ASIIN Seal & European Labels

Accreditation Report

Bachelor's Degree Programme and Master's Degree Programme
Civil Engineering

Provided by
University of Zagreb

Version: 28.09.2018

Table of Content

A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Sveučilišni pred-diplomski studij građevinarstva	Bachelor of Civil Engineering	ASIIN, EUR-ACE® Label	2012-2018 by ASIIN	TC 03
Sveučilišni diplomski studij građevinarstva	Master of Civil Engineering	ASIIN, EUR-ACE® Label	2012-2018 by ASIIN	TC 03
Date of the contract: 04.04.2017 **Submission of the final version of the self-assessment report:** 01.06.2018 **Date of the onsite visit:** 25.-26.06.2918 **at:** Zagreb				
Peer panel: Dipl.-Ing. Alfred Barillas, TSB Ingenieurgesellschaft mbH Prof. Dr.-Ing. Mike Gralla, Technical University Dortmund Izabela Krnjus (Student), University of Rijeka Prof. Dr.-Ing. Guenter Schmidt-Gönner, University of Applied Sciences Saarland				
Representative of the ASIIN headquarter: Dr. Michael Meyer				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used:				

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes.

[2] TC: Technical Committees for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering; TC 02 - Electrical Engineering/Information Technology; TC 03 - Civil Engineering, Geodesy and Architecture; TC 04 - Informatics/Computer Science; TC 05 - Physical Technologies, Materials and Processes; TC 06 - Industrial Engineering; TC 07 - Business Informatics/Information Systems; TC 08 - Agriculture, Nutritional Sciences and Landscape Architecture; TC 09 - Chemistry; TC 10 - Life Sciences; TC 11 - Geosciences; TC 12 - Mathematics; TC 13 - Physics.

European Standards and Guidelines as of 15.05.2015 ASIIN General Criteria, as of 10.12.2015 Subject-Specific Criteria of Technical Committee 03 – Civil Engineering, Geodesy, Architecture as of 28.09.2012	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[3]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Civil Engineering	Sveučilišni pred-diplomski studij građevinarstva Bachelor of Science	--	Level 6	Full time	--	6 Semester	180 ECTS	Yearly 2005/06
Civil Engineering	Sveučilišni diplomski studij građevinarstva Master of Science	Specialisation: geotechnical engineering; construction materials; hydraulic engineering; structures; construction management; transportation engineering; theory and modelling structures.	Level 7	Full time	--	4 Semester	120 ECTS	Yearly 2005/06

For the Bachelor's degree programme Civil Engineering the institution has presented the following profile in the self-assessment report:

Undergraduate study in civil engineering has been framed as unitary and general three-year university study. In Croatia, like in many other European countries, although there is a tradition of three-year higher education programmes, they have been more professionally oriented and not aimed at the acquisition of scientific basics in a profession. The reformed undergraduate university study in civil engineering is primarily aimed at acquiring scientific basics of civil engineering, but does not ignore the professional knowledge essential for students who want to complete their education at this level and wish to find employment. Since such studies are novel in Croatia, as well as in Europe, and there is lack of experience in this area, in developing this programme, a particular attention has been paid

[3] EQF = The European Qualifications Framework for lifelong learning

to the optimal balance between the scientific basics in civil engineering and professional knowledge. Therefore, it has been estimated that there will be a high demand for students who have successfully completed studies, and that they will easily find employment, like former graduates. It is highly probable that the graduates from these studies will advance easier than graduates from professional studies, because they will upgrade their knowledge on firm scientific basics. On the other hand, students furthering their education in civil engineering will have good foundations for the completion of higher level.

A graduate student can (academic competences):

- apply knowledge of mathematic, science and technology in civil engineering;
- prepare and conduct experiments and analyse and interpret results;
- recognise, describe and solve engineering problems;
- recognise interaction between design, building, marketing, user's demands and elimination of construction;
- apply usual computation tools for execution of documents, presentations, internet pages, calculations and simulations;
- design structures at elementary level;
- manage a limited construction project;
- size small scale building structures according to static loads;
- participate in planning, design, implementation, supervision and maintenance of larger construction projects.

For the Master ’s degree programme, Civil Engineering the institution has presented the following profile in the self-assessment report:

At graduate university study students specialise in the following disciplines of civil engineering: geotechnical engineering, construction materials, hydraulic engineering, structural engineering, construction management, transportation engineering and theory and modelling structures.

The study objective is for students to master one of the above mentioned disciplines in civil engineering, and qualify for high quality professional jobs in that discipline (to obtain licence for independent professional work), or for development and scientific research in elected discipline in civil engineering, or for further professional or scientific advancement in postgraduate studies.

A graduate student can (personal competences): exchange information, ideas, problems and solutions with professional and lay people; adapt to changes in technology and working methods within life-long learning; cooperate efficiently with professional groups and adapt to the demands of the work environment; understand the impacts of civil engineering on the society and the environment and demonstrate moral and ethical attitude in the solution of engineering problems; apply acquired knowledge and practices in his/her further professional and academic education; in a creative manner and critically assess arguments, presumptions, abstract concepts and facts in decision making and solving engineering problems.

Theoretically, scientifically and professionally oriented undergraduate university study in civil engineering teaches the basics of mathematic and natural science, foundations of engineering and courses in civil engineering. Undergraduate university study in civil engineering is general – there are no specialisations and all the disciplines in civil engineering are evenly represented. In its professional aspect, the undergraduate university study in civil engineering emphasises the integration of innovative building technologies with current economic and business terms and concepts. In its scientific aspect, at the end of studies, a student is capable of processing medium demanding tasks in the field of civil engineering by applying scientific methods.

This generally profiled undergraduate university study (university bachelor in civil engineering) enables graduates to find adequate employment, but with regular further education within or outside university

A graduate student can (academic competences (in addition to the competences of undergraduate university study of civil engineering)) :

- have a comprehensive understanding of general aspects and problems in civil engi-neering, particularly in the discipline of his specialisation;
- apply acquired knowledge and skills in planning, design, construction, supervision and maintenance of complex structures, interventions and systems in his/her spe-cialised field from the point of stability, safety, serviceability, environment protec-tion and costs;

apply acquired skills and necessary knowledge in recognition, formulation and anal-ysis of problems and find one or more acceptable solutions in his specialised disci-pline of civil engineering;

- develop civil engineering discipline of his/her specialisation, taking into considera-tion the discoveries in other sciences;

- interpret social aspects of construction projects he/she is working on and the social context of the construction;

- demonstrate a high level of professional knowledge and behaviour in civil engineer-ing;

- develop constantly in his profession.

A graduate student can (personal competences (in addition to the competences of undergraduate university study in civil engineering)):accept the analytical approach to work, based on a wider scientific knowledge; take the leading role in companies and research institutions and contribute to innovations; plan, supervise and implement professional, development and research projects; explain his/her ideas and projects to associates; find solutions to technical and human problems in his/her work environment; apply acquired knowledge in a creative manner to bring decisions at responsible professional positions; consider cultural, linguistic, social and economic influences when working on an international level; take responsibility for own decisions; accept demands of other professions and be ready to participate in interdisciplinary activities.

Graduate university study in civil engineering is scientifically oriented and offers seven study programmes of specialisation and is an upgrade to undergraduate university study programme.

Professional oriented content and methods are taught from both scientific and professional aspects.

At the beginning of study mathematical and natural sciences basics are advanced and extended.

From the start to the completion of study, e.g. from the first to the fourth semester, civil engineering knowledge is advanced and extended, and the priority is scientific knowledge and not learning facts.

In the fourth semester students are required to write a Master Thesis which supplements the elected specialisation in content and methods.

In previous years, graduate students from former graduate studies have shown a good scientific and professional expertise. Therefore, present form of education has to be kept to expect a good placement of graduates in the employment market.

C Peer Report for the ASIIN Seal and the EUR ACE Label[4]

1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-assessment report
- Website of the department
- Discussions with representatives of university management, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
The study aims and intended learning outcomes of both programmes at a level of higher education, defined by the university, correspond to learning outcomes relevant to level 6 and 7 of the European Qualifications Framework. Learning outcomes are accessible to students, staff members, and all the other stakeholders on the faculty web site. These objectives were discussed in staff meetings with the faculty team. The department consults with private companies and governmental institutions in the development of the programmes.

In detail, the aims met the requirements of the subject specific criteria of the Technical Committee for Civil Engineering, Geodesy and Architecture of ASIIN and with the EUR ACE Framework.

In the Bachelor programme students should get knowledge of basics in mathematics, natural sciences and subject specific fundamentals in civil engineering. Students should have deepened and expanded the subject-specific skills and applied them in different fields of

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

civil engineering by using classical and modern specific methods. They should get additionally some basic knowledge in ecology and law and should train their communication and team working skills.

During the Master programme students should deepen and expand their knowledge and competences out of their Bachelor studies.

From the point of view of the peers the intended profile of the programme offers students excellent opportunities in the labour market in the construction industry or in engineering offices

Criterion 1.2 Name of the degree programme

- Websites of the degree programmes
- Self-Assessment Report

Preliminary assessment and analysis of the peers:
The titles of both programmes are published on the subject specific webpages. The information about the programmes is published in Croatian and English language. The panel confirmed that the names of the programmes reflect the intended aims and learning outcomes.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Report
- Study plans of all degree programmes
- Module descriptions
- Discussions with representatives of university management, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
In general, the peers came away with a good impression of the curricula and that their structure and content conform to the aims of the programmes.

In the first three semesters the Bachelor programme consists of modules dealing with fundamentals in mathematics and natural and engineering sciences (mathematics 1 and 2, geometry, geodesy, mathematical programmes, physics, mechanics 1 and 2, building construction and materials science, strength of materials, statistics, fluid mechanics, and hydrology, structural analysis, soil mechanics). Professional oriented modules follow the fundamental parts where the basic knowledge is applied in specific fields of civil engineering

(concrete and masonry structures, roads, railroads, construction organisation, metal structures, bridges, timber structures, light structures and hydraulic structure). Additionally, each semester contents one or two elective modules wherein students choose one out of two modules. The electives in the first semester are dealing with history of civil engineering, economy, law and languages, followed in the other semester by field specific elective courses. The programme finishes with the final assignment.

From the point of view of the panel, the curriculum fulfils the study aims in a very traditional way.

In the master programme students select one of the seven specialisations in geotechnical engineering, construction materials, hydraulic engineering, structural engineering, construction management, transportation engineering, theory and modelling structures. Each specialisation has its own curriculum with some common modules. Within each specialisation there is one elective module each semester wherein students select one course out of an catalogue defined for the single specialisation.

The peers could follow the argumentation of the university not to include Building Information Modelling into the Bachelor programmes although from their point of view it would be helpful for undergraduate students as well. They did not follow the university implementing BIM in the master programme only in the specialisation of construction management. From their point of view, all graduates of o modern master programme have to be familiar at least with the application of BIM. Therefore, they asked for a concept how to include BIM in all specialisations of the master programme.

A similar situation the panel found with regard to building services aspects. The university offers construction aspects of building technology only in several modules of the specialisation construction management. From their point of view, all master graduates have to be familiar at least with the construction related aspects of building services technology.

Finally, the peers assessed that finite element methods are only taught for students of the specialisation in modelling structures. From their view, it would be useful for graduates of the specialisations in construction management, structural and geotechnical engineering as well to be familiar with the application of finite elements methods.

Criterion 1.4 Admission requirements

Evidence:

- Websites of the degree programmes
- Self-Assessment Report

Preliminary assessment and analysis of the peers:
The requirements and procedures are mandatory, transparent and the same for all applicants. The auditors consider the requirements suitable for assuring subject-specific qualifications of high school graduates for being admitted to higher education in the bachelor programme. For the Master programme there are clear rules how individual admission requirements that have not been fulfilled can be compensated.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

The peers thanked the university for the remark that finite element methods also are included in the specialisation in structural and geotechnical engineering. As the peers could not find any regarding contents in the module descriptions they confirmed their preliminary assessment and suggested a requirement.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self Assessment Report
- Module descriptions
- Examination regulations
- Study plan
- Discussions with representatives of university management, programme coordinators, lecturers, students

Preliminary assessment and analysis of the peers:
The peers acknowledged that the degree programmes under review are divided into modules and their structure is clearly outlined on the subject specific website. Each module is a summation of teaching and learning. With its choice of modules, the structure ensures that the learning outcomes can be reached without exceeding the regular course duration. The modules have been adapted to the requirements of the degree programme. Each module helps to reach the qualification level and the overall intended learning outcomes of the programmes.

In general, the module structure with its elective courses allows students to absolve studies abroad without any loss of time. To facilitate the mobility of the students the university has defined rules for the recognition of credits acquired at other higher education institutions based on the competences of the students. Nevertheless, only 5% of the students are studying at universities abroad.

The panel pointed out that the option to study abroad at other higher education institutions should be more strongly supported by the department and the university. Exchange agreements should be established with foreign universities and the possibility to study abroad should be actively promoted.

In both programmes peers found adequate opportunities for the students to define an individual focus and course of study. Nevertheless, in the master programme the rules for election hinders combination of modules out of different specialisations. Therefore, the peers found it necessary to restructure the elective opportunities of the students in a more open way for the master programme.

Criterion 2.2 Work load and credits

Evidence:

- Self-Assessment Report
- Module Handbooks for both degree programmes
- Discussions with representatives of the management of the university, programme coordinators, lecturers, students

Preliminary assessment and analysis of the peers:
The peers understood that the university uses ECTS credit points based on the student workload. Considering the named ECTS points for the single modules the peers assessed the estimated time budgets as realistic to enable students to complete the degree without exceeding the regular course duration. Workload peaks have thus been avoided by the university. The students confirmed this assessment of the peers.

The statistical data of study behavior showed no indicating that the workload could be to high for the students to reach the expected study goals in time. At an average students needs 3,8 years in the bachelor and 2,5 years in the master programme to finish their studies.

Criterion 2.3 Teaching methodology

Evidence:

- Self Assessment Report

- Module descriptions:
- Discussions with representatives of university management, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
The programme under review is a full-time programme with classroom, structured and self-study activities. The staff members apply various teaching and learning methods (such as lectures, computer training, classroom exercises or excursions, individual and group assignments, seminars and project works). Structured activities include tutorial, homework, assignment and practical activities. Several courses involve laboratory trainings and project work.

In total, the peers found that the teaching methods and instruments support the students in achieving the learning outcomes. From their point of view the programmes are well-balanced between attendance-based learning and self-study. There is evidence that students have practice developing skills in academic research and writing.

The peers were astonished to learn from the students that there are nearly no e-learning offers by the teaching staff. Regarding modern didactical methods the teaching staff should use e-learning more intensively.

They welcomed the number of project works included in the modules to give students opportunities to apply their theoretical knowledge practically and to train communication and team working skills. With these projects works the peers saw additionally the chance for the programmes to combine interdisciplinary aspects of the different specialisations. But until now the faculty made no use of this chance.

Criterion 2.4 Support and assistance

Evidence:

- Self Assessment Report
- Discussions with representatives of management of the university, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
Students receive much support in study and interpersonal-related situations at the university. Resources and infrastructure for an effective support and assistance system are clearly visible and are used by the students.

Both staff and students seem highly involved in the administrative and academic activities at the faculty. Good relationships evidently exist between students and staff members. Reportedly, the teaching staff is in general responsive towards the students' needs and complaints as well. Students met by the peers expressed a general satisfaction with teachers' responsiveness to their needs. A special office at university for handicapped student organises individualised solution with the faculty.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

The peers noticed the remark of the university that there are several courses available on internet platforms. But obviously these offers are not common for the students. Therefore the peers confirmed their impression that e-learning methods are only used rudimentarily by the teaching staff and they suggested a recommendation.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Self Assessment Report
- Examination Regulations
- Study plan
- Module descriptions
- Discussions with representatives of management of the university, programme coordinators, lecturers, students

Preliminary assessment and analysis of the peers:
The peers noted that each module has a pre-exam, which has to be passed for the participation of the final exam. Exams are module-related and offer students continuous feedback on their progress in developing competences. Final examinations can be oral, written, in the form of tests, or as a combined form.

The number and distribution of the final exams ensure that the exam load and preparation times are adequate. All exams are scheduled in order to avoid delays in students' academic progress caused by deadlines, exam correction times, re-cesses etc. All exams are marked using transparent criteria. There are mechanisms in place, which ensure that exams marked

by different examiners are comparable. Failed exams can be repeated but students are not allowed to enrol in all courses of the following semester.

Nevertheless, the positive assessment of the final exams is relativized by the structure of the pre-exams. From the point of view of the peers, it could have negative impact on the opportunity to graduate in the foreseen time of study, if at least one pre-exam has to be passed by the students in each module. The students confirmed this impression of the peers that the pre-exams are the main reason for the extension of duration of study. Therefore, the peers found it necessary to restructure the pre-examination system in a way that it does not extend the time to graduate in the programmes although the implementation of pre-exams originally was wished by students.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

As the university abstained from any comment to this criterion, the peers confirmed their preliminary assessment without any changes.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self Assessment Report
- Staff handbook
- Discussions with representatives of management of the university, programme coordinators, lecturers,

Preliminary assessment and analysis of the peers:
The peers reviewed various research activities carried out in the last years. They welcomed that students were partly involved in these research projects.

Summarising, the peers noticed that the composition, scientific orientation and qualification of the teaching staff are suitable for sustaining the degree programme and that the quantity of the staff ensured a good professor student ratio with regard to the supervision of the students during their design projects.

The peers recognised that the teaching staff is involved in several national research projects. As far as the peers could see, the teaching staff is involved only in a few international projects. This could be intensified from the view of the peers.

Criterion 4.2 Staff development

Evidence:

- Self Assessment Report
- Staff handbook
- Discussions with representatives of management of the university, programme coordinators, lecturers,

Preliminary assessment and analysis of the peers:
The university explained that there were several arrangements to enhance the didactical competences of the teaching staff. For the continuing improvement of teaching skills, a broad offer of special courses exists at the university. Staff members who wish to develop their professional skills as well can participate in international conferences; these costs are covered by the university. Additionally, every seven years the professors can apply for a larger research project and a sabbatical.

In summary, the peers confirm that the university offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- On-site visit of the laboratories, lecture rooms, and the library

Preliminary assessment and analysis of the peers:
The peers learned that financial sources for UQU originated from tuition fees, government funding and private funding of companies. The operational funds were distributed to the Faculties and Colleges of the university based on a specific formula depending on the number of students. The peers were convinced that the financial sources were sufficient and secured for the timeframe of the accreditation.

The peers inspected the classrooms, library and laboratories in order to assess the quality of the infrastructure and the technical equipment. They found an adequate equipped technical and administrative infrastructure to ensure the support of the programmes.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

The peers mentioned the remark of the university that the teaching staff is expected to apply for research projects sponsored by EU as well. The peers confirmed their preliminary assessment without any changes.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions
- Webpage

Preliminary assessment and analysis of the peers:
The peers positively noted that the college published the module descriptions for the degree programme under review. Hence, the module descriptions normally are available for all interested stakeholders. They examined the module descriptions and noted that the modules have comprehensible names and identification codes, that responsible persons are named, the teaching methods are specified and the workload is defined in connection with the credit points for each module. Additionally the contents and objectives of the modules are described, their admission and examination requirements as well as the forms of assessments.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Report
- Sample Transcript of Records for each degree programme
- Sample Diploma Certificate for each degree programme
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:
The peers approve from studying the documents provided for review that the students are awarded a Diploma and a Diploma Supplement after graduation. The Diploma consists of a Diploma Certificate and a Transcript of Records.

The peers found that the Diploma Supplements inform about the structure and content of the respective degree programme, provide information about the individual performance of the student as well as statistical data regarding the final grade, and include information about the composition of the final grade according to the ECTS-Users' guide. This allows the reader to categorise the individual result.

Criterion 5.3 Relevant rules

Evidence:

- Statue of the University
- Statue of the faculty
- Ordinance on examination regulations
- Ordinance om undergraduate and graduate Programmes at University of Zagreb

Preliminary assessment and analysis of the peers:
The peers confirm that the rights and duties of both university and students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all relevant stakeholders. In addition, the students receive all relevant course material at the beginning of every semester.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

As the university abstained from any comment to this criterion, the peers confirmed their preliminary assessment without any changes.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self Assessment Report
- Rulebook of the system of Quality Assurance
- Discussions with representatives of management of universities, programme coordinators, lecturers, students

Preliminary assessment and analysis of the peers:
The peers confirmed that the programmes are subject to regular internal quality assessment procedures aiming at continuous improvement. All responsibilities and mechanisms defined for the purposes of continued development are binding.

Internal evaluation of the quality of the degree programmes is performed by surveys. A students' survey is organised by the university's office for evaluating didactical and professional performance of teachers. This evaluation takes place in every course and in every semester. Results are published aggregated but there are no discussions with students because the teaching staff is only informed about the results some six month after the evaluation. On the other side within the boards and institutions of the university 10% of members has to be students. In these boards he results of the teaching evaluation are discussed in detail. Therefore, students involved could organise to inform all other students about the discussions. Nevertheless, the peers recommended to discuss the results of the evaluation with students concerned.

The peers, in summary, consider the quality management system operative and suitable for identifying weaknesses and inappropriate trends, as well as implementing modifications for improving and strengthening the degree programmes. All stakeholders are involved in the process.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

As the university abstained from any comment, any comment the peers confirmed their preliminary assessment without any changes.

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

- Completed staff handbook

E Comment of the Higher Education Institution

The university resigned to any comments.

F Summary: Peer recommendations

The peers recommend the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024
Ma Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024

A) Accreditation with or without requirements

Requirements

For both programmes

A 1. (ASIIN 3) Restructure the pre-examination system in a way that it does not extend the time for students to graduate in the programmes.

For the master programme

A 2. (ASIIN 1.3) A concept has to be given how to implement construction aspects of building technology in all specialisations.

A 3. (ASIIN 1.3) A concept has to be given how to implement offers for all students to become familiar with the application of building information modelling.

A 4. (ASIIN 2.1) Restructure the elective opportunities of the students in a more open way.

A 5. (ASIIN 2.3) Organise the project works more interdisciplinary by combining aspects of the different specialisations.

Recommendations

For both programmes

E 1. (ASIIN 6) It is recommended to discuss the results of the evaluation with students concerned.

E 2. (ASIIN 2.3) It is recommended to use e-learning components more intensively:

For the Masterprogramme

E 3. (ASIIN 1.3) It is recommend to offer opportunities at least for students in structural engineering to get familiar with the application of Finite Elements Methods.

G Comment of the Technical Committee 03- Civil Engineering, Geodesy, Architecture

The Technical Committee discussed the procedure. The members of the committee combined the requirements regarding construction aspects and building information modelling and underlined that only offers are asked. Further on, they assessed it as necessary that at least students of specialisation in structural engineering get familiar with the application of finite element methods and suggested to change the recommendation into an requirement. On the other side, they assessed the election opportunities of the students and the interdisciplinary organisation of the project work not as a necessary points and suggested to change the requirements into recommendations. Regarding all other aspects the Technical Committee followed the assessment of the peers without any further changes.

The Technical Committee 03 – Civil Engineering, Geodesy and Architecture recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024
Ma Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024

Requirements

For both programmes

A 1. (ASIIN 3) Restructure the pre-examination system in a way that it does not extend the time for students to graduate in the programmes.

For the master programme

A 2. (ASIIN 1.3) A concept has to be given how to implement offers for all students to become familiar with the application of building information modeling and construction aspects of building technology.

A 3. Ensure that at least students in structural engineering get familiar with the application of Finite Elements Methods.

For both programmes

E 1. (ASIIN 6) It is recommended to discuss the results of the evaluation with students concerned.

E 2. (ASIIN 2.3) It is recommended to use e-learning components more intensively.

For the Masterprogramme

E 3. (ASIIN 2.1) It is recommended to restructure the elective opportunities of the students in a more open way.

E 4. (ASIIN 2.3) It is recommended to organise the project works more interdisciplinary by combining aspects of the different specialisations.

H Decision of the Accreditation Commission (28.09.2018)

The Accreditation Commission discussed the procedure and followed all suggested changes of the Technical Committee. Further on, the Accreditation Commission can follow the argumentation of the university that in the master programme students should focus on the selected specialization. Therefore, the Commission deleted the suggested recommendation regarding addition elective opprotunities.

The Accreditation Commission for Degree Programmes decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024
Ma Civil Engineering	With requirements for one year	EUR-ACE	30.09.2024

Requirements

For both programmes

A 1. (ASIIN 3) Restructure the pre-examination system in a way that it does not extend the time for students to graduate in the programmes.

For the master programme

A 2. (ASIIN 1.3) A concept has to be given how to implement offers for all students to become familiar with the application of building information modelling and construction aspects of building technology.

A 3. (ASIIN 1.3) Ensure that at least students in structural engineering get familiar with the application of Finite Elements Methods.

Recommendations

For both programmes

E 1. (ASIIN 6) It is recommended to discuss the results of the evaluation with students concerned.

E 2. (ASIIN 2.3) It is recommended to use e-learning components more intensively.

For the Master programme

E 3. (ASIIN 2.3) It is recommended to organise the project works more interdisciplinary by combining aspects of the different specialisations.

Appendix: Programme Learning Outcomes and Curricula

According to the document "Undergraduate and Graduate Study Programmes with learning outcomes" the Bachelor degree programme Civil Engineering shall achieve the following **objectives** and **learning outcomes**:

Accomplished learning outcomes upon the competition of undergraduate studies:

(ACQUIRING KNOWLEDGE AND UNDERSTANDING)

- ability to recognize and describe engineering issues
- ability to recognize the interaction between design, construction, marketing, clients' demands and removal of structures
- understanding of the impact of civil engineering on society and

the environment (APPLYING KNOWLEDGE AND UNDERSTANDING)

- application of acquired knowledge of mathematics, science and technology to civil engineering
- ability to prepare and carry out experiments, and to analyse and interpret their results
- application of current computer tools to execute calculations and simulations
- basic structure design
- static load dimensioning for medium-sized building

structures (MAKING INFORMED JUDGEMENTS AND

CHOICES=

- critical assessment of arguments, hypotheses, abstract concepts and data in reaching decisions and solving engineering issues creatively

(COMMUNICATING KNOWLEDGE AND UNDERSTANDING, WORKING AS PART OF A TEAM)

- participation in planning, design, realisation, supervision and maintenance of large-scale construction work
- supervision of small-scale construction work
- exchange of information, ideas, problems and solutions with experts and non-experts
- participation in expert groups and adaptability to the work environment
- application of current computer tools to produce documents, presentations

and internet pages (CAPACITIES TO CONTINUE LEARNING, ETHICS)

- application of acquired knowledge and skills in further professional and academic education
- adaptability to changes in technology and work methods in the process of life-long learning
- ethical attitude to solving engineering issues

The following **curriculum** is presented:

1st year, 1st semester

Course			Horus per week		ECTS
			Lecture	Practice	
1	Elective subjects	Introduction to Civil Engineering	2	0	3
		History of Building			
2	Mathematics 1		4	4	9
3	Descriptive Geometry		2	3	6
4	Basics of Construction Informatics		1	2	3
5	Mathematical Programmes for Engineers		1	1	2
6	Geodesy		2	2	4
7	Elective subjects	Sociology of Work and Professional Ethics	2	0	3
		Basics of Civil Engineering Law			
		Business Economics			
		English in Civil Engineering 1			
		German in Civil Engineering 1			
	Total		14	12	30

1st year, 2nd semester

	Horus per week	ECTS

Course		Lecture	Practice	
1	Mathematics 2	4	3	8
2	Physics	4	1	6
3	Mechanics 1	2	2	5
4	Building Construction	3	3	7
5	Materials Science	2	1	4
	Total	15	10	30

2nd year, 3rd semester

Course			Horus per week		ECTS
			Lecture	Practice	
1	Probability and Statistics		2	2	4
2	Strength of Materials 1		3	3	7
3	Fluid Mechanics		3	2	6
4	Mechanics 2		2	2	5
5	Elective courses	Construction Materials	2	2	5
		Basic of Concrete Technology			
6	Hydrology		2	1	3
	Total		14	12	30

2nd year, 4th semester

Course			Horus per week		ECTS
			Lecture	Practice	
1	Elective courses	Applied Geology	2	0	3
		Environmental Protection			
2	Strength of Materials 2		3	2	5,5
3	Structural Analysis 1		4	3	7,5
4	Introduction to Structural Engineering		2	0	2
5	Soil Mechanics		3	2	6
6	Elective Courses	Water Supply and Sewerage 1	2	1	4
		Water Protection			
7	Law in Construction		2	0	3
	Total		18	8	30

3rd year, 5th semester

	Course		Horus per week		ECTS
			Lecture	Practice	
1	Concrete and Masonry Structures		4	3	6,5
2	Rock Mechanics		3	2	6
3	Roads		3	2	6
4	Elective courses	Building Technology	2	0	3
		Technology of Heavy Construction			
5	Elective courses	Structural Analysis 2	2	2	4,5
		Numerical Modelling of Structures			
6	Railways		2	1	3
	Total		16	10	29

3rd year, 6th semester

	Course		Horus per week		ECTS
			Lecture	Practice	
1	Construction Management 1		3	3	6,5
2	Metal Structures		2	1	4
3	Bridges		2	1	4
4	Elective courses	Timber Structures	2	1	4
		Lightweight Structures			
5	Hydraulic Engineering Structures		3	0	3,5
6	Education on Construction Site		0	3	3
7	Final Assignment		0	0	6
	Total		12	9	31

According to the document “Undergraduate and Graduate Study Programmes with learning outcomes” the Master degree programme Civil Engineering shall achieve the following **objectives** and **learning outcomes**:

Accomplished learning outcomes upon the completition of undergraduate studies:

(ACQUIRING KONWLEDGE AND UNDERSTANDING)

- comprehensively understand general phenomena and problems in civil engineering, particularly in their area of specialisation
- demonstrate a high level of professional knowledge and conduct in civil engineering

(APPLYING KNOWLEDGE AND UNDERSTANDING)

- apply the obtained knowledge and skills to planning, design, construction, supervision and maintenance of complex building structures, interventions and systems in their specialised area with regard to the issues of stability, safety, occupancy, environment protection and costs
- apply the obtained skills and necessary knowledge in recognizing, formulating and analysing problems and in finding one or more acceptable solutions in their specialised area
- have an analytic approach to work, based on a wider knowledge of science
- plan, supervise and perform professional, developmental and sci-

entific projects (MAKING INFORMED JUDGEMENTS AND CHOICES)

- interpret the social aspect as well as the social context of construction projects they are working on
- manage companies and research institutions and contribute to innovations
- develop the civil engineering area of his/hr specialisation, respecting the development of other scientific disciplines

(COMMUNICATING KNOWLEDGE AND UNDERSTANDING, WORKING AS PART OF A TEAM)

- explain their ideas and projects to associates
- find solutions to technical and personal problems in working environment
- creatively apply obtained knowledge to decision making at high levels
- work on an international level, taking into account cultural, linguistic, social and economic influences

(CAPACITIES TO CONTINURE LEARNING, ETHICS)

- constantly follow innovations and improve in their profession
- accept responsibility for their decisions
- accept requirements of other professions and be ready to participate in interdisciplinary activities

The following **curriculum** is presented:

GEOTECHNICAL ENGINEERING PROGRAMME

1st year, 1st semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Mathematics 3	3	2	7,5
		Stohastic Processes			
2	Research Methods		1	0	1,5
3	Geotechnical Engineering		2	2	6
4	Flow Processes in Soil and Rock		2	2	6
5	Applied Soil Mechanics		3	2	7,5
		Total	11	8	28,5

1st year, 2nd semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Structures		2	2	6
3	Foundation Engineering		3	2	7,5
4	Numerical Modelling in Geotechnics		2	3	7,5
5	Elective subjects	Applied Geology	2	0	3
		Environmental Protection			
6	Elective subjects (1 or 2)				
		Total			31,5

Elective subjects (2. semester)		Hours per week		ECTS
		Lectures	Practice	
1	Dynamics of Structures and Earthquake Engineering	3	2	7,5
2	Theory of Elasticity and Plasticity	3	2	7,5
3	Numerical Mathematics	2	2	6
4	Perspective	2	2	6
5	Basic of Differential Geometry	2	2	6
6	Waves and Oscillations	2	2	6
7	Courses of other programmes or electives of other studies	2	2	6

2nd year 3rd semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Improvement of Soil and Rock	2	2	6
2	Earthfill and Retaining Structures	2	2	6
3	Hydrogeology and Engineering Geology	2	0	3
4	Geotechnical Laboratory	2	3	7,5
5	Elective subjects (1 or 2)			
	Total			30

	Elective subjects (3. semester)	Hours per week		ECTS
		Lectures	Practice	
1	Underground Structures	2	2	6
2	Geotechnics and Environmental Protection	2	1	4,5
3	Soil Dynamics	2	2	6
34	English in Civil Engineering 2	0	3	4,5
5	German in Civil Engineering 2	0	3	4,5
6	Courses of other programmes or electives of other studies			

2nd year 4th semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Geotechnical Design	2	2	6
2	Field investigation and Monitoring	2	2	6
3	Final Assignment	0	12	18
	Total			30

HYDRAULIC ENGINEERING

1st year, 1st semester

	Hours per week	ECTS

Course			Lectures	Practice	
1	Elective subjects	Mathematics 3 Stohastic Processes	3	2	7,5
2	Researche Methods		1	0	1,5
3	Hydraulics 1		3	2	7,5
4	Hydrology 2		2	2	6
5	River Training		3	2	7,5
		Total	12	8	30

1st year, 2nd semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Water Supply and Sewerage 1 Water Protection	2	1	4
2	Ports and Waterways		3	3	9
3	Drainage and Irrigation 1		3	2	8
4	Sturctures		2	2	6
5	Elective subjects	Applied Geology Environmental Protection	2	0	3
		Total	12	8	30

2nd year, 3rd semester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Water Power Use	2	2	6
2	Water Supply and Drainage 2	2	2	6
3	Elective subjects (3)			
	Total			30

Elective subjects (3. semester)		Hours per week		ECTS
		Lectures	Practice	
1	Urban Hydrology	2	2	6

2	Potable and Waste Water Treatment	2	2	6
3	Modeling in Hydraulic Engineering	2	2	6
4	Drainage and Irrigation 2	2	2	6
5	Flood Protection	2	2	6
6	Hydraulics 2	2	2	6
7	Earthfill and Retaining Structures	2	2	6
8	Hydrogeology and Engineering Geology	2	0	3
9	Hydrotechnical Concrete	2	2	6
10	Courses of other programmes or electives of other studies			

2nd year, 4th semester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Water Resources Engineering	3	1	6
2	Elective subject			
3	Final Assignment	0	12	18
	Total			30

Elective subjects (3. semester)		Hours per week		ECTS
		Lectures	Practice	
1	Design in Hydraulic Engineering	0	4	6
2	Vegetative Water Facilities	2	2	6
3	Special Water Power Projects	2	2	6
4	Maritime Structures	2	2	6
5	Courses of other programmes or electives of other studies			

STRUCTURAL ENGINEERING PROGRAMME

1st year, 1st semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Mathematics 3	3	2	7,5
		Stohastic Processes			
2	Researche Methods		1	0	1,5
3	Prestressed Concrete		2	2	6

4	Bridges 2	2	2	6
5	Metal Structures 2	2	2	6
6	Reliability of Structures	2	0	3
	Total	12	8	30

1st year, 2nd semester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Concrete and Masonry Structures 2	2	2	6
2	Metal Structures 3	2	2	6
3	Timber Structures 2	2	2	6
4	Durability of Structures 1	2	2	6
5	Precast Reinforced Concrete Structures	2	2	6
	Total	10	10	30

2nd year, 3rd semester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Concrete Structures 3	2	2	6
2	Bridges 3	2	2	6
3	Dynamics of Structures	2	1	4,5
4	Elective subject (3)			
	Total			30

Elective subjects (3. semester)		Hours per week		ECTS
		Lectures	Practice	
1	Stability of Structures	2	1	4,5
2	Durability of Structures 2	2	1	4,5
3	Tall Buildings	2	1	4,5
4	Structural Testing	2	1	4,5
5	English in Civil Engineering 2	0	3	4,5
6	German in Civil Engineering 2	0	4	4,5

2nd year, 4th semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Special Engineering Structures	2	1	4,5
2	Composite Structures	2	1	4,5
3	Elective subject			
4	Final Assignment	0	12	18,0
	Total			30

	Elective subjects (4. semester)	Hours per week		ECTS
		Lectures	Practice	
1	Earthquake Engineering	2	0	3
2	Numerical Mathematics	2	2	6
3	Perspective	2	2	6
4	Basic of Differential Geometry	2	2	6
5	Waves and Oscillations	2	2	6
6	Courses of other programmes or electives of other studies	2	0	3

CONSTRUCTION MATERIALS PROGRAMME

1st year, 1st semester

	Course		Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Mathematics 3	3	2	7,5
		Stohastic Processes			
2	Researche Methods		1	0	1,5
3	Theory and Technology of Concrete		2	2	6
4	Building Physics		2	2	6
5	Polymers		2	1	4,5
6	Mechanics of Material		2	1	4,5
	Total		12	8	30

1st year, 2nd semester

	Hours per week	ECTS

Course			Lectures	Practice	
1	Elective subjects	Applied Geology Environmental Protection	2	0	3,0
2	Elective subjects	Quality Management Theory of Elasticity and Plasticity	3	2	7,5
3	Durability of Structural Materials		2	2	6
4	Special Concrete and Technologies		3	2	7,5
5	Concrete and Masonry Structures 2		2	2	6
		Total	12	8	30

2nd year, 3rdsemester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Precast Systems	2	2	6,0
2	Non-destructive Testing	2	2	6,0
3	Fire Protection	2	2	6,0
4	Elective subjects (2)			
	Total			30

Elective subjects (3. semester)		Hours per week		ECTS
		Lectures	Practice	
1	Technology of Repair and Strengthening	2	2	6
2	Concretes for Roads	2	2	6
3	Hydrotechnical Concrete	2	2	6
4	Metal Structures 2	2	2	6

2nd year, 4th semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Numerical Modeling in Engineering Materials High Performance Concrete	2	2	6
2	Elective subject				
3	Final Assignment		0	12	18

Total			30

	Elective subjects (4. semester)	Hours per week		ECTS
		Lectures	Practice	
1	Design of Experiments	2	2	6
2	Applied Metalurgy	2	2	6
3	Numerical Mathematics	2	2	6
4	Perspective	2	2	6
5	Basic of Differential Geometry	2	2	6
6	Waves and Oscillations	2	2	6
7	English in Civil Engineering 2	0	3	4,5
8	German in Civil Engineering 2	0	3	4,5

CONSTRUCTION MANAGEMENT PROGRAMME

1st year, 1st semester

	Course		Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Mathematics 3	3	2	7,5
		Stohastic Processes			
2	Research Methods		1	0	1,5
3	Construction Management 2		2	2	6
4	Building Maintenance Management		2	1	4,5
5	Optimization Methods in Construction		2	2	6
6	Study of Work		2	1	4,5
	Total		12	8	30

1st year, 2nd semester

	Course		Hours per week		ECTS
			Lectures	Practice	
1	Construction Equipment		2	2	6
2	Management for Construction Industry		2	1	4,5
3	Construction Project Management		4	2	9
4	Elective subjects	Environmental Protection	2	0	3
		English in Civil Engineering 2	0	3	4,5
		German in Civil Engineering 2	0	3	4,5
5	Elective subjects				
	Total				30

Elective subjects (2. semester)		Hours per week		
		Lectures	Practice	ECTS
1	Construction Technology 1	3	2	6
2	Supervising and Monitoring Construction Projects	2	0	3
3	Numerical Mathematics	2	2	6
4	Perspective	2	2	6
5	Basic of Differential Geometry	2	2	6
6	Waves and Oscillations	2	2	6
7	Courses of other programmes or electives of other studies			

2nd year, 3rd semester

Course		Hours per week		
		Lectures	Practice	ECTS
1	Construction Business Systems	2	2	6
2	Planning and Scheduling Methods	2	2	6
3	Construction Site Practice	0	4	6
4	Elective subjects (2)			
	Total			30

Elective subjects (4. semester)		Hours per week		
		Lectures	Practice	ECTS
1	Human Resource Management	2	2	6
2	Construction Technology 2	2	2	6
3	Investment Appraisals in Construction	2	2	6
4	Courses of other programmes or electives of other studies	2	2	6

2nd year, 4th semester

Course		Hours per week		
		Lectures	Practice	ECTS
1	Business Strategies in Construction	3	0	4,5
2	Sociology of Organization	2	1	4,5
3	Elective subjects (2-7 in 2nd semester)			

4	Final assignment	0	12	18
	Total			30

TRANSPORTATION ENGINEERING PROGRAMME

1st year, 1st semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Elective subjects	Mathematics 3	3	2	7,5
		Stohastic Processes			
2	Traffic Noise		2	1	4,5
3	Transportation Engineering		2	2	6
4	Highway Design		2	2	6
5	Railway Design and Construction		2	2	6
	Total		11	9	30

1st year, 2nd semester

Course			Hours per week		ECTS
			Lectures	Practice	
1	Management in Civil Engineering		2	0	3
2	Elective subjects	Applied Geology	2	0	3
		Environmental Protection			
3	Pavements Structures		2	2	6
4	Permanent Way		3	1	6
5	Earthworks		2	2	6
6	Road Intersections		2	2	6
	Total		13	7	30

2nd year, 3rd semester

Course		Hours per week		ECTS
		Lectures	Practice	
1	Research Methods	1	0	1,5
2	Traffic Tunnels	2	2	6
3	Airports	2	1	4,5
4	Road Equipment	3	0	4,5
5	Transport Systems	3	0	4,5
6	Elective subjects (2)			
	Total			30

	Elective subjects (3. semester)	Hours per week		
		Lectures	Practice	ECTS
1	Drainage of Transportation Facilities	2	1	4,5
2	Traffic Buildings	2	1	4,5
3	Soil - improvement Methods	2	1	4,5
4	English in Civil Engineering 2	0	3	4,5
5	German in Civil Engineering 2	0	3	4,5
7	Courses of other programmes or electives of other studies			

2nd year, 4th semester

	Course	Hours per week		
		Lectures	Practice	ECTS
1	Pavement Management	2	0	3
2	Elective subjects (2)			
4	Final Assignment	0	12	18
	Total			30

	Elective subjects (4. semester)	Hours per week		
		Lectures	Practice	ECTS
1	Parking Facilities	2	1	4,5
2	Track Maintenance	3	0	4,5
3	Urban Railways	2	1	4,5
4	Numerical Mathematics	2	2	6
5	Perspective	2	2	6
6	Basic of Differential Geometry	2	2	6
7	Waves and vibrations	2	2	6
8	Courses of other programmes or electives of other studies			

THEORY AND MODELLING OF STRUCTURES PROGRAMME

1st year, 1st semester

	Hours per week	ECTS

	Course	Lectures	Practice	
1	Mathematics 3	3	2	7,5
2	Research Methods	1	0	1,5
3	Mechanics of Materials	2	1	4,5
4	Nonlinear Analysis of Rod Structures	2	1	4,5
5	Experimental Methods 1	2	2	6
6	Metal Structures 2	2	2	6
	Total	12	8	30

1st year, 2nd semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Theory of Elasticity and Plasticity	3	2	7,5
2	Dynamics of Structures and Earthquake Engineering	3	2	7,5
3	Finite Element Method	2	2	6
4	Theory of Composites	2	1	4,5
5	Concrete and Masonry Structures 2	2	1	4,5
	Total	12	8	30

2nd year, 3rd semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Space Structures	2	2	6
2	Structural Testings	2	2	6
3	Elective subjects (3 or 4, courses programmes min 13,5 ECTS)			
	Total			30

	Elective subjects (3. semester)	Hours per week		ECTS
		Lectures	Practice	
1	Methods of Theory of Elasticity and Plasticity	2	1	4,5
2	Polymers	2	1	4,5
3	Basic of Fracture Mechanics	2	1	4,5
4	Programming Structural Analysis Procedures	2	1	4,5
5	Courses of other programmes or electives of other studies	0	3	4,5

2nd year, 4th semester

	Course	Hours per week		ECTS
		Lectures	Practice	
1	Stability Theory	2	2	6
2	Elective subjects (1 or 2)			
4	Final Assignment	0	12	18
	Total			30

	Elective subjects (4. semester)	Hours per week		ECTS
		Lectures	Practice	
1	Numerical Methods in Structural Analysis	2	1	4,5
2	Selected Topics on Strength of Materials	2	1	4,5
3	Stochastic Analysis of Structures	2	1	4,5
4	Numerical Mathematics	2	2	6,0
5	Perspective	2	2	6
6	Basic of Differential Geometry	2	2	6
7	Waves and vibrations	2	2	6
8	Courses of other programmes or electives of other studies			