University of Debrecen
Faculty of Engineering

Urban Systems Engineering MSc Program

2021

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DEAN'S WELCOME

Welcome to UD's Faculty of Engineering!

The Faculty of Engineering of the University of Debrecen has become an outstanding centre of education and research in the Eastern Hungarian region. Following the footsteps of our predecessors, the academic and administrative staff of the Faculty work hand in hand to make our training programmes and researches meet both national and international standards.

The Faculty of Engineering is one of Hungary's most significant institutions of higher-education, and its 3000 students make it a dominant faculty of the University of Debrecen which - having the most international students, offering the most academic programmes among Hungarian universities and having been classified as a research university, the highest of qualifications - is officially listed among the best universities in the country.

We welcome the most outstanding and inquisitive students of the region with an enthusiastic and professional team of academics and researchers, and a set of laboratories unique in the country. We consciously aspire to develop the quality of education and research further, based on a close cooperation between the Faculty and the industry. Our students enter many prestigious competitions and they are becoming increasingly successful and acclaimed, while our instructors are working on a growing number of national and international projects of basic and applied research.

The Faculty bridges the gap between theory and practice and provides a high-quality theoretical background merged into practice-oriented training based on industrial relations. We do our best to maintain the high prestige of the engineering diplomas awarded by the University of Debrecen and to make sure that the knowledge and achievements of students who graduate from our Faculty continue to be recognised in the labour market.

All things considered, you are kindly advised to read this bulletin which hopefully reflects our endeavours appropriately and provides all the information you need to know about your chosen training programme. We are looking forward to supporting the personal and professional growth of our future engineers.

With the best of wishes for the years to come,

Géza Husi

Dean

HISTORY OF THE UNIVERSITY

The history of Debrecen's higher education dates back to the 16th century. The Calvinist Reformed College, established in 1538, played a central role in education, teaching in the native language and spreading Hungarian culture in the region as well as in the whole country. The College was a sound base for the Hungarian Royal University, founded in 1912. Apart from the three academic faculties (arts, law, theology) a new faculty, the Faculty of Medicine was established, and the University soon became one of the regional citadels of Hungarian higher education. Today, University of Debrecen is classified as "University of National Excellence" and offers the highest number of academic programs in the country, therefore it is considered to be one of the best universities in Hungary. Its reputation is the result of its quality training, research activities and the numerous training programs in different fields of science and engineering in English. With 14 faculties and a student body of almost 30.000, out of which about 3700 are international students, the University of Debrecen is one of the largest higher education institutions in Hungary.

The history of the Faculty of Engineering dates back to 1965, when the Technical College was established. In 1972 it was renamed Ybl Miklós Polytechnic and in 1995 it became part of Kossuth Lajos University. In 2000 the Faculty of Engineering became part of the integrated University of Debrecen.

In 2005 the Bologna System was introduced which supports the competitiveness of qualifications received at the University of Debrecen against universities all over Europe.

The Faculty of Engineering is practice-oriented and develops skills required for the current needs of the national and international labour market. The teaching staff is involved in numerous domestic and international research and design projects. The recently-opened new building wing with its ultra-modern design hosts several lecture halls, seminar rooms and laboratories equipped with the latest technology. Our students are provided with practical knowledge, training and field practice from numerous prestigious domestic and multi-national industry partners. The internship periods are excellent opportunities for students to experience how theory is put into practice at the most renowned industry representatives and become more successful in the labour market of this highly competitive sector. Students learn how to work in the working environment of multi-national companies and adapt to challenges easily. After graduation they will be able to work at a strategic decision-making level, giving priority to efficiency and engineering ethics.

The Faculty of Engineering offers a great variety of BSc, MSc courses and post-graduate training courses tailored to the needs of the rapidly changing world of engineering and focusing on European and international trends. In 2011 the Faculty of Engineering launched engineering trainings in English. In order to optimize the quality of training, the Faculty continuously strives to expand the number of industrial and educational partners at home and abroad.

The Faculty of Engineering has been a pioneer in the introduction of Quality Management System at faculty level to measure and evaluate the efficiency of its education and

teaching staff in order to improve the quality of education and training from the feedback received.

The Faculty of Engineering has a vivid student life. There is a film club waiting for movie buffs and the door of the Faculty library is always open. The library is not only the host to the latest technical books, exhibitions and tea afternoons with invited speakers, but students can also purchase theatre and concert tickets from the librarians. The Borsos József Dormitory is also a hub of activities for students.

The increasing number of international students brings cultural and ethnic diversity to the faculty.

Our aim is to aid students to become efficient members of the labour market and enrich the world of engineering in Hungary and abroad with their knowledge and expertise.

ADMINISTRATION UNITS FOR INTERNATIONAL PROGRAMMES

COORDINATING CENTER FOR INTERNATIONAL EDUCATION

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The Coordinating Centre for International Education supports the international degree programmes of the University of Debrecen in giving new students information on admission and entrance exam. It has tasks in promoting and is in charge of tasks like enrolment, study contracts, modifying student status or degree programme, activating student status, modifying students' personal data, requesting and updating student cards, providing certificates for the Immigration Office (for residence permit), issuing student status letters and certificates on credit recognition, concluding health insurance contract and providing Health Insurance Card, helping students with visa process application.

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The International Office has been functioning since 2014 in order to ensure the smooth running of the international degree courses. The office is responsible for student administration (full-time students, full-time transfer students, visiting/Erasmus students), providing certificates for students, considering and accepting requests, solving problems related to course registration, giving information about internship, final exam, thesis, etc.

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Department of Building Services and Building Engineering
Department of Civil Engineering
Department of Engineering Management and Enterprise
Department of Environmental Engineering
Department of Mechanical Engineering
Department of Mechatronics
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ACADEMIC CALENDAR

General structure of the academic year:

Study period	1st week	Registration*	1 week
	2nd – 7th week	Teaching Block 1	6 weeks
	8th week	1st Drawing Week	1 week
	9th – 14th week	Teaching Block 2	6 weeks
	15th week	2nd Drawing Week	1 week
Exam period	directly after the study period	Exams	7 weeks

*Usually, registration is scheduled for the first week of September in the fall semester, and for the first week of February in the spring semester.

ACADEMIC CALENDAR OF THE FACULTY OF ENGINEERING 2021/2022

Opening ceremony of the academic year	5 September 2021 (Sunday)
Registration week	30 August - 3 September 2021
Revision week (exams in Exam courses may be scheduled during this week)	30 August - 3 September 2021
1st semester study period in MSc and BSc programs	6 September - 10 December 2021 (14 weeks) In case of finalist courses: 6 September 2021 - 5 November 2021 (9 weeks)
Reporting period I (Drawing week I)	18 - 22 October 2021 (4 working days without scheduled lessons, consultation schedule announced previously)
Conferences, Career Days	27-29 October 2021
Faculty Conference of Scientific Students' Association	11 November 2021
Reporting period II (Drawing week II)	6-10 December 2021 (5 working days without scheduled lessons, consultation schedule announced previously)

1st semester examination period	13 December 2021 - 28 January 2022 (7 weeks) In case of finalist courses: 8 November - 10 December 2021 (5 weeks)
Thesis (BSc, MSc) submission deadline	As defined by the departments; max. 14 days of the beginning of the final examination period.
Final examination period	As defined by the departments; at least one occasion between 13 December 2021 and 28 January 2022.
Registration week	31 January - 4 February 2022
2nd semester study period in MSc and BSc programs	7 February - 13 May 2022 (14 weeks) In case of finalist courses: 7 February - 8 April 2022 (9 weeks)
Reporting period I (Drawing week I)	21 - 25 March 2022 (5 working days without scheduled lessons, consultation schedule announced previously)
Conferences	30 March – 1 April 2022
Career Days – "Industry Days in Debrecen 2021" (working days without teaching for Mechanical Eng. BSc, Mechanical Eng. MSc, Environmental Eng. MSc, Mechatronics Eng. BSc, Mechatronical Eng. MSc, Civil Eng. BSc students)	30 March – 1 April 2022
Career Days and Exhibition in Building Services Engineering (organised by the Department of Building Services and Building Engineering)	5 May 2022
Reporting period II (Drawing week II)	9 – 13 May 2022 (5 working days without scheduled lessons, consultation schedule announced previously).
2nd semester examination period	16 May - 1 July 2022 (7 weeks) In case of finalist courses: 11 April - 13 May 2022 (5 weeks)

Thesis (BSc, MSc) submission deadline	As defined by the departments; max. 14 days of the beginning of the final examination period.
Final examination period	As defined by the departments; at least one occasion between 16 May and 17 June 2022. The departments shall announce the date of the final examination until 15 February 2022.

