constructions in wood:

Raw material, standards, binding agents, glue-constructions, tension bars and compression bars, thrusts, framework girders.

5th Year :

Building components:

Plate girder, supports, connections to supports and walls.

Realization and maintenance:

Corrosion and fire protection, transportation, mounting.

Systems:

Constructions of walls, roofs and halls, multiple floor building.

1.5 BUILDINGS AND DESIGN THEORY

Training and Teaching Aims:

The student will

- comprehend the necessary requirements of function and space during the planning of a building,
- get basic knowledge for the shaping of areas, spaces and objects considering material, function and colour,
- plan ecologically and free of barriers.

Contents:

3rd Year :

Living areas:

Organization, allocation, orientation, furniture, requirements of function and space, influences of the environment.

Residential construction:

Single and multiple family houses, concentrated blocks of flats, development forms, community institutions, ecological aspects.

Shape construction:

Measures and proportions, building substance, front.

4th Year :

Commercial buildings:

Tourism, trade, commerce, administration.

Shape principles:

Connection between function, construction, material and form.

Building object:

Analysis, total effect.

Construction draw up:

Inventory-taking and documentation of a building or its essential parts.

1.6 ARCHITECTURAL STYLES

Training and Teaching Aims:

The student will

- be able to interpret the interaction between historical, social, political and ideological requirements,
- be familiar with the shape language of the present and of the past.

Contents:

5th Year :

Elements of the style:

Classification, terms, sketching.

Stylistic periods:

Antiquity, early Christian art, Byzantium, Romanesque period, Gothic, Renaissance, Baroque, Rokoko, 19th and 20th century.

1.7 CIVIL ENGINEERING

Training and Teaching Aims:

The student will

- be able to resolve simple problems of the civil engineering.

Contents:

5th Year :

Soil engineering:

Soil static, building pits, drainage, standard and special foundations.

Hydraulic engineering in settlements:

Determination of requirements, resources, preparation, distribution and storing.

Waste management:

Drainage (systems, measuring) , canalization, purification of the sewage, waste management, deposition, ecology.

Road construction:

Design and construction of simple traffic areas.

1.8 CONSTRUCTION MANAGEMENT

Training and Teaching Aims:

The student will

- be able to determine standardized building substances,
- make descriptions of the power factor and of calculations,
- know the possibility of use and the requirements of maintenance of the machines and the instruments,
- be able to guide a planning of a construction and be able to settle the accounts.

Contents:

3rd Year :

Construction organization:

Project run, areas of responsibility, authorizations for the planning and the realization.

Construction regulations:

Construction laws, protection for the employees, ecology law, register of the lands and public books, approval, disposal of the residues.

4th Year :

Construction machines and instruments:

Different kinds, use, capacity, maintenance, list of the machines (aquisition, use and costs).

Placing:

Standards of contract, catalogue of intend, invitation of tenders, offers, contract, orders.

Quantity and costs:

Determination of quantities according to the standards, need of material, structure and assessment of the costs.

5th Year :

Construction organization:

Project - management (structure, proceedings, planning of the costs and of the dates, controlling), building site set up, operations scheduling, quality guaranty.

Calculation:

First calculation, control calculation, price correction.

Settlement of accounts:

Reductions, management and final account, defects, guaranty.

1.9 SURVEY

Training and Teaching Aims:

The student will

- know perfectly the methods and instruments of the geodesy,
- be familiar with the specific laws.

Contents:

3rd Year :

Terms:

Austrian survey system, measuring units, errors in measuring (kinds, limits).

Length-, position-, height measuring:

Measuring of distances, of horizontal and vertical angles, leveling, instruments, electronic data processing.

Surveying and marking out:

Polygonal draws, draws of the position and the height, determination of the quantity and of the areas, transfer of a sketch into the terrain.

1.10 SKETCHING

Training and Teaching Aims:

The student will

- be able to make drafts according to given programs and to illustrate through simple axonometries and perspectives,
- be able to illustrate simple construction details,
- use specific knowledge by his own and in teamwork,
- be able to present and documentate all necessary steps of the project (literature, programs of the area, of the function and of the final programs, problem analysis, conclusions, valuations, proposals to resolve problems, drafts, time plannings, proceedings, assessments of the costs),
- be familiar with the use of the electronic data processing and CAD,
- be able to use the specific knowledge in a general single or team project,
- be able to use the methods of the planning (drafts, authority, advertisement, assessment of the costs time).

Contents:

5th Year :

Sketching:

Smaller or medium projects, above all a building project (first sketch, sketch, illustrations, proceeding until to the finished project, plannings of the project and the assessment of all theoretic subjects).

Construction:

Illustration of constructive details.

Models:

Simple building subject, working and architecture models.

1.11 CONSTRUCTIONAL PRACTICE

Continuation of the compulsory subject „Constructional Practice“ in section A.

Contents:4th Year :

See section A and in addition:

Drawings according to the plans of a building with multiple floor buildings.

5th Year :

Project(s) from the main points of the curriculum.

1.12 PRACTICAL TRAINING IN CONSTRUCTION ENGINEERING

Continuation of the compulsory subject „Practical training in Construction Engineering“ in section A.

Contents:3rd Year :

Constructions with concrete and steel:

Concrete restoration, concrete cure, system workforms.

Timber construction workshop:

Calculations of different roof truss constructions with special programs of electronic data processing, engineer wood construction.

Secondary trades and trades which are similar to the construction:

Basics of the trade of carpenters, roofers, plumbers, tilers, stucco-workers, panel-worker, pavers, packer, wall-paper worker and fitters of sanitary and electric installations.

Operation scheduling and material storage:

Determination of quantities, dates and requirements, storage and sorting out of building materials, storage, cure and selection of woods, preparation for construction sites, planning of dates and work, organization of the storage, responsibility of the stock, settlement within the enterprise, reports about the processing of the construction, settlement of the school-products and school-sites with the use of modern aids such as electronic data processing.

B.2 CIVIL ENGINEERING

2.1 BUILDING CONSTRUCTION

Continuation of the compulsory subject „Building Construction“ in section A.

Contents:5th Year :

Adaptation and restoration:

Works for security, underpinning, changing, draining, improvements of thermal and acoustic insulation, construction-physically problems.

Joints:

Different kinds of construction, seams, construction seams, packings.

Assembly:

Basics of the construction with assembly units, front panelling.

2.2 STATICS

Continuation of the compulsory subject „Statics“ in section A.

Content of curriculum:3rd Year :

See section A and in addition:

Supporting systems:

System analysis, bar drafts, three dimensional systems, simple supporting arcs.

Loads:

Movable loads, influence lines.

5th Year :

See section B.1.

2.3 REINFORCED CONCRETE CONSTRUCTION

See compulsory subject „Reinforced Concrete Constructions“ in section B.1.

2.4 STEEL AND TIMBER CONSTRUCTION

See compulsory subject „Steel and Timber Construction“ in section B.1.

2.5 BRIDGE CONSTRUCTION

Training and Teaching Aims:

The student will

- be able to build statically and constructively in an autonomous way bridges,
- be able to design construction - drafts for bridges and to guide and supervise the execution.

Contents:

4th Year :

Terms:

Kinds and systems, standards and regulations, construction circumstances.

Construction:

Support, pillars, supporting girders, stores, transition constructions.

5th Year :

Construction and calculation:

Simple bridges supports, equipment for bridges, mounting.

Stock:

Controlling, maintenance, restoration of existing bridges.

2.6 TRANSPORT WAYS CONSTRUCTION

Training and Teaching Aims:

The student will

- comprehend the traffic problems,
- know the technical basics of the projecting and of the planning of main traffic courses,
- be able to elaborate in an autonomous way simple projects and be able to make proper drafts.

Contents:

4th Year :

Traffic technics:

Means of transportation, traffic of goods and persons, „resting“ traffic, requirements of energy, capacity, ecology.

Constructions of the „resting“ traffic.

Tracing (routes, cross section).

Construction of railways and roads:

Soil, substructure and final construction, draining, planting and maintenance.

5th Year :

Construction of railways and roads:

Calculation of location lines , determination of the quantities, assessment of the costs, subways and overpasses, bridges, galleries and tunnels.

Special drafts:

Railway stations, airports, docks, traffic systems, traffic in the cities, acoustic insulation, installations for conduction and security, management of the transportation, special railways.

2.7 SOIL AND HYDRAULIC ENGINEERING

Training and Teaching Aims:

The student will

- be able to realize simple statical calculations concerning the soil and hydraulic constructions,
- be able to recognize the constructions in common use of soil and hydraulic construction,
- realize simple projects concerning the water supply and the disposal of the sewage,
- make proper plans of such projects and guide and supervise the realization.

Contents:

3rd Year :

Soil engineering:

Standards and regulations, characteristic physical values.

Soil statical calculations:

Setting, earth pressure, hydrostatic pressure, land register, foundations.

4th Year :

Building pits:

Supports, draining.

Soil construction:

Slopes, tunnels

Protection - hydraulic - engineering:

Protection of floods, protection of torrents and avalanches, calculation courses.

Hydraulic constructions:

Hydraulic, water pressure, water supply, river - regulation, water catchment, hydroelectric power stations, transport on the water.

Environmental technology:

Ecology of buildings, natural hydraulic measures, deposals.

5th Year :

Water supply:

Duties and constructions of the supply with drinkable water (requirements, production, preparation, storage, supply, distribution), project, regulations for the execution and for the supervision.

Disposal of the sewage:

Duties and constructions (quantities, properties of the sewage), draining proceedings, canalization projects, installations for the cleaning of the sewage (mechanical, biological, chemical), treatment of mud.

Deposal of waste:

Deposal, compostition, regulations for the execution and the supervision, environmental sociability.

2.8 CONSTRUCTION MANAGEMENT

See the compulsory subject „ Construction Management,, in section B.1.

2.9 SURVEY

Training and Teaching Aims:

See the compulsory subject „Survey“ in section B.1.

Content of the curriculum:3rd Year :

See section B 1 and in addition:

Transfer of the drafts of main transport ways into the terrain, supervision of buildings (extensions, settings).

2.10. CONSTRUCTIONAL PRACTICE AND PROJECTS

Continuation of the compulsory subject „Constructional Practice“ in section A.

Training and Teaching Aims:

The student will

- be able to use the specific knowledge in a general single or team project,
- be able to use the methods of the planning (drawing, presentation, catalogue of intend, assessment of the costs, time).

Contents:5th Year :

Calculations and drafts of this special focus, interdisciplinary project(s) of medium size.

2.11 PRACTICAL TRAINING IN CONSTRUCTION ENGINEERING

Continuation of the compulsory subject „Practical Training in Construction Engineering“ in section A.

Contents:3rd Year :

See section B.1.

B.3 RESTORATION AND URBAN RENEWAL

3.1 BUILDING CONSTRUCTION

Continuation of the compulsory subject „Building Construction“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- be familiar with the historical methods of timber, natural stone and steel construction.

Contents:5th Year :

Works of adaptation and restoration:

Securing works, underpinning, replacement, draining, measures for the physical improvement, new construction in historical buildings.

Exterior areas:

Surface design, exterior stairs, garden, fencing.

Space sizes and requirements:

Simple plans of buildings, functional connections.

3.2 STATICS

Continuation of the compulsory subject „Statics“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- be able to analyse timber, natural stone and steel constructions, considering the standardized load capacity and if necessary reinforce or remeasure it.

Contents:

4th Year :

See section A and in addition:

Girder systems:

Systems, forms of girders, arches and vaults.

Reinforced concrete, steel and timber constructions:

Technology, standards, constructions, binding agents, ceilings, roof truss, wood girders.

5th Year :

Historical girders:

Kinds of supporting masonry, piers, arches, vaults, ceilings, roof trusses, timber girders.

Changing the building stock:

Measures for the restoration, replacement, reinforcements, underpinning, supports, plans, constructions according to the adequate material, economy.

3.3 BUILDING MAINTENANCE AND RESTORATION, MONUMENTS PRESERVATION

Training and Teaching Aims:

The student will

- know the methods and the materials used for the maintenance and preservation of buildings considering old mechanical technologies and historical ways of building,
- be able to choose the appropriate methods and materials for the conservation of monuments,
- be able to take advantage of all possibilities and standards of the preservation of monuments,
- know the methods of the modern preservation of monuments and act accordingly.

Contents:

3rd Year :

Soil mechanic, soil stabilization, injections.

Historical foundations:

Kinds, foundation, securing underpinning.

Historical masonry:

Clag, brick, brick-lined masonry, construction of ashlar masonry, cut-stone masonry.

Arches:

Kinds, technology, security.

Masonry moisture:

Causes, additional seal, treat with salts, dehumidification, demineralization.

Cornices:

Constructions, cornices works, templates.

Building material:

Natural stones, wrought iron, cast iron, replacement materials.

4th Year :

Preservation of monuments:

Terms, history, values, federal office for the preservation of monuments and its proceedings, legal standards (national regulations, The Hague Convention, Austrian provincial laws).

Practical preservation of monuments:

Analysis of damage, planning of improvements, measures, application- and technical-checkup-methods (kinds, methods, technics).

Wooden beamed ceilings:

Historical constructions, reinforcements, restoration.

Historical plastering:

Kinds, production, strengthening, demineralization, dehumidification, remedial plaster.

Coatings:

Paintings, colouring technics, historical technics and materials , rust protection.

Doors, portals and windows:

Forms and development, historical constructions, metal fittings, wrought iron works, surfaces, restoration.

Floors:

Historical under floors (loam, terrazzo, stone, wood) and floors, defects, restoration, surface, treatment.

Roof truss and roofing:

Historical forms, reinforcements, restoration, historical roofing materials.

Building materials:

Timber, glass, historical materials, defects, wood preservation.

5th Year :**Restoration works:**

Replacement of constructive components, shoring and bracing, timber constructions (protection, reinforcements), physical improvements (acoustic and thermic insulation), restoration of concrete (historical materials, constructive reinforcements), iron structures (historical material, constructive reinforcement), attic flats in historical buildings.

Decorations:

Decorative elements, ornaments, architectural plastics and ceramics, terracotta, enamel works, wood panels, wall coverings, wallpapers, stucco work, marble, stucco - lustro , gold plating, moulding (casting, material, technics).

Preservation work:

Surface treatment of building components, restoration of plasterwork, conservation of natural stones (weathering, complementation), reinforcements, hydrophobation, substitute building materials.

Building materials:

Synthetic materials, clay, stoneware, reinforcement materials.

Restoration of mobile cultural objects:

Types, methods, techniques.

3.4 EXAMINATION, DOCUMENTATION AND SURVEYING OF BUILDINGS

Training and Teaching Aims:

The student will

- independently survey and in addition draw up a building,
- describe, date and document the surveyed objects.

Contents:**3rd Year :****Surveying and evaluation:**

Manual, geodetic and photogrammetric methods, plan drawing (ground plans, elevation, sections, details).

Surveying:

Terms, measuring methods, real surveying and staking out.

4th Year :**Assessment of surveyed objects:**

Historical, technical and economic analysis and evaluation, carry out of space books, description of constructive conditions.

Documentation:

Description, diagnosis, evidence keeping, inventory, economic efficiency.

3.5 ARCHITECTURAL STYLES

Training and Teaching Aims:

The student will

- be able to interpret the interrelation of social, economic, political and creative situations in the course of the European history,
- know the characteristics of architectural styles, the historical terms and examples, and will be able to apply this knowledge to practical tasks,
- realize and sketch regional different and art-historical forms and elements.

Contents:

3rd Year :

Stylistic elements:

Structure, terms, architectonic theory.

Stylistic periods:

Mesopotamia, Egypt.

4th Year :

Stylistic periods:

Crete, Mycenae, Greece, Rome, early Christian art, Byzantium, Romanesque period.

5th Year :

Stylistic periods:

Gothic, Renaissance, Baroque, Rococo, 19th and 20th century.

3.6 HISTORICAL URBAN DEVELOPMENT AND RENEWAL

Training and Teaching Aims:

The student will

- know the historical, economic, aesthetic, cultural and art-historical criteria and the connections of historically grown, especially Austrian cities,
- cope with technical tasks of the present preservation of historical monuments in urban and regional planning in historically grown urban structures,
- know the planning methods used in urban renewal,
- be able to determine the actual condition of buildings and to categorize them culturally, economically with regard to their fabric,
- know the possibilities of urban agglomeration and renewal, revitalization and renovation with regard to special regional forms as well as complexes and protective areas, technical preservation of historical monuments and economic efficiency.

Contents:

4th Year :

Urban development:

Antiquity (model towns of Greeks, Romans); Middle ages (development of regional planning, development of functional urban development); Renaissance (model cities in Italy, France, Germany, realization of utopias); Baroque (important references and axes in urban development in France, Spain, Italy, Germany); 19th and 20th centuries (industrial revolution, post-liberal and garden and modern cities).

Urban in development in Austria:

Foundation, types, historical cities and complexes, capitals.

5th Year :

Construction forms:

Forms of residential and farm houses, design characteristics (building materials, function, region); urban residential forms in the course of times, integration, historical examples.

Types of settlement:

Development of villages (typologies, optic design characteristics, technical and functional characteristics); urban evolution development and design (inventory, new city centers, protective zones, development and restoration programs); traffic (development, integration, deficits, town center).

Urban tool-kit:

Squares and road spaces, axes, green areas, pedestrian areas, references, distances, construction deficits and repair.

Legal standards:

Guidelines, construction laws, plan for house building and zoning plan; regional plans, guidelines for complex protection, revitalization.

3.7 CONSTRUCTION MANAGEMENT

See the compulsory subject „Construction Management“ in section B.1.

3.8 MODELLING

Training and Teaching Aims:

The student will

- independently produce models based on plans.

Contents:

5th Year :

Basics:

Materials, tools, techniques.

Models:

Architectural models, decorative building sculptures, castings.

3.9 LABORATORY

Continuation of compulsory subject „Laboratory“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- be able to choose, analyse, measure, examine and document independently the interventions corresponding to the respective damage, i.e. the techniques of restoration, preservation and strengthening frequently used in modern preservation of historical monuments.

Contents:

4th Year :

Plasters:

Analysing, cleaning, strengthening, demineralizing, backfilling, preserving, complementing, water repellent finishing.

Surfaces (paints and coatings):

Analysing, cleaning, complementing, cementing, strengthening, preserving, impregnating.

Stone:

Cleaning, strengthening, demineralizing, preserving, complementing.

Timber:

Cleaning, strengthening, wood protection, preservation, complementing.

5th Year :

Chemical analyses:

Building components, building material.

Stucco:

Analysing, cleaning, strengthening, backfilling, preserving, complementing with stucco marble, marmorino and stucco-lustro.

Metal improvement:

Cleaning, preserving, coating.

Gilding:

Analysing, cleaning, preserving, complementing (on all grounds).

3.10 CONSTRUCTIONAL PRACTICE AND PROJECT

Continuation of compulsory subject „Constructional Practice and Project“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- be able to draw up standardized building and working plans independently regarding the principles of the preservation of historical monuments, and to sketch first drafts based on given space requirements.

Contents:

5th Year:

Interdisciplinary project(s) of medium size.

3.11 PRACTICAL TRAINING IN CONSTRUCTION ENGINEERING

Continuation of compulsory subject „Practical Training in Construction Engineering“ in section A.

Contents:

3rd Year:

Masonry:

Historical plasters and plastering techniques (fresco, secco, palladians, structures).

Stone-masonry and artificial stone works:

Facade parts; stencils; smoothing and polishing of surfaces and profiles.

Stucco works:

Drawing of profiles and cornices by means of stencils; surface design (collaring, felting, scraping, washing, polishing, smoothing, filling); casting; shaping, modelling and cutting of ornamental workpieces.

Painting and coating:

Historical applications; production of settings and coatings.

Roof covering:

Historical roof coverings with different materials and roof forms (arris and valleys).

Preparation of shingles, shingling, plumbing works.

Joinery:

Basic knowledge of the making of doors, windows and frame, panels, partition walls; surface treatment.

Preparations for work and materials storage:

Determination of demand; storing and assorting of building materials; site installations and organization. Planning of schedule and operations.

B.4 ENVIRONMENTAL TECHNOLOGY

4.1 BUILDING CONSTRUCTION

Continuation of compulsory subject „Building construction“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- deliver general concepts, address site problems and the integration of buildings into the natural environment,
- assess and organize construction projects regarding environmental impact, the economical use of energy and the principles of biological engineering.

Contents:

5th Year:

Building project run:

Tasks, competences and responsibilities of the authorities and persons involved in the building project; site optimization (infrastructure, landscape protection, environmental impact); approval.

Construction management:

Invitation to tenders, calculation, offer and acceptance; placing of order; schedule, control of construction, liability, guaranty works.

Survey:

Cadastral engineering, topographic survey, plan of building location.

4.2 STATICS

Continuation of the compulsory subject „Statics“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- know in theory the fundamental principles of the mechanical calculation in mechanical engineering.

Content of curriculum:

4th Year :

See section A and in addition

Introduction into soil mechanics:

Ground statical calculations.

5th Year :

Timber, steel and reinforced concrete building construction:

Fundamentals, measurement and construction of columns, girders, boards and walls; outlines in prestressed concrete design, assembly units, Austrian standards (ÖNORM).

4.3 APPLIED BIOLOGY

Training and Teaching Aims:

The student will

- be able to understand the function of organisms, the whole biotop area and the importance of a healthy environment, point out natural and environmentally-friendly building methods and a balance between nature and technical influences, convey the fundamentals of waster water engineering, waste disposal and air pollution control,
- know the fundamental principles of vegetable and animal organisms, their cells, tissues and organs and their biological and physiological life-forms, regularity of genetics and have sufficient knowledge of general microbiology and be able to assess the importance of micro-organisms in the natural environment,
- be able to assess changes of environmental on fauna and flora, have intensive knowledge of the habitats soil and water, know correlations between organisms and the environment and how to protect them and apply this knowledge to building projects.

Contents:

3rd Year :

General principles:

Animate and inanimate material; vegetable and animal organism.

Science of cells and tissues:

Vegetable and animal cells; cell division, cell colony - tissue (vegetable developing and permanent tissue, basic forms of animal tissue) - organ (basic vegetable organs, animal and human organs); ingestion, transfer and storage of substances in plants with respect to the corresponding organs; water management.

Composition of organic substance:

Importance of organs and organella.

Decomposition of organic substance:

Forms of dissimilation (respiration, fermentation, decaying); importance of bacteria and fungi in the materials cycle of nature.

Life:

Evolution and dissemination of life, geological history, theory of evolution.

Stimulus physiology of plants:

Movement and growth.

4th Year :

Reproduction and propagation of animals and plants:

Forms of unsexual and sexual reproduction; reproduction organs and behaviors; comparisons with human beings.

Microbiology:

Micro-organisms and thallophyta; cytology, morphology, physiology and propagation of the major budding, mould and split fungi; essential groups of bacteria in the medical, saprophytical and industrial field, virus, phages and rickettsiae; micro-organisms for the waste water treatment.

Overview of fauna and flora:

species, locations, conditions of life.

The soil as habitat:

Fundamentals of pedology, soil-air-water cycles, life in soil.

The water as habitat:

Fundamentals of hydrobiology, water pollution (organic, chemical); effects of harmful substances.

Organism and the environment:

Substance cycles and flow of energy, biological balance, natural and artificial environment, adaptation as process and condition, convergence phenomena, biorythme, effects of harmful substances on organisms.

4.4 ECOLOGY, CONSTRUCTION ECOLOGY AND METEOROLOGY

Training and Teaching Aims:

The student will

- know the regularities of the natural environment and be able to assess the impact in the event of changes of the exterior conditions,
- know the fundamental principles of meteorology, weather, influence of the weather on nature and the effects of environmental changes on the atmosphere,
- be able to have an influence, based on the knowledge of biology, by means of cultivation and use,
- learn - through the knowledge of the correlation „natural environment“ - „artificial environment“ - „pollution of the environment“ - „weather factors“ - „climate“ - to adapt building measures to the natural circumstances, to assess and to minimize the effects of harmful substances in order to protect the biodiversity of the natural environment.

Contents:

3rd Year :

Meteorology:

Atmosphere; thermal conditions of the air (air temperature, air humidity, air pressure, air movement); meteorological measurements, interpretation of measurement data (heating degree-days, cooling degree-hours).

4th Year :

Ecology:

Ecological balance, biotope; cultivation of natural environment (agriculture, grassland culture, wood culture, fertilizing, ground assessment, land consolidation); pollutants and pollutant immission (effects on water, soil, air, human being, plant, animal); environmental planning criteria (industrial sites, traffic, residential areas, leisure facilities, tourism facilities); immission assessment, observation of the environment, environmental measuring, immission cadastre, protective measures; environmental accidents (assessment, environmental redevelopment and rescue measures).

Construction ecology:

Building material and building constructions adapted to the needs of human beings, climate and ecology (production, application, possible reutilization, disposal); building culture (compact, restful determination of building sites; tradition and energy critical construction style; radiation influences).

Environmental impact assessment.

5th Year :

Regional development:

Zoning plan, use of areas, protected areas.

Grassland design:

Urban and regional grassland, leisure facilities, cultivation plans, natural habitats, recultivation measures.

Natural building measures:

slope protection and avalanche protection, wind protection, river bank protection, creation and preservation of biotopes.

4.5 BASICS OF THE ELECTRICAL AND CONTROL ENGINEERING

Training and Teaching Aims:

The student will

- be able to apply the fundamental principles of electrical engineering and electronics as well as the corresponding legal regulations and standards with respect to technical machines and equipment used for buildings, plants and environment techniques,
- know how equipment and electrical powers work, know the common procedures for measuring, regulating and controlling electrical and nonelectrical quantities and to be familiar with interfaces to microelectronics,
- be able to take the required dimensioning measures.

Contents:

3rd Year:

Applied direct current, alternating current and rotary current engineering:

Electrical circuits; composition of electric machines and how they work; selection, connection and dimensioning of electrical powers.

Protective measures in electrical installations:

Extra-low voltage, fuse disconnectors, protective insulation, protective earthing, earthing, residual current operated device.

Fundamental principles of electronics:

General electronic components, semiconductor components; fundamental components of digital engineering; component groups of electronics.

Measuring technology:

Quantities and units; measuring of electrical quantities (current, voltage, resistance, power, work); measuring of nonelectrical quantities (temperature, humidity, flow, heat, pressure, power; gas analysis, air and water pollution; radioactivity); measuring instruments (non-registering electric measuring instruments; recorder, data-logger, point printer); error of measurement and measuring uncertainties.

Regulation engineering:

Contact control system, electric control systems; circuit diagram (detailed wiring diagram, flow diagram, wiring diagram); hydraulic and pneumatic control systems.

Fundamental principles of control engineering:

Autolevellers and control units (including behaviour and constant-current characteristic); single-loop and multi-loop control system; placing of final control elements, optimal adjustment of control unit; cascade control.

4.6 TECHNICAL BUILDING INSTALLATION AND ENERGY PLANNING

Training and Teaching Aims:

The student will:

- know the composition, construction types, application fields, mode of operation, function and operating behaviour of the different technical building installations as well as their relevant legal regulations and standards,
- acquire the ability to develop an optimal energy concept for a given problem of technical building installation, which takes into account all aspects of engineering, profitability, environmental impact and the reasonable use of energy,
- plan modern energy techniques with special consideration of renewable energies (solar and biogas installation, heat pumps, block power station, district heating, heat and power co-generation) and in complex and according to the latest technical developments economically and ecologically optimal solutions which are adapted to the Austrian energy and environment conditions,
- to take the required dimensioning measures.

Contents:

4th Year:

Energy planning:

Combination of building systems, thermal insulation, energies and heating systems.

Heating systems:

Individual heating, central heating, active and passive solar system, heat pump, biomass, biogas, multi-valency systems, district heating and heat and power co-generation plant.

Principles of calculation:

Heating load and annual heat demand of buildings; room air conditions and comfort, minimum outer air volume flow; dimensioning of heat-emitting systems; hydraulic calculation of pipes and final control elements.

Fuels:

Planning, properties, availability.

Combustion process:

Chemical and physical partial processes; exhaust emission control.

Firing places:

Gas firing, oil firing, solid fuel firing and especially wood firing.

Boiler plants:

Heating boiler, heat exchanger, steam generator, flow heater, coater-boiler; construction types, function, exhaust gas cleaning, operating performance, adjustment, heat calculation; steam boiler prescription, environmental protection requirements.

Installations technology:

Pumps, water supply, waste water disposal, gas supply.

5th Year :**Energy planning:**

Heat recovery (residential building, trade, industry, agriculture); energy saving measures.

Ventilation, climate and refrigeration technology:

Systems and components (draft, calculation, sound insulation, control techniques), industrial suction, heat recovery, refrigerator, calculation of refrigerating load.

Applied regulation engineering:

Heating, ventilation and climate autoleveller; regulation of multi-valency heating systems; exhaust gas control; process automatization; microcomputer systems, interfaces, central process control technique.

Electrical installations:

Current supply for households; high-voltage protector; telephones and intercoms.

Other installations:

Waste disposal; transportation systems, elevators; gates and loading facilities.

4.7 HYDRAULIC ENGINEERING AND WATER POLLUTION CONTROL

Training and Teaching Aims:

The student will

- gain basic knowledge of natural water reserves and the subsoil and learn to optimize their reasonable use technically, economically and environmental technologically,
- get familiarized with the construction methods and the most common calculation methods in water management in order to erect and assess construction designed for the protection, for use of water and for the protection against harmful effects,
- know the required building regulations and guidelines and to be able to apply them,
- take efficient measures for the protection and redevelopment of waters and the environment.

Contents:**3rd Year :****Subsoil:**

Types of soil and rocks, properties, soil mechanical parameters.

Water:

Properties, reserves, hydrogeology.

Hydrography:

Measuring instruments, measurements, preparation of measuring data.

Hydrology:

Precipitation, discharge, evaporation; peak values; hydrograph curve, precipitation-discharge relationship.

Water management:

water supply, water demand, water distribution, water economy; water economy plans, fishing.

Water in the soil:

Slope water, slumps, securing of slope, ground and mountain water.

4th Year:**Hydraulics:**

Laws with respect to open paddle holes, pipe flow and ground water.

The obstruction of torrents and avalanches:

Danger zone plans, erosion, mudflow, planning criteria.

The construction of rivers:

Planning criteria, natural obstruction methods, bed load carried by a stream and suspended matter, ice, river banks and flood protection, fundamental principles of water way engineering.

Hydroelectric power station:

Systems, construction methods, construction components, equipment, operation, location planning, environmental impact.

5th Year:**Water supply:**

Water reservoirs, storage, water treatment, distribution.

Waste water disposal:

Canal, sewage treatment plants, waste water treatment, industrial water disposal.

Agricultural water engineering:

Irrigation and draining methods, plant parts, operation.

Water protection:

Biological, chemical and thermal water control, water consolidation.

Environment and economic efficiency:

Cost-effectiveness analysis of water constructions, impact of plannings on the natural environment, principles of regional development, general planning concept, environmental impact.

4.8 AIR POLLUTION CONTROL

Training and Teaching Aims:

The student will

- be able to establish a connection between applied procedures for air pollution control in theory and practice with economic facts and legal requirements,
- be able to meet the requirements of individual industrial branches, considering the minimization of pollutants.

Contents:**4th Year:****Basis:**

Physical, chemical, biological and hygienic principles of dustlike, fluid (aerosol) and gaseous air pollutions, olfactory substances, segregation of solid impurities (centrifugal force filter, cloth filter, electrostatic filter, washer).

5th Year:**Separator:**

Aerosol separation, separation of gaseous components (washer, spray crenellate, adsorption and absorption, chemical binding, catalytic division, post-combustion) impurity, special procedures, disposal of cleaning products, minimization of harmful effect.

4.9 WASTE MANAGEMENT AND RECYCLING

Training and Teaching Aims:

The student will

- have knowledge of type, composition and quantity of waste from households, trade and industry and be able to assess its impact on the environment in the sense of a well-ordered waste management,
- be able to plan a well-ordered storage and disposal avoiding damages to the environment,
- know the principles of recycling of materials and the function, economic efficiency and energy use of recycling plants.

Contents:

5th Year :

Waste:

Household waste, commercial and industrial waste, special waste, danger materials (composition, quantity, impact on the environment).

Waste management:

Waste minimization, waste disposal systems, waste transport, safety instructions.

Waste piling:

Garbage dump (planning, construction, recultivation), storage for used materials, special waste storage (safety instructions).

Waste disposal plants:

Incineration plants (planning, construction), residue storage and recycling.

Recycling:

Reusable materials (types, material technology, utilization possibilities, treatment); building recycling (demolition, preparation, reutilization of building materials); recycling plants.

4.10 WORKSHOP

Training and Teaching Aims:

The student will

- be able to use and maintain the facilities, tools, machines and devices,
- know the properties and the processing and utilization possibilities of the essential process materials,
- be able to independently produce relevant products conforming to standards, from drawings conforming to standards,
- know and respect the relevant safety instructions and instructions for the prevention of accidents.

Contents:

3rd Year :

Mechanical basic training:

Workshop rules, general prevention of accidents; fundamental and mechanical working techniques for processing relevant materials, taking into account certain tolerances and quality standards.

Sheet metal:

Sheet metal working machine, section shearing machine, pneumatic, hydraulic and electrical tools; sheet metal unwinder, spot welding, glueing; workshop exercises with pipes in climate and ventilation installation; insulations.

Welding:

Safety instructions, gas welding, arc-welding (edge preparation, butt weld, fillet weld, corner weld in various work piece densities and positions; single run welding, multiple layer welding; avoidance and disposal of weld seam errors); hard soldering, electric resistance welding, torch cutting; thin metal sheet welding, pipe welding, overhead welding, butt-welding with reflectors.

Gas, water and heating installations:

Pipe threading, pipe connections, sealing and protective insulation, soldered joints and clamping joints; placing of supply, discharge and exhaust gas pipes; removal of faults in pipes (supply, discharge and exhaust gas pipes) and installations; connecting of water supply facilities, heatings and sanitations; density check; mounting (assembly and

adjustment of installations and tools of the heating, ventilation, climate and refrigeration engineering); initial operation, operation checkout, special safety instructions.

Plastics processing:

Processing and shaping of thermoplasts, duroplastics, elastomeres.

Work preparation and material storage:

Orders, workshop drawings, schedule, precalculation and post-calculation of orders, work control.

4.11 LABORATORY

Continuation of the compulsory subject „Laboratory“ in section A.

Contents:

4th Year :

Exercises covering issues from the compulsory subjects „Technical Building Installation and Energy Planning“, „Basics of Electrical and Control Engineering“, „Hydraulic Engineering and Water Pollution Control“ and „Applied Biology“.

5th Year :

Exercises covering issues from the compulsory subjects „Applied biology“, „Air Pollution Control“ and „Waste Management and Recycling“.

4.12 CONSTRUCTIONAL PRACTICE AND PROJECT

Continuation of the compulsory subject „Constructional Practice and Project“ in section A.

Contents:

5th Year :

Interdisciplinary projekts(s) of medium size.

B.5 CONSTRUCTION INDUSTRY

5.1 BUILDING CONSTRUCTION

See section B.2.

5.2 STATICS

See section B.1.

5.3 REINFORCED CONCRETE CONSTRUCTION

See section B.1

5.4 STEEL AND TIMBER CONSTRUCTION

See section B.1.

5.5 ACCOUNTANCY

Training and Teaching Aims:

The student will

- be able to account standard business transactions with conventional practices and on computer,
- be familiar with the most common cost accounting systems and be able to make calculations with and without PC,
- know perfectly the personnel accounting including bookkeeping and correspondence.

Contents:

4th Year :

Function of accounting:

Terms; structure and task of accounting; legal basic; records; bookkeeping systems.

Double-entry bookkeeping system:

Term and characteristics; books, uniform system and chart of accounts; entry of business transactions with and without EDP (entry of sale and purchase of goods; postage, returns; price discounts, cash discount, payment without bill of exchange; taxes, salaries and wages); annual accounts; balance (assessment principles, assessment of goods, materials and plants, depreciation) with and without the help of computers; capital reserves; assessment of receivables, retained earnings.

5th Year :

Cost accounting:

Tasks and position within accounting; notion and types of costs, cost dependency; full costs, partial costs, actual costs, standard costs; cost centre costing (formation of costs, cost center plan, operational accounting); cost unit costing (division calculation, supplement calculation); internal performance accounting, assessment of half-finished and finished goods; contribution margin method, critical quantity.

Organization of accounting:

Division according to amount of work and size of the company, EDP.

Accounting as a basis for corporate decisions:

Interim closing, profit and loss account, cash-flow, financial plan, product program, production procedures, identification of profit and loss sources, correlation between market changes and investment decisions, warehousing; cost accounting as a tool for decisions of price policy and as a rationalization instrument.

5.6 COMPANY ORGANIZATION

Training and Teaching Aims:

The student will

- know the tasks and structure of economic operations and building sites,
- independently solve organizational tasks in the operation,
- know the findings of industrial and social psychology which are essential for the cooperation within the company,
- recognise and analyse individual psychological differences, motives of behaviour and conflicts of interest and to overcome them with conflict management techniques,
- know adequate modes behaviour with colleagues, superiors, staff members and customers,
- support the group objective when working in group, recognise and fulfil the role most suitable for him and respect the work of others.

Contents:

3rd Year :

Nature of company organisation:

Order character; structuring of organisation and processes (department, position, authority, function); planning and examination of processes.

Operational performance:

Definition of terms (service, payment in kind); warehousing (determination of certain storage figures, calculation of ratios, costs of storage); transport (internal transport of materials and information, optimal choice of types and ways); processing (processing procedures, planning, preparation, program); organization, correspondence.

Types and means of the organisation:

Questions regarding the organisation, types of organizations, use of means.

Social and industrial psychology:

Needs of work-force; individual motives and motivation, individual and group behaviour; satisfaction with work, working ethic, working atmosphere; types of internal communication, decision-making and conflict management; motivation of groups, psychological preparation for use of EDP; complex psychological problems in personnel management; selection criteria, aptitude test; personnel assessment, equality of payment (assessment of work, salary schemes).

Rationalisation:

Methods (individual discussion, written questioning, conference method, work and time studies); identification of priorities, schematic and individual phases; possibilities and dangers of automation; initiation of examination and structuring work (analysis of tasks, synthesis of tasks, jobs and processes); implementation of rationalisation measures.

General organisation model:

Matrix organisation, product management; teamwork and project management (solution of special tasks, committees, project-oriented matrix organization).

Management concepts:

To set objectives and to reach them; leadership techniques, ways of leadership; management information through the use of EDP.

5.7 PROJECT DEVELOPMENT

Training and Teaching Aims:

The student will

- know methods of planning and supervision of building projects,
- be able to observe the relevant standards for the implementation of projects and to use symbolic and graphic descriptions as well as tools,
- be able to support the group objective by problem-handling in group work and to realise and to fill the role most suitable for him,
- handle conflicts and take responsibilities.

Contents:

4th Year :

Project planning:

Setting objectives, competences, power of attorney, team building, coordination with all departments of the company; fixation of duties, documentation standards, schedule, control of work progress, reporting.

Planning phases:

Project analysis (first study, determination of requirements), product development (projecting in outline and detailed projecting), product introduction (implementation preparation, implementation).

Planning methods:

Methods of determining and analysing actual situations, structuring methods, methods for graphic process description, decision tables; computer-aided project planning.

Communication:

Work instruction, organization manual, operating instructions.

Case studies:

Small projects from the fields of business management and plant organisation.

5th Year :

Case studies:

Projects in construction planning (structure plans, cost planning methods, allocation of means, arrangement relations, desired processes, actual processes, effects, evaluation).

Projects in construction implementation (structure and organisation of processes, time management, planning of time limits, capacity management, planning of availability of means, cost analysis, array relations, desired process, actual process, effects, evaluation).

5.8 CIVIL ENGINEERING

See section B.1.

5.9 CONSTRUCTION MANAGEMENT

Training and Teaching Aims:

The student will

- know the regulations of administrative, civil, commercial, social, industrial and criminal law as well as of building law required for the management of a building operation,
- be able to work with laws and legal comments and public registers,
- invite tenders for building projects, calculate, run, supervise, account and deliver them,
- be familiar with the correspondence of the construction management,
- know the common types of building equipment and their use.

Contents:**3rd Year :****Building law:**

Tsks, competences and responsibilities of authorities and persons involved in the building project; law of administrative procedures; land register, land cadaster, public books; area planning; building codes, construction engineering law and regulations; environmental law and other construction-related laws.

Public subsidies:

Subsidies from the federal government, provinces, municipalities and others.

Corporate law:

Term of merchant; types of corporations; registrar of companies; trading regulations; certificate of qualification for building trade; civil engineering law; engineering law.

Contract law:

Formal aspects (finalisation and content of contracts); contract of sale; work contract and other contracts.

Standards law:

Binding character; general standards, building standards and allocation standards.

4th Year :**Allocation:**

Allocation (invitation to tenders, offer, acceptance); list of obligations; reporting (building book, daily building report); accounting (building accounting procedure, determination of dimensions and quantity, invoicing); takeover, liability, guarantee, technical documentation.

Building equipment:

Machines and tools for overground workings, construction of roads, bridges and tunnels; Austrian list of building equipment; determination of performance of production chains.

Determination of total construction costs:

Determination of surfaces and volumes in overground workings; assessment of components, cost estimate.

5th Year :**Calculation:**

Calculation of offer, postcalculation, additional offer; conversion of variable prices.

Planning of building process:

Work preparation; planning of building time; equipment of building site.

Employee law:

Working constitution, working hours, work contract, collective agreement, salary; employee protection, protection of construction workers.

5.10. SURVEY

See section B.1.

5.11 CONSTRUCTIONAL PRACTICE AND PROJECT

Continuation of the compulsory subject „Constructional Practice and Project“ in section A.

Training and Teaching Aims:

See section A and in addition the student will

- carry out construction drafts based on given space requirements independently, as well as simple axonometric and perspective sketches,
- draft simple construction details,
- be able to apply his knowledge of different subjects to a small project by himself or to a bigger project in self-organized teamwork,
- be able to document and present all partial steps necessary for the project (literature study, area, function and objective program, problem analysis, conclusions, assessments, proposals for solution, drafts, planing of schedule and operation, cost estimate).

Contents:5th Year :

Calculations and drawings with regard to the special focus; interdisciplinary project(s) of medium size.

5.12 PRACTICAL TRAINING IN CONSTRUCTION ENGINEERING

Continuation of the compulsory subject „Practical Training in Construction Engineering“ in section A.

Contents:3rd Year :

See section B.1.

MANDATORY WORK PLACEMENT**Training and Teaching Aims:**

The student will

- be able to apply the knowledge and skills acquired in theory lessons and practical training programmes to actual business practice.

Organisation and Contents:

Mandatory work placement must last for at least eight weeks; it is advisable to split it into two four-week periods, however. The first part shall mainly comprise handicraft activities, while the second one should provide experience in engineering or business organisation. Preparation and review of mandatory work placement has to include issues on social and labour legislation.

The student has to hand in a mandatory work placement report to the head of the department documenting his activities and acquired skills.

C. OPTIONAL SUBJECTS, NON-OBLIGATORY PRACTICE
AND TUTORIALS

C.1 OPTIONAL SUBJECTS

SECOND MODERN LANGUAGE

(French, Italian, Spanish, Serbo-Croatian, Hungarian). Compulsory subject English shall apply analogously.

C.2 NON-OBLIGATORY PRACTICE

PHYSICAL EDUCATION

See Federal Law Gazette 37/1989

C.3 TUTORIALS**Training and Teaching Aims:**

Students who show a contemporary performance drop, but are principally qualified and prepared to work, will be provided with knowledge and skills needed to achieve training and teaching aims.

Contents:

Contents of the corresponding compulsory subject shall apply analogously; they are limited to repetitions and exercises.