THE URBAN SYSTEMS ENGINEERING MASTER PROGRAM

INFORMATIONS ABOUT THE PROGRAM

Name of master's program:	Urban Systems Engineering Master's Program
Specializations available:	-
Field, branch:	engineering
Level:	graduate
Qualification:	Urban System Engineer
Mode of attendance:	Full-time
Faculty:	Faculty of Engineering
Program coordinator:	Dr. György Csomós, College Professor
Program length:	4 semesters
Credits total:	120

Objectives of the undergraduate program, competences to be acquired:

The objective of the program is to train urban system engineers who are able to provide and control activities of urban planning, settlement architecture, principal architecture and technical authorities, administrations and the communal, maintenance, organizational, services, environmental and the protection of urban built environment of local governments. Urban systems engineers are prepared at a high level to implement the concepts and programs of urban development and to make design them. They are able to synchronise the development of settlements, groups of settlements and areas to make spatial plans, to manage and control such activities, and to make scientific research of the professional field. The program also functions as preparation for students interested in doing a PhD.

Professional competences to be acquired

An urban systems engineer

a) Knowledge

- knows contemporary theory and practice of urban planning, the interrelationship of theory and practice.
- has acquired the basic knowledge of architecture, engineering, ecology, environmental science, sociology, economy, law and administration.

- is able to interpret and assess maps, plans and technical drawings, the techniques of visualization.
- knows the methods and tools of coordinating and carrying out regional and rural development programs.
- knows complex natural and cultural environmental systems, the latest results, outcomes of the professional field.
- has acquired the knowledge of computer communication, data management and data analysis.
- knows graphic systems (CAD, GIS) and their application in regional and rural planning.
- knows the fundamental principles of environment protection, quality management, consumer protection, product liability, the principles and application of equal access, workplace health and safety, legal regulations of engineering and economy and engineering ethics.
- knows the widely applicable problem solving techniques in research and scientific work.
- knows the characteristics of global social and economic processes that influence urban development and settlement.

b) Abilities

- is able to apply the acquired knowledge and problem solving techniques in practice.
- is able to apply the acquired professional knowledge of the discipline to elaborate new problems and phenomena originates from the lack of experience.
- is able to form, if possible, an accurate judgement or opinion on problems of urban development and to make conclusions.
- is able to design and carry out tasks of settlement and construction at a high professional level.
- is able to manage resources of engineering, as well as economy and human resources.
- is able to provide urban and regional development tasks as a result of his/her system approach and process-oriented thinking.
- is able to apply integrated social, economic, environmental knowledge in the fields of urban settlement, urban development and regional planning.
- is able to make investigations, analyses and structural and regulatory plans involving engineers of different professional branches and aiming at the arrangement of settlements and groups of settlements.
- is able to assess plans of urban development and operations, to analyse them critically and, based on this, to perform the tasks of an urban system architect, a chief architect and tasks of technical authorities, administration.
- is able to organize, synchronise, coordinate and manage the activities of a planning team, to recognize the systems of settlement operation and the links and modes of action of its processes, and to assess and manage them in a system approach.
- He/she is able to apply procedures, models, information technologies used in urban planning, operation and administration.

c) Attitude

- endeavours to acquire developed spatial vision and appropriate visual expression.
- endeavours to solve problems originated by different interests in settlement development and to make decisions that serve public interest.
- is open to cooperate, communicate and negotiate in professional processes.
- endeavours to analyse and make synthesis assessment of the elements related to the built environment.
- is open to participate in comprehensive work of different professional fields, to manage and coordinate team work.
- endeavours to enforce the requirements of energy efficiency and maintenance.
- endeavours to work in a complex manner based on a system approach and a process oriented way of thinking.
- examines the possible researches, developments and innovations and endeavours to fulfil them during his/her work.
- is open to participate in professional trainings that convey up-to-date knowledge.

d) Autonomy and responsibility

- having spent enough time in the profession he/she can manage drawing up plans on settlement development and organization.
- acts proactively and independently when professional problems related to territorial and settlement planning need to be solved.
- has responsibility for sustainable and environmentally aware settlement development.
- makes and takes responsibility for decisions on settlement development and organization, and constructions independently and prudentially consulting with representatives of the relevant areas of expertise (primarily legal, economic, energetic and environmental fields).
- when making a decision, he/she considers environment protection, quality management, consumer protection, product liability, the principle of equal access and application, health and safety at work, engineering, economic and legal regulations, and meets the standards of engineering ethics.

COMPLETION OF THE ACADEMIC PROGRAM

The Credit System

Majors in the Hungarian Education System have generally been instituted and ruled by the Act of Parliament under the Higher Education Act. The higher education system meets the qualifications of the Bologna Process that defines the qualifications in terms of learning outcomes: statements of what students know and can do on completing their degrees. In describing the cycles, the framework uses the European Credit Transfer and Accumulation System (ECTS).

ECTS was developed as an instrument of improving academic recognition throughout the European Universities by means of effective and general mechanisms. ECTS serves as a model of academic recognition, as it provides greater transparency of study programs and student achievement. ECTS in no way regulates the content, structure and/or equivalence of study programs.

Regarding each major the Higher Education Act prescribes which professional fields define a certain training program. It contains the proportion of the subject groups: natural sciences, economics and humanities, profession-related subjects and differentiated field-specific subjects.

The following professional fields define the training program of the **Urban Systems Engineering MSc**:

- Natural sciences: 5 credits;
- Economics and humanities: 5-10 credits;
- Knowledge on design (regional planning, urban planning, architecture, urban infrastructure, transportation, public works, urban environment protection, built heritage protection): 70-80 credits.

Minimum of credit points assigned to optional subjects: 6

Credit points assigned to thesis: 30

Credits total: 120

During the program students have to complete a total amount of 120 credit points. It means approximately 30 credits per semester. The curriculum contains the list of subjects (with credit points) and the recommended order of completing them, which takes into account the prerequisite(s) of each subject. You can find the recommended list of subjects/semesters in chapter “Guideline”.

Guideline (List of Subjects/Semesters)

The total number of credit points (120) of the training program can be obtained by completing the subjects of the curriculum. There is a certain degree of freedom in the order students can complete the subjects. However, it is recommended that the suggested order be followed because some subjects can only be taken after the completion of the prerequisite subject(s), and/or can be the prerequisites for other subjects.

The list of subjects to complete in the semesters according to the model curriculum of Urban Systems Engineering MSc program:

1st semester	2nd semester
Geographic Information Systems (GIS)	Urban Transportation Planning II
Urban Morphology	Public Works I
Urbanization	Greenfield Management
Urban Transportation Planning I	Ecological Planning
Urban Environmental Protection	Urban Planning I
Urban Renewal Processes	Smart Cities
Urban Design	Municipal Administration
Real Estate Development and Management	
3rd semester	**4th semester**
Public Works II	Preparation of the Thesis
Urban Artifacts	
Strategic Environmental Assessment	
Urban Waste Management	
Urban Planning II	
Built Heritage Protection	
Optional Course I	
Optional Course II	

About the prerequisites of each subject please read the chapter “Course Descriptions”!

Work and Fire Safety Course

According to the Rules and Regulations of University of Debrecen students must complete the online course for work and fire safety in the first semester of their studies. Registration for the course and its completion are necessary for graduation. For MSc students the course is only necessary if their BSc diploma has not been awarded by the University of Debrecen.

Registration in the Neptun system by the subject: MUNKAVEDELEM

Students have to watch/read an online material to get the signature on Neptun for the completion of the course. The link of the online course is available on the website of the Faculty.

Internship

Students majoring in the Urban Systems Engineering MSc have to do a four-week-long internship as described in the model curriculum. The internship course must be registered for previously via the NEPTUN system in the spring semester (2th semester). Its completion is required for getting the pre-degree certificate (absolutorium).

Objective of the internship, competences

Students get acquainted with professional work in conformity with their major at a company or institution and join in their daily working process. They have to resolve tasks independently assigned by their supervisor and gain experiences that may be used later in the labour market. During the internship, common and professional competences may be acquired. Common competences: precise working on schedule either individually or in team, ability to communicate applying correct terminology. Professional competences: applying the professional skills gained during the training and acquiring new knowledge.

Places suitable for internship

All the organizations, institutions and companies in Hungary or abroad are suitable which can provide students with the opportunity to acquire proficiency in accordance with their specialization in the field of operation, repairing technology, installation, management and development of different machines and vehicles, may be a suitable place.

All the necessary formal documents can be downloaded from the website of the Faculty of Engineering: www.eng.unideb.hu/en (For Current Students/Graduate Programs in English /Urban Systems Engineering MSc/Internship)

Physical Education

According to the Rules and Regulations of University of Debrecen students must complete Physical Education course at least in one semester during his/her Master's training. Our University offers a wide range of facilities to complete them. Further information is available from the Sport Centre of the University, its website: http://sportsci.unideb.hu.

Optional (elective) courses

According to the Rules and Regulations of University of Debrecen students must complete elective courses during their MSc studies. These elective courses are opened by the Departments at the Faculty of Engineering at the beginning of the actual semester. Students can also select optional courses offered by other faculties of University of Debrecen to complete but these courses are accepted as 3 credits maximum. Optional subjects can be completed in any semester and with any number of subjects.

Please note that courses completed on Erasmus scholarship often can be transferred as elective subjects into your curriculum.

In the Urban Systems Engineering MSc program, one must gain at least 6 credits by completing elective subjects.

Pre-degree Certification

A pre-degree certificate is issued by the Faculty after completion of the master's (MSc) program. The pre-degree certificate can be issued if a student has successfully completed the study and exam requirements as set out in the curriculum, the requirements related to Physical Education as set out in Section 10 in Rules and Regulations, internship (mandatory) – with the exception of thesis preparing – and gained the necessary credit points (120). The pre-degree certificate verifies (without any mention of assessment or grades) that the student has fulfilled all the necessary study and exam requirements defined in the curriculum and the requirements for Physical Education. Students who obtained the pre-degree certificate can submit the thesis and take the final exam.

Thesis

Thesis is the creative elaboration of a professional task (scientific, engineering, design, development, research or research development) in a written form. By solving the task, the student relies on his/her studies using national and international literature under the guidance of an internal and external supervisor (referee). By writing and successfully

defending a thesis, students of the Urban Systems Engineering Master program prove that they are able to apply the acquired knowledge in practice, to summarize the work done and its results in a professional way, to solve the tasks related to their topic creatively, and to complete individual professional work.

Students in the master program must write a thesis as a prerequisite of the final exam. Requirements regarding the content of the thesis, the general aspects of evaluation and the number of credits assigned to it are defined based on the requirements of the program. In case of the Urban Systems Engineering Master Program, the number of credits assigned to the thesis is 30.

Thesis topics are announced by the departments no later than the end of the fourth week of the study period of the last but one semester. Students may also offer a topic for the thesis, which the competent head of department may accept or reject. The conditions on the acceptance of a SSS (Student Scientific Society) paper as a degree thesis are defined by the Faculty. SSS papers are supposed to meet the requirements of a thesis both in form and content. Furthermore, it is necessary that the committee of the Pre-SSS make suggestions on the SSS papers to be accepted as theses.

Formal requirements of thesis shall be designated by the Department of Civil Engineering and must be announced in writing together with other thesis-related assignments.
The preparation of a thesis shall be overseen by an internal supervisor approved by the department, and an external supervisor appointed by an industrial partner or local government entities. The rules of thesis writing and partial deadlines designated by the department must be considered.

The thesis submission deadline is defined in the academic calendar of the Faculty (issued by the Vice-Rector for Education) or, failing that, it is 12 a.m. on the 14th day before the first day of the final exam. The thesis can be submitted only if both the internal and the external supervisors approve. It is evaluated by an independent external reviewer, and the Head of the Department of Civil Engineering makes a suggestion to the Final Examination Board on its classification based on a five-grade scale.

If the reviewer evaluates the thesis firmly as fail, the student may not take the final exam and must create a new thesis. Students must be informed about it. Conditions on resubmitting the thesis are designated by the head of the relevant educational unit responsible for the major or specialization.

Final exam

After receiving the pre-degree certificate, students conclude their studies by taking the final exam of Urban Systems Engineering master program. The final exam shall test and assess the knowledge, skills and abilities requisite to the award of the degree, whereby students shall also prove their ability to apply the acquired knowledge in practice. The conditions for taking the final exam and the parts of the final exam itself shall be defined in the requirements for the training program (see entry 'Completion of studies').

The final exam shall be taken in the examination period following the award of the pre-degree certificate in front of a board formed by internal and external (industrial or profession performing) members. If a candidate does not pass the final exam until the termination of his/her student status, that student can sit for the final exam any time after the termination of his/her student status according to the provisions regarding the final exam, effective at the time of taking the final exam.

In the Urban Systems Engineering MSc, the final exam consists of the thesis defence, which is a 15-minute presentation, followed by a 10-minute debate.

Evaluation of the final exam

The oral examination shall be assessed on a five-grade scale by the members of the final examination board. The board shall then consult behind closed doors and vote about the final grade for the final exam. In case of equal division of the votes, the chairperson shall be given the casting vote. The result of the final exam shall be announced by the chairperson of the board. Minutes shall be taken during the final examination. Partial results and the qualification of the degree must be registered in the lecture book too.

Repeating a failed Final exam

If any part of the final exam is evaluated as fail, according to the existing rules of the university, it can be retaken. The retake of the final exam may be attempted in the following examination period at the earliest. If a thesis is evaluated unanimously as fail, the student may not take the final exam and shall write another thesis. The final exam can be retaken twice per each subject.

The Final Examination Board

The Chairman of the Final Examination Board is adjured from the external and internal experts in the field by the Dean with the support of the Faculty council. According to the tradition of the Faculty a vice chairman is appointed too in case he is unable to be present. A Final Examination Board is formed by at least one external (industrial or profession performing) and two internal members (with a Ph.D. degree). The charge of the Board

lasts for one year. The sequence of the candidates is put out by the Registry Office at the Faculty.

The order of subjects follows the subject list in the model curriculum.

Subject group "Natural Sciences"

Geographic Information Systems (GIS)

Code: MK5GEO1S5TX17-EN

ECTS Credit Points: 5

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 0 + 4

Topics:

GIS tasks of the urban planning procedure. Generation of settlement's spatial information, and realization in GIS environment. Common function of the OPENJump, its structure and appearance. Creating vector database, importing vector data from CAD environment, filling database, generating geometrical objects, editing vector data. Loading raster data. Importing external databases. Joining tables. Thematic map implementation. Integrating the interdisciplinary criteria system (according the URGE project) into a working geographical information system. Spatial and statistical queries according to indicators. Presentation of the results of the queries.

Comparing GIS and CAD applications. Review of an Open JUMP project. Spatial data, vector and raster formats. Attributes. The concept of the sample project. Basic indicators of the project. NDVI, URGE criteria. Building geodatabase, processing data. Queries from own GIS project. Criteria aspect GIS operations. Visualization of the results, charts, cartographic presentations. Discussing of the occurring problems.

The goal of the practice is to train the project approach GIS in a most economical way.

Literature:

Required:

- Paul A. Longley (2005): Geographical information systems and science, ISBN: 047087001X
- CHRISTOPHER B. JONES (1997): Geographical information systems and computer cartography, ISBN: 0582044391.
- http://www.tankonyvtar.hu/hu/tartalom/tamop425/0027_BGD1/index.html
- http://openjump.org

Recommended:

- GEORGE F. PINDER (2002): Groundwater modelling using geographical information systems, ISBN: 0471084980

Schedule

1st week Registration week	
2nd week: **Practice:** Comparing CAM and GIS applications. Various data-sources in GIS. Introduction the OPENJump project.	3rd week: **Practice:** Introduction to OPENJump software. Opening tutorial and sample project tasks. Investigate existing well-working projects.
4th week: **Practice:** Setting of objectives of a GIS project. Converting spatial data. CAM inputs. Loading vector data.	5th week: **Practice:** Processing vector data. Transform and replicate vector data.
6th week: **Practice:** Editing, converting geometric data. Quality control of vector data. Topological monitoring.	7th week: **Practice:** Automated and semi-automated data sources. Extract data by geometry type. Extract data by attribute.
8th week: 1st drawing week	
9th week: **Practice:** Loading raster data into the GIS project. Transformations, corrections.	10th week: **Practice:** Extract geometrical data from raster.
11th week: **Practice:** Loading attributes, filling attribute tables. Edit view/attributes.	12th week: **Practice:** Edit schema, styles.
13th week: **Practice:** Statistical analyses, indicators, queries. Possibilities of the Sextante modul.	14th week: **Practice:** Project presentations, evaluation of the personal project implementation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice is compulsory. Students have to attend the practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date, which is to be discussed with the tutor. Students are required to bring a USB storage drive to each practice. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

Students have to make a GIS project presentation or essay from an existing or an accomplished/working project. If it is correct the student gets a signature.

B, for a grade:

The course ends with a practical grade.

During the semester the students have to make their own GIS project, and they have to send all of the project files to the leader of the practice at the end of the semester. According to the basic requirements of a GIS, the practice leader evaluate the student's work and offer him/her a practical grade. Evaluating consideration: completeness, integrity, operability, through the viewpoints of the acquainted criteria system.

Students can make up or improve their grades at the last week of the semester.

Subject group "Social Sciences"

Urban Morphology

Code: MK5TEL1S02TX17-EN

ECTS Credit Points: 2

Evaluation: exam

Year, Semester: 1st, year 1st semester

Prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

Introduction to urban morphology (UM): different morphological approaches, morphological schools and the aspects of urban forms. Paths of understanding the town from the urban form (Conzen) to the mental perceiving of the city (Lynch) through the flows (space syntax) with the importance of the history (Caniggia). Typo-Morphology. UM as a generative process: everything is a product of a sociocultural process and the type is a bigger notion than the configuration. Hierarchy and the related disciplines of the UM

(history, economics, policies, architecture, geography, transport, planning, aesthetics, sociology, health, philosophy). Urban tissue. Character areas. Morphogenesis (time - form), poly-morphogenesis and the evolution of forms. Different analyses and urban design measures, from the traditional (UM, Typo-Morphology) to the new methods (Spacemate, Morpho) together with pilot methodologies (Morphometrics).

Lectures: interactive + frontal lecture + various tasks at the lectures

Aim (basis of evaluation): at the end of the course students will be able to outline the different urban forms and types, urban tissues and make UM analyses and conclude the character of the fabric independently.

Literature:

Compulsory:

1. Oliveira, V., 2016. Urban Morphology - An Introduction to the Study of the Physical Form of Cities. Springer. ISBN: 978-3-319-32083-0
2. Kropf, K., 2017. The Handbook of Urban Morphology. Wiley. ISBN: 978-1118747698

Recommended:

1. Alexander, C., 1978. A Pattern Language: Towns, Buildings, Construction. Center for Environmental Structure, Berkeley.
2. Caniggia, G. - Maffei, G.L., 2001. Architectural composition and building typology: interpreting basic building. Alinea Editrice.
3. Conzen, M.R.G., Conzen, M.P. ed., 2004. Thinking About Urban Form. Papers On Urban Morphology 1932-1998. Peter Lang.
4. Hillier, B. and Hanson, J., 1984. The social logic of space. Cambridge University Press.

Schedule

1st week Registration week	
2nd week: **Lecture:** Urban Morphology. Introduction – phenomena.	**3rd week:** **Lecture:** Urban Morphology Schools - Approaches.
4th week: **Lecture:** Field trip (joint: Urban Design, Urban Renewal Processes)	**5th week:** **Lecture:** Historico-Geographical Approach. Process Typological Approach. Space Syntax. Spatial Analysis.
6th week: **Lecture:** Case Studies. Comparative Studies of Urban Form.	**7th week:** **Lecture:** Image of the City. Townscape.
8th week: 1st drawing week	

9th week: Lecture: Spacemate. Morpho. Morphometrics.	10th week: Lecture: Practice – Understanding the Urban Form (case studies from the Urban Design Studio).
11th week: Lecture: Case studies – worldwide (presentations by the students – discussion).	12th week: Lecture: Relationships with Other Fields of Knowledge.
13th week: Lecture: From Theory to Practice. Urban Morphology and Planning.	14th week: Lecture: Systematization and discussion. Valorisation and evaluation.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation in lectures is compulsory. Students must attend lectures and may not miss more than three lectures during the semester (11+3). In case of further absences, a medical certification or another official certificate from other authorities must be presented. The attendance is recorded by the lecturer. Being late is equivalent to an absence. In case of unofficially justified absence over the 3 allowed, the subject will not be signed (completed) and the student must repeat the course.

B, for grade:

The final evaluation takes into consideration the performance at the lectures and the grade at the oral exam.

Urbanization

Code: MK5TEL2S4TX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 3 + 0

Topics:

Urbanization and urban geography. The origins and growth of cities and urban life. The U.S. urban system and its cities. Urban systems and cities in transition. Urbanization in less developed countries. Urban forms and land use in less developed countries. Urban

problems and responses in less developed countries. The process of urban development. How neighbourhoods change. The politics of change: urbanization and urban governance. Urban policy and planning. The residential kaleidoscope. The city as text: architecture and urban design. Urbanization, urban life, and urban spaces. Problems of urbanization.

Literature:

Required:

- Knox, P. L. & McCarthy, L., 2012. Urbanization: An introduction to urban geography. Third Edition. Pearson, London. ISBN 978-0-321-73643-7
- Short, J. R., 1996. The urban order: An introduction to cities, culture, and power. Blackwell, Oxford. ISBN 1-55786-361-X

Recommended:

- Jonas, A. E. G., McCann, E. & Thomas, M., 2015. Urban geography: A critical introduction. Wiley Blackwell, Malden-Oxford. ISBN 978-1-4051-8979-8

Schedule

1st week Registration week	
2nd week: Lecture: Urbanization and urban geography.	3rd week: Lecture: The origins and growth of cities and urban life.
4th week: Lecture: The U.S. urban system and its cities.	5th week: Lecture: Urban systems and cities in transition.
6th week: Lecture: Urbanization in the less developed countries.	7th week: Lecture: Urban form and land use in the less developed countries. Urban problems and responses in the less developed countries.
8th week: 1st drawing week	
9th week: Lecture: The urban development process.	10th week: Lecture: How neighbourhoods change.
11th week: Lecture: The politics of change: urbanization and urban governance.	12th week: Lecture: Urban policy and planning.
13th week: Lecture: The residential kaleidoscope. The city as text: architecture and urban design.	14th week: Lecture: Urbanization, urban life, and urban spaces. Problems of urbanization.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at lectures is compulsory. Students have to attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

B, for a grade:

An oral exam has to be taken in order to get a grade.

Subject group "Planning Studies"

Urban Transportation Planning I

Code: MK5KOZ1S4TX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes (Urban Transportation Planning II)

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

Characteristics of road transportation. Road networks, categories. Vehicle proceeding in straight and circular sections. Speeds, impedances. Sight distances. Horizontal and vertical alignment, harmonization. Rural and urban intersections, sizing. Multi-level intersections. Implementing of roads. Planning phases. Agricultural roads. Materials of road structures. Flexible and inflexible road structures.

Literature:

Required:

- W. Kuhn , M.K. Jha: Fundamentals of Road Design (ISBN: 9781845640972)

Schedule

1st week Registration week	
2nd week:	3rd week: **Lecture:** Horizontal and vertical alignment.

Lecture: Road types, standards, design parameters. **Practice**: Map, contour lines.	**Practice**: Site-plan.
4th week: **Lecture:** Horizontal and vertical alignment **Practice**: Long-section.	**5th week:** **Lecture:** Junctions. **Practice**: Long-section.
6th week: **Lecture:** Junctions. **Practice**: practicing calculations.	**7th week:** **Lecture:** Test. **Practice**: Test.
8th week: 1st drawing week	
9th week: **Lecture:** Parking. **Practice**: Typical cross-section.	**10th week:** **Lecture:** Accessibility in transportation. **Practice**: Consultation of homework.
11th week: **Lecture:** Bicycle roads. **Practice**: Consultation of homework.	**12th week:** **Lecture:** Materials of road structures. **Practice**: Materials of road structures.
13th week: **Lecture:** Materials of road structures. **Practice**: Materials of road structures.	**14th week:** **Lecture:** Test. **Practice**: Test.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practices** is compulsory. Students have to attend practice classes and may not miss more than three during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. Attendance will be recorded by the practice leader. Being late counts as an absence. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

During the semester there is one test, at the end of the semester. A student can retake the test once if necessary. The test is valid if the student reaches 51 out of 100 points. A valid test is the requirement for the signature.

During the semester, there is one homework to be submitted. An accepted homework is a requirement for the signature. The homework is valid if it reaches 51 points out of 100. A valid homework is the requirement for the signature.

B, for a grade:

The course ends in an **examination grade**, based on the points of the tests, the homework and the exam. In the exam, further 200 points can be achieved.

Percent/ Grade: 0-50 % = fail (1); 51-62 % = pass (2); 62-73 % = satisfactory (3); 74-85 % = good (4); 86-100 % = excellent (5)

Urban Transportation Planning II

Code: MK5KOZ2S4TX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): Urban Transportation Planning I

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

History and role of public transportation in urban development, urban passenger transport modes, vehicle motion and performance, transit system performance, highway transit and bus rapid transit, rail transit and regional rail transit, unconventional transport systems, specialized technology systems, paratransit, characteristics and comparison of transit modes

Literature:

Required:

- Vukan R. Vuchic: Urban Transit; Wiley; Hoboken, New Jersey; 2007

Recommended:

- Gartner, Improta: Urban Traffic networks, Springer, 1995, ISBN 978-3-642-79641-8
- Bell, Kaparias, Mount: Urban Traffic Engineering and Streetscape Design, Imperial College Press, 2012

Schedule

1st week Registration week	
2nd week: **Lecture:** Basic terms in transportation planning, repetition. **Practice:** Design methods in transportation planning.	**3rd week:** **Lecture:** History and role of urban transport services. **Practice:** Capacity evolution of urban transport services.

4th week: **Lecture:** The different transport modes, terms, attributes, costs. **Practice:** Transport modes, calculation practice.	**5th week:** **Lecture:** Network principles. 101 basics in modelling of transport systems. Traffic control and influencing. **Practice:** Handling of homework.
6th week: **Lecture:** Environmental impacts of traffic. Air pollution, noise, groundwater hazard, animal life. **Practice:** Reduction principles on environmental impacts. Active and passive cutback possibilities.	**7th week:** **Lecture:** Rail transit. Railway planning. Introduction to trackbound design. Repetition of Bachelor level knowledge. General approach and issues. **Practice:** Consultation of homework.
8th week: 1st drawing week	
9th week: **Lecture:** Rail transit. Urban rail transit. Typical planning considerations. **Practice**: Case studies of European and Asian cities.	**10th week:** **Lecture:** Rail transit, regional rail transit. State-of-the-art systems on commuter traffic. **Practice:** Consultation of homework.
11th week: **Lecture:** Alternative transit options. Bus rapid transit. Design principles. **Practice:** Streetscape design issues.	**12th week:** **Lecture:** Unconventional urban transport systems. Trackbound types and other cabin systems. **Practice:** Consultation of homework.
13th week: **Lecture:** Paratransit, disability categories, properties, costs. **Practice:** Planning issues about of paratransit.	**14th week:** **Lecture:** Mid-term test. **Practice:** Handling of homework.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at **practices** is compulsory. Students have to attend practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. Attendance be recorded by the practice leader. Being late counts as an absence. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

There is one test, at the end of the semester. A student can retake the test once if necessary. The test is valid if it reaches 51 points out of 100. A valid test is the requirement for the signature.

During semester, there is one homework to be submitted. An accepted homework is a requirement for the signature. The homework is valid if it reaches 51 out of 100 points. A valid homework is the requirement for the signature.

B, for a grade:

The course ends in an **examination grade**, based on the points of the tests, the homework and the exam. At the exam, further 200 points can be achieved.

Percent/ Grade: 0-50 % = fail (1); 51-62 % = pass (2); 62-73 % = satisfactory (3); 74-85 % = good (4); 86-100 % = excellent (5)

Public Works I

Code: MK5VIZ1S4TX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes (Public Works II)

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

This course presents basic technical parameters of water public work, water consumption and its features. Water resources in Hungary (in Europe). Water quality and water classification. Physical, chemical and biological parameters. Water purification methods. Water supply system. Drinking water distribution system, network.

The basic designing instructions are presented for drinking water distribution system.

Literature:

Required:

- Jonathan T. Ricketts, M. Kent Loftin, Frederick S. Merritt, **Standard Handbook for Civil Engineers**, McGraw-Hill Publishing Company, 2003; ISBN 0-07-136473-0

Recommended:

- Melvyn Kay, **Practical Hydraulics**, Taylor and Francis Group, 2008; ISBN 978-0-415-35115-7

Schedule

1st week Registration week	
2nd week: **Lecture:** Technical parameters of water public work. **Practice:** General public works plan of the street.	3rd week: **Lecture:** Water consumption and its features. **Practice: Semester task issuing**
4th week: **Lecture:** Water resources in Hungary (in Europe). **Practice:** Consultation.	5th week: **Lecture:** Type of water resources. **Practice:** Consultation.
6th week: **Lecture:** Water quality and water classification. Physical, chemical and biological parameters. **Practice:** Checking the water quality on website of Water Works Ltd.	7th week: **Lecture:** Water purification methods. **Practice:** Pipes and fittings.
8th week: 1st drawing week	
9th week: **Lecture:** Drinking water distribution system, network. **Practice:** Pumps and pump curves.	10th week: **Lecture:** Designing instructions for drinking water distribution system. **Practice:** Consultation.
11th week: **Lecture:** Hardy-Cross method theory. **Practice:** Practical application of Hardy-Cross method.	12th week: **Lecture:** EPANET program. **Practice:** Input data for Epanet 2.0 modelling program.
13th week: **Lecture: :** Presentation of Epanet program results. **Practice:** Graphical presentation of results.	14th week: **Lecture:** Discussion of Epanet program. **Practice:** Semester task finishing.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice is compulsory. Students have to attend the practices and may not miss more than three practice classes during the semester. In case a student does so, the

subject will not be signed and the student must repeat the course. The attendance on practice will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented.

B, for a practical grade:

Semester task must be done in a good technical quality.

Public Works II

Code: MK5VIZ2S4TX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Public Works I

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

This course presents basic technical parameters types of sewers. Group the sewer systems. Combined sewer system and separated sewer system. Pressure sewer system, vacuum sewer system.

Estimating wastewater flow. Sewer design. Storm water inlets. Manholes. The basic designing instructions are presented for public utilities.

Literature:

Required:

- Jonathan T. Ricketts, M. Kent Loftin, Frederick S. Merritt, **Standard Handbook for Civil Engineers**, McGraw-Hill Publishing Company, 2003; ISBN 0-07-136473-0
- Melvyn Kay, **Practical Hydraulics**, Taylor and Francis Group, 2008; ISBN 978-0-415-35115-7

Schedule

1st week Registration week	
2nd week: **Lecture:** Group the sewer systems. **Practice:** Film presentation.	**3rd week:** **Lecture:** Technical parameters, types of sewers. **Practice:** Semester task issuing.
4th week:	**5th week:**

Lecture: Pressure sewer system. **Practice:** Estimating wastewater flow.	**Lecture:** Vacuum sewer system. **Practice:** Discussion.
6th week: **Lecture:** Sewer design theory. **Practice:** Dimension the gravity waste water pipe.	**7th week:** **Lecture:** Modelling programs for sewer design. **Practice:** Consultation.
8th week: 1st drawing week	
9th week: **Lecture:** SWMM program presentation. **Practice:** Storm water inlets.	**10th week:** **Lecture:** Pipe systems and materials. **Practice:** Discussion of pipe systems.
11th week: **Lecture:** New pressure sewer system. **Practice:** Dimension the gravity storm water pipe.	**12th week:** **Lecture:** Manholes in the sewer system. **Practice:** Place of the manholes.
13th week: **Lecture:** Type and function of the manholes. **Practice:** Practical examples.	**14th week:** **Lecture:** Discussion of semester work and conclusions. **Practice:** Semester task finishing and submit.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at **lectures** is recommended, but not compulsory.

Participation at **practice** is compulsory. Students have to attend the practice classes and may not miss more than three times during the semester. Students cannot make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course to each practice. Active participation is evaluated by the teacher in every class. If a student's behaviour or conduct does not meet the requirements of active participation, the teacher may evaluate his/her participation as an absence due to the lack of active participation in class.

Students have to **submit semester drawing task** as scheduled minimum at a sufficient level.

B, for a grade:

The course ends in a colloquium. Based on the average of the mark of the drawing and the colloquium result, the grade is calculated as an average of them.

Urban Artifacts

Code: MK5TAR1S3TX17-EN

ECTS Credit Points: 3

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

History of bridges. Bridges classes. Norms and preliminary works. Foundations, substructures and equipment. Dilatations. Structure and building techniques of steel bridges. Steel beam bridges. Steel frame, arch and suspension bridges. Orthotropic plates. Structure and building techniques of concrete bridges. Concrete beam, frame and arch bridges. Prestressing techniques. Precast pretensioned girder bridges. Concrete box girders. Structures and building techniques of cable-stayed bridges. Composite and timber bridges. Test loading, monitoring and maintenance and strengthening techniques. Reservoirs, bunkers water-towers.

Literature:

Required:

- M. J. Ryall, G. A. R. Parke, J. E. Harding (2000): The Manual of Bridge Engineering, Thomas Telford
- H. G. Tyrrell (2008): History of Bridge Engineering; Stubbe Press

Recommended:

- fib Bulletin N° 39. Seismic bridge design and retrofit - structural solutions. State-of-art report (300 pages, ISBN 978-2-88394-079-6, May 2007).
- fib Bulletin N° 32. Guidelines for the design of footbridges. Guide to good practice (160 pages, ISBN 978-2-88394-072-7, November 2005).
- fib Bulletin N° 30. Acceptance of stay cable systems using prestressing steels. Recommendation (80 pages, ISBN 978-2-88394-070-3, January 2005)
- fib Bulletin N° 29. Precast concrete bridges. State-of-art report (84 pages, ISBN 978-2-88394-069-7, November 2004).
- fib Bulletin N° 9. Guidance for good bridge design. Part 1 – Introduction. Part 2 – Design and construction aspects. Guide to good practice (190 pages, ISBN 978-2-88394-049-9, July 2000).

Schedule

1st week Registration week	
2nd week: **Lecture:** History of bridges. Classes of bridges.	3rd week: **Lecture:** Norms and preliminary works.
4th week: **Lecture:** Foundations, substructures and equipment. Dilatations.	5th week: **Lecture:** Structure and building techniques of steel bridges. Steel beam bridges.
6th week: **Lecture:** Steel frame, arch and suspension bridges. Orthotropic plates.	7th week: Study trip.
8th week: 1st drawing week	
9th week: **Lecture:** Structure and building techniques of concrete bridges. Concrete beam, frame and arch bridges.	10th week: **Lecture:** Prestressing techniques. Precast pretensioned girder bridges. Concrete box girders.
11th week: **Lecture:** Structures and building techniques of cable-stayed bridges. Composite and timber bridges.	12th week: **Lecture:** Test loading, monitoring and maintenance and strengthening techniques.
13th week: **Lecture:** Reservoirs, bunkers water-towers.	14th week: Study trip.
15th week: 2nd drawing week / Test / Presentations	

Requirements

Attending the **lectures** is **compulsory**. Students must attend lectures and may not miss more than three lectures during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the staff of the department. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator and the printed materials of the lectures with them to each lecture. Active participation is evaluated by the teacher in every class. Active participation is required from students. Students have to **submit a test and a presentation** as scheduled minimum at a sufficient level.

A, for a signature:

A student has to reach at least 40 points out of the 60 points on the test and at least 21 points out of the 40 points on presentation. The presentation has to be handed in personally. One will get questions about the presentation on it.

B, for mid-semester grade:

The course ends with mid-semester grade. Based on the summa points of the test and the presentation, the mid-semester grade is defined in the following way:

Test:	Maximum:	**60 points**	Minimum:	**40 points**
Homework:	Maximum:	**40 points**	Minimum:	**21 points**
Summa points:	Maximum:	**100 points**	Minimum:	**61 points**

Score / grade: 0 – 60 points: fail (no signature); 61 – 70 points: pass (2); 71 – 80 points: satisfactory (3); 81 – 90 points: good (4); 91 – 100 points: excellent (5)

Urban Environmental Protection

Code: MK5TKOVK3TX17-EN
ECTS Credit Points: 3
Evaluation: exam
Year, Semester: 1st year, 1st semester
Its prerequisite(s): -
Further courses are built on it: No
Number of teaching hours/week (lecture + practice): 2 + 0

Topics:
This series of lectures is based on the topics of urban environmental issues. Characterization of environmental elements. The impact of urbanization on the urban environment and urban metabolism. Green chemistry, chemicals in the environment: their fate and transport. Transport processes in the environment. Air pollution sources in urban environment. Basic atmospheric phenomena. Air pollution modelling. Urban air quality, monitoring and biomonitoring network. Impacts of air pollution. Policies and legislation. Water resource systems. Aquatic chemistry. Water quality control. Water and wastewater treatment technology. The importance of soil, soil origin and development. Soil conversation, erosion, deflation. Characteristics of urban soils. Definitions of waste, waste arising. Methods of characterizing municipal solid waste. The variability of municipal solid waste generation. History of waste treatment and disposal. Waste

recycling, economic considerations. Introduction to waste management. Fundamentals of noise and vibration, noise propagation, noise pollution and noise measurements.

Literature:

Required:

- Andrew Farmer: Handbook of Environmental Protection and Enforcement: Principles and Practice (Hardcover), 294 pages, 2007, ISBN-13: 978-1844073092
- Mukesh Doble: Green Chemistry and Engineering (Hardcover), 381 pages, 2007 ISBN-13: 978-0123725325
- Jerry A. Nathanson, Richard A. Schneider: Basic Environmental Technology: Water Supply, Waste Management and Pollution Control. Prentice Hall (6th Edition, 2015), 456 pages, ISBN-13: 9780132840149

Recommended:

- Trevor Letcher, Daniel Vallero: Waste: A Handbook for Management. Academic Press (1st edition, 2011), 604 pages, ISBN 9780123814753

Schedule

1st week Registration week	
2nd week: **Lecture:** The basic concepts of environmental protection and management. Characterization of environmental elements.	**3rd week:** **Lecture:** The impact of urbanization on the urban environment and urban metabolism. Green chemistry, chemicals in the environment: their fate and transport. Environmental analysis.
4th week: **Lecture:** Transport processes in the environment.	**5th week:** **Lecture:** Air pollution sources in urban environment. Basic atmospheric phenomena.
6th week: **Lecture:** Air pollution modelling. Urban air quality, monitoring and biomonitoring network. Impacts of air pollution.	**7th week:** **Lecture:** Water resource systems. Aquatic chemistry.
8th week: 1st drawing week	
9th week: **Lecture:** Water quality control. Water and wastewater treatment technology.	**10th week:** **Lecture:** Protection of Nature and Landscape.
11th week:	**12th week:**

Lecture: The importance of soil, soil origin and development. Soil conversation, erosion, deflation. Characteristics of urban soils.	**Lecture:** Definitions of waste, characteristics of municipal solid waste streams. The variability of municipal solid waste generation. Basics of waste treatment and disposal. Introduction to waste management.
13th week:	**14th week:**
Lecture: Fundamentals of noise and vibration, noise propagation, noise pollution and noise measurements.	**Lecture:** Visit to the Local waste water treatment plant.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Active participation is requested and evaluated by the teacher in every class. There are no tests during the semester.

B, for a grade:

The course ends in a written exam covering the whole semester material and the students get a grade on the base of its result. The minimum requirement for the end-term test is 60%.

The grade for the tests is given according to the following (score/grade):

0 – 59: fail (1); 60 – 69 points: pass (2); 70 – 79 points: satisfactory (3); 80 – 89 points: good (4); 90 – 100 points: excellent (5)

If the score of the end-term test is below 60, the student will be allowed to write it again and improve their grades.

Greenfield Management

Code: MK5KOR1S3TX17-EN

ECTS Credit Points: 3

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

The main goal of the course is to introduce the greenfield types and their management as these areas and objects can help to manage the environmental challenges – including climate change induced pressures (e.g. flash floods) and pollution - of urban areas in a sustainable and cost effective way.

Therefore, the students get basic knowledge on greenfield systems, their multifunctional values and benefits as well as on anthropogenic impacts on urban green surfaces. By introducing techniques and strategies for improving urban ecological sustainability, along with good practices and weak solutions, students will be able to understand the importance of integrated greenfield, urban and landscape management.

The greenfield management and ecological planning courses side by side provide an integrated approach and knowledge on sustainable urban management.

Literature:

Required:

- John W. Dover, Green infrastructure, *Incorporating plants and enhancing biodiversity in buildings and urban environments*, Routledge Taylor and Francis Group, London and New York, 2015, ISBN 978-0-415-52123-9
- Kimberly Etingoff, Urban Ecology, *Strategies for Green Infrastructure and Land Use*, Apple Academic Press Taylor and Francis Group, Oakville, Canada, 2016, ISBN: 13: 978-1-77188-281-1

Recommended:

- Green space strategies, *a good practice guide*, Commission for the Architecture and Built Environment, UK, London, 2004 pp. 44
- GreenKeys Manual, A Strategy for urban green space (2008), URL: https://www.ioer.de/greenkeys/Greenkeys_Tools/manual.htm
- Harnik, P., Urban Green, *Innovative Parks for Resurgent Cities*, Island Press, Washington DC, 2010, pp. 208
- Palazzo, D. and Steiner, F. R., Urban Ecological Design, *A Process for Regenerative Spaces*, Island Press, Washington DC, 2011, pp. 328

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction to greenfield types and functions.	**3rd week:** **Lecture:** Green roofs and green walls.
4th week: **Lecture:** Urban ecosystems and the city as ecosystem.	**5th week:** **Lecture:** Ecosystem services of various greenfield systems.
6th week:	**7th week:**

Lecture: Impacts of green areas on urban climate and air quality.	**Lecture:** Impacts of green areas on the urban hydrological cycle. Green solutions.
8th week: 1st drawing week	Visiting the "passive house" of the university.
9th week: **Lecture:** Impacts of green areas on human health and well-being.	**10th week:** **Lecture:** Anthropogenic pressures and impacts on green fields
11th week: **Lecture:** Sustainable management and development strategies for greenfield.	**12th week:** **Lecture:** Green Infrastructure Strategy – a new approach.
13th week: **Lecture:** Best practices and weak solutions around the world.	**14th week:** **Lecture:** Visiting Debrecen's different greenfield types.
15th week: 2nd drawing week: TEST	

Requirements

A, for a signature:

Participation at practice is compulsory. Students have to attend practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. Attendance at practice will be recorded by the practice leader Students write a test at the end of the semester, and present the result of their group work carried out during the course.

Test: Maximum: 100 points (Minimum: 60 points)

B, for a grade:

The grade of the test and the presentation defining the mid-semester grade.

The grade is given according to the following (score/grade): 0 – 59: fail (1); 60 – 69 points: pass (2); 70 – 79 points: satisfactory (3); 80 – 89 points: good (4); 90 – 100 points: excellent (5)

Strategic Environmental Assessment

Code: MK5KOR2S5TX17-EN

ECTS Credit Points: 5

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

Students will learn the method of SEA through Objectives and field of application; Provisions on screening and exemptions; sustainability aspects; criteria for determining the likely significance of effects; the relevant Directive; level of detail; SEA and other forms of assessment; Requirements for consultation; five Stages of SEA; the SEA and the report; assessing alternatives; Content of the Environmental Report; Monitoring acquirements. Based on this study they will be able to manage the process of an assessment or to evaluate a report.

Literature:

Required:

- DIRECTIVE 2001/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 June 2001 on the assessment of the effects of certain plans and programs on the environment
- A Practical Guide to the Strategic Environmental Assessment Directive; ISBN 1851127887
- Strategic Environmental Assessment in Policy and Sector Reform 211., ISBN: 978-0-8213-8559-3
- INTEGRATING THE ENVIRONMENT INTO STRATEGIC DECISION-MAKING: CONCEPTUALIZING POLICY SEA William R. Sheate, Suzan Dagg, Jeremy Richardson, Ralf Aschemann, Juan Palerm and Ulla Steen European Environment Eur. Env. 13, 1–18 (2003) Published online in Wiley InterScience DOI: 10.1002/eet.305

Recommended:

- Monica Fundingsland Tetlow & Marie Hanusch (2012) Strategic environmental assessment: the state of the art, Impact Assessment and Project Appraisal, 30:1, 15-24, DOI: 10.1080/14615517.2012.666400
- White L, Noble BF, Strategic environmental assessment for sustainability: A review of a decade of academic research, Environ Impact Asses Rev (2012)

Schedule

1st week Registration week	
2nd week: **Lecture:** Background and Context of the SEA: Objectives and requirements; field of application; Provisions on screening and exemptions; The level of detail in SEA; SEA and other forms of assessment.	**3rd week:** **Lecture:** SEA and Sustainable Development. **Practice:** Examples; consultation of the task.

Practice: introducing the task, which is a study.	
4th week: **Lecture:** Stages of SEA: 1st stage - Setting the context and objectives, establishing the baseline and 26 deciding on the scope. **Practice:** examples; consultation of the task.	**5th week:** **Lecture:** Stages of SEA: 2nd stage - Developing and refining alternatives and assessing effects **Practice:** Examples; consultation of the task.
6th week: **Lecture:** Stages of SEA: 3rd stage - Preparing the Environmental Report. **Practice:** Content of the report; examples; consultation of the task.	**7th week:** **Lecture:** Stages of SEA: 4th stage - Consultation and decision-making; 5th stage - Monitoring implementation of the plan or program. **Practice:** Examples; consultation of the task.
8th week: 1st drawing week	
9th week: **Lecture:** Case studies. **Practice:** Students' presentations based on their studies.	**10th week:** **Lecture:** Case studies. **Practice:** Students' presentations based on their studies.
11th week: **Lecture:** Case studies. **Practice:** Students' presentations based on their study.	**12th week:** **Lecture:** Case studies. **Practice:** Students' presentations based on their study.
13th week: **Lecture:** Test. **Practice:** Students' presentations based on their study.	**14th week:** **Lecture**: Improvement chance of the test. **Practice:** Students' presentations based on their study.
15th week: 2nd drawing week	

Requirements

A, for a signature: Completing and presenting their study; writing the test with a minimum result of 30%.

B, for a grade: Signature and writing the test with a minimum result of 61%.

Urban Waste Management

Code: MK5HUGKK3TX17-EN

ECTS Credit Points: 3

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

This subject aims to cover different areas of waste management. Legislation and regulation of wastes. European Union waste management policy, waste strategy in the EU. Municipal solid waste (MSW), hazardous waste, sewage sludge, and other wastes. Life cycling analysis of materials recycling. Waste containers, collection systems, transport. The logistics of solid waste collection. Types of collection systems, equipment, and personnel requirements. The economics of waste management. Options of waste treatment and disposal. Waste landfill, types of waste landfilled. Waste incineration, incineration technologies. Other waste treatment technologies: pyrolysis, gasification, composting, anaerobic digestion. Composting of municipal solid wastes. Environmental, public, and industrial health considerations. Hazardous waste definition, classification and generation. Green engineering and sustainable design aspects. Integrated waste management strategies.

Literature:

Required:

- Jerry A. Nathanson, Richard A. Schneider: Basic Environmental Technology: Water Supply, Waste Management and Pollution Control. Prentice Hall (6th Edition, 2015), 456 pages, ISBN-13: 9780132840149
- George Tchobanoglous and Frank Kreith: Handbook of Solid Waste Management. McGraw-Hill Education (2nd edition, 2002), 950 pages, 2002, ISBN-13: 9780071356237

Recommended:

- Paul T. Williams, Waste Treatment and Disposal. John Wiley & sons, Ltd. (2nd edition, 2005), 392 pages, ISBN-13: 9780470849132
- Trevor Letcher, Daniel Vallero: Waste: A Handbook for Management. Academic Press (1st edition, 2011), 604 pages, ISBN 9780123814753
- Alireza Bahadori: Waste Management in the Chemical and Petroleum Industries, Wiley, 2013. ISBN: 978-1-118-73175-8

Schedule

1st week Registration week	
2nd week: Lecture: The current situation and challenges of waste management in the	3rd week: Lecture: Legislation and regulation of wastes. European Union waste management policy, waste strategies.

world. Environmental, public, and industrial health considerations.	
4th week: **Lecture:** Options of waste treatment and disposal. The economics of waste management. Waste management plans.	5th week: **Lecture:** The logistics of solid waste collection. Waste containers, types of collection systems, equipment, and personal requirements.
6th week: **Lecture:** Waste landfill, types of waste landfilled. Landfills for hazardous waste, for non-hazardous waste, and for inert waste.	7th week: **Lecture:** Waste incineration, incineration technologies. Negative effects on the environment caused by the incineration of waste. Operational conditions, technical requirements, and emission limit values for incineration and co-incineration plants.
8th week: 1st drawing week	
9th week: **Lecture:** Life cycling analysis of materials recycling. Recyclable materials, municipal recycling facilities. Turning waste into a resource and build up a circular economy.	10th week: **Lecture:** Composting, anaerob digestion. Composting of municipal solid wastes. Treatment methods for biodegradable waste.
11th week: **Lecture:** Other waste treatment technologies: pyrolysis, gasification. Shipment of waste around the world.	12th week: **Lecture:** Green engineering and sustainable design aspects. Integrated waste management strategies.
13th week: **Lecture:** Processing and utilization of plastic and rubber wastes, degradable plastics and their significance in waste management.	14th week: **Lecture:** Waste from the chemical industry, their handling and utilization.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory. Active participation is requested and evaluated by the teacher in every class. There are no tests during the semester.

B, for a grade:

The course ends in a written exam covering the whole semester material and the students get a grade on the bases of its result. The minimum requirement for the end-term test is 60%.

The grade for the tests is given according to the following (score/grade):

0 – 59: fail (1); 60 – 69 points: pass (2); 70 – 79 points: satisfactory (3); 80 – 89 points: good (4); 90 – 100 points: excellent (5)

If the score of the end-term test is below 60, the student will be allowed to write it again and improve their grades.

Ecological Planning

Code: MK5KOR3S5TX17-EN

ECTS Credit Points: 5

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s):

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

This course has two main objectives. The first is to describe the basic science of ecology as well as environmental pressures and impacts. The second is to introduce and explain key ecological concepts/tools, as well as new approaches and good methods in design and planning in the field of sustainable urban development and landscape management.

Literature:

Required:

- Jari Niemäla, Urban Ecology, Patterns, Processes and Applications, Oxford University Press, 2014, ISBN 978-0-19-964395-0

Recommended:

- Perlman, D. L., Milder, Practical Ecology for Planners, Developers, and Citizens. Island Press. 2004, ISBN-10 1559637161
- Forster Ndubisi, Ecological Planning, Johns Hopkins University Press, 2002, ISBN 13: 9780801868016

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction of the ecological approach in planning processes. New ideas and tools.	**3rd week:** **Lecture:** Environmental pressures and impacts.

Practice: Explaining the goals and elements of group work. Forming groups among students, case study selection.	**Practice:** Group work: Analysing the environmental pressures and impacts in the case study.
4th week: **Lecture:** Systems thinking and design thinking – the new way of planning and design. **Practice:** Group work: Elaborating a conceptual model, a DPSIR model and a Leopold Matrix for the case study.	**5th week:** **Lecture:** Settlement as ecosystem. The role and importance of ecosystems in urban areas. Interactions between natural and manmade environments. **Practice: Group work:** Group work: Analysing the interactions and the ecosystem services in the case study.
6th week: **Lecture:** Sustainable building and urban development and planning – ecological approach applied in engineering. **Practice:** Group work: Listing the ecological planning tools to be applied.	**7th week:** **Lecture:** Smart cities. (water, waste and energy issues), **Practice:** Group work: Analysing the ecological planning tools to be applied.
8th week: 1st drawing week	**Field trip**
9th week: **Lecture:** Sponge cities, green cities. **Practice:** Group work: Analysing the ecological planning tools to be applied.	**10th week:** **Lecture:** Renewable energy sources. **Practice:** Weak solutions and good practices.
11th week: **Lecture:** Management of point and diffuse pollution sources. **Practice:** Weak solutions and good practices.	**12th week:** **Lecture:** Introduction into Ecohydrology. Ecological aspects in the water management and rural planning. Engineering measures in wetlands (goals, types and impacts). **Practice:** Weak solutions and good practices.
13th week: **Lecture:** Integrated river basin management. The ecohydrological approach (cont.). **Practice:** Finalizing group work.	**14th week:** **Lecture:** Integrated rural and urban development for the sustainability. **Practice:** Presentation of group work.
15th week: 2nd drawing week: Test	

Requirements

A, for a signature:

Participation at practice is compulsory. Students have to attend practice classes and may not miss more than three times during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. Attendance at practice will be recorded by the practice leader. Students write a test at the end of the semester, and present the result of their group work carried out during the course.

Test:	Maximum:	50 points
Presentation:	Maximum:	50 points
Summa:	100 points	(Minimum: 60 points)

B, for a grade:

The grade of the test and the presentation defining the mid-semester grade.

The grade is given according to the following:

0 – 59: fail (1); 60 – 69 points: pass (2); 70 – 79 points: satisfactory (3); 80 – 89 points: good (4); 90 – 100 points: excellent (5)

Urban Renewal Processes

Code: MK5MAG1S03TX17-EN

ECTS Credit Points: 3

Evaluation: mid-semester grade

Year, Semester: 1st, year 1st semester

Prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

Phenomena, tools and procedures of urban rehabilitation processes via actual, already finalized or ongoing programmes in the EU and worldwide. Segregation. Improvement of housing conditions as an essential criterion of these actions. Good and bad practices: explanation along with the structural, economic, legal background of the projects. Urban heritage. Discussion and profound analysis of the urban renewal programmes. The future path of more efficient rehabilitation.

Studio: urban rehabilitation is an integrated part of the Urban Design Studio (design task). Lectures: interactive + frontal lecture + various tasks at the lectures

Literature:

Recommended:

5. Fitz, A. -Krasny, E. -Architekturzentrum Wien, 2019. Critical Care: Architecture and Urbanism for a Broken Planet. The MIT Press, Cambridge/London. ISBN 978-0-262-53683

6. Council of Europe, 2005. Guidance on urban rehabilitation. Council of Europe Publishing, Strasbourg. ISBN 978-92-871-5528-3
7. UNESCO, 2016. Culture: urban future; global report on culture for sustainable urban development. UNESCO, Paris. ISBN:978-92-3-100170-3
8. Case Studies: Social Rehabilitation, Industrial Heritage, Evaluation of Urban Renewal Processes. Collected articles and handbooks are going to be available on the e-learning platform.

Schedule

1st week Registration week	
2nd week: **Lecture:** Urban renewal processes. Introduction – phenomena.	3rd week: **Lecture:** Urban Rehabilitation. Case Studies.
4th week: **Lecture:** Field trip (joint: Urban Design, Urban Morphology)	5th week: **Lecture:** Urban Revitalisation. Case Studies.
6th week: **Lecture:** Segregation. Social Urban Rehabilitation. Case Studies.	7th week: **Lecture:** Functional Urban Rehabilitation. Case Studies.
8th week: 1st drawing week	
9th week: **Lecture:** Urban Rehabilitation Towards Urban Sustainability and Resilience.	10th week: **Lecture:** Changing neighbourhoods. Social Inclusion.
11th week: **Lecture:** Acts and policies: individual case studies.	12th week: **Lecture:** Urban Heritage. UNESCO and local authorities. Case Studies.
13th week: **Lecture:** How to include urban renewal in the urban design process.	14th week: **Lecture:** Systematization and discussion. Valorisation and evaluation.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation in lectures is compulsory. Students must attend lectures and may not miss more than three lectures during the semester (11+3). In case of further absences, a medical certification or another official certificate from other authorities must be presented. The attendance is recorded by the lecturer. Being late is equivalent to an

absence. In case of unofficially justified absence over the 3 allowed, the subject will not be signed (completed) and the student must repeat the course.

B, for grade:

The final evaluation takes into consideration the performance at the lectures and the Urban Rehabilitation section of the Urban Design Studio.

Urban Planning I

Code: MK5MAG2S5TX17-EN

ECTS Credit Points: 5

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: Yes (Urban Planning II)

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

The first part of the course entitled "Urban Planning" focuses on the process of urban development. Main topics are as follows: goals, technics, participants, and resources of urban development. Students will be able to produce urban development plans like feasibility study, urban development concept, and integrated urban development strategy.

Literature:

Required:

- Weber, R. & Crane, R. (Eds.), 2012: The Oxford Handbook of Urban Planning. Oxford University Press, Oxford. ISBN 978-0-19-023526-0
- Bayer, M., Frank, N. & Valerious, J., 2010: Becoming an Urban Planner. John Wiley and Sons, Hoboken, NJ. ISBN 978-0-470-27863-5

Recommended:

- Gehl, J., 2010: Cities for People. Island Press, 978-1597265737

Schedule

1st week Registration week	
2nd week: **Lecture:** Challenges that cities are facing worldwide. Urban development as response for the challenges.	**3rd week:** **Lecture:** Goals, methods, participants, and resources of urban development. Sustainable urban development.

Practice: Investigating challenges that cities are facing worldwide.	**Practice**: Planning the urban development process.
4th week:	**5th week:**
Lecture: The basis of the urban development process: The Feasibility study	**Lecture:** The basis of the urban development process: The Feasibility study
Practice: Creating a Feasibility study.	**Practice**: Creating a Feasibility study.
6th week:	**7th week:**
Lecture: Long-term goals of the urban development process: The Urban development concept.	**Lecture:** Long-term goals of the urban development process: The Urban development concept.
Practice: Creating an Urban development concept.	**Practice**: Creating an Urban development concept.
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture: Planning operative development projects: The Integrated urban development strategy.	**Lecture:** Planning operative development projects: The Integrated urban development strategy.
Practice: Creating an Integrated urban development strategy.	**Practice**: Creating an Integrated urban development strategy.
11th week:	**12th week:**
Lecture: Case studies: urban development in Europe.	**Lecture:** Case studies: urban development in Northern America.
Practice: Analysing selected case studies.	**Practice**: Analysing selected case studies.
13th week:	**14th week:**
Lecture: Case studies: urban development in Latin America.	**Lecture:** Case studies: urban development in Asia.
Practice: Analysing selected case studies.	**Practice**: Analysing selected case studies.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory.

Participation at practice is compulsory. Students have to attend the practical classes and may not miss more than three practical classes during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. The attendance at practice will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor. Students are required

to bring the drawing tasks and drawing instruments for the course with them to each practice. Active participation is evaluated by the teacher in every class.

Students (or the group of students) have to submit all the three urban development strategies as scheduled minimum at a sufficient level.

B, for a grade:

An oral exam has to be taken in order to get a grade.

Urban Planning II

Code: MK5MAG3S5TX17-EN

ECTS Credit Points: 5

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): Urban Planning I

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 2

Topics:

The second part of the course entitled "Urban Planning" focuses on the process of urban planning. Main topics are as follows: the necessity of planning, the history of planning, plan making and the types of plans, planning agents, and institutions in planning, land-use planning, and the practice of zoning.

Literature:

Required:

- Weber, R. & Crane, R. (Eds.), 2012: The Oxford Handbook of Urban Planning. Oxford University Press, Oxford. ISBN 978-0-19-023526-0
- Bayer, M., Frank, N. & Valerious, J., 2010: Becoming an Urban Planner. John Wiley and Sons, Hoboken, NJ. ISBN 978-0-470-27863-5

Recommended:

- Gehl, J., 2010: Cities for People. Island Press, 978-1597265737

Schedule

1st week Registration week	
2nd week: **Lecture:** The history of urban planning, and the necessity of planning. Part I **Practice**: Types of plans. Part I	**3rd week:** **Lecture:** The history of urban planning, and the necessity of planning. Part II **Practice**: Types of plans. Part I

4th week: **Lecture:** Principle goals of planning. Part I **Practice**: Land-use planning. Part I	5th week: **Lecture:** Principle goals of planning. Part II **Practice**: Land-use planning. Part II
6th week: **Lecture:** Plan making. Modelling urban systems. Part I **Practice**: Planning and zoning. Part I	7th week: **Lecture:** Plan making. Modelling urban systems. Part I **Practice**: Planning and zoning. Part II
8th week: 1st drawing week	
9th week: **Lecture:** Planning agents, and institutions in planning. Part I **Practice**: How to create structure plans. Part I	10th week: **Lecture:** Planning agents, and institutions in planning. Part II **Practice**: How to create structure plans. Part II
11th week: **Lecture:** Case studies: urban planning in Europe. **Practice**: Analysing selected case studies.	12th week: **Lecture:** Case studies: urban planning in Northern America. **Practice**: Analysing selected case studies.
13th week: **Lecture:** Case studies: urban planning in Latin America. **Practice**: Analysing selected case studies.	14th week: **Lecture:** Case studies: urban planning in Asia. **Practice**: Analysing selected case studies.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory.

Participation at practice is compulsory. Students have to attend the practical classes and may not miss more than three practical classes during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Students cannot make up a practice with another group. The attendance at practice will be recorded by the practice leader. Being late counts as an absence. In case of further absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date, to be discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course with them to each practice. Active participation is evaluated by the teacher in every class.

Students (or the group of students) have to submit a land-use plan, a zoning plan, and a structure plan as scheduled minimum at a sufficient level.

B, for a grade:

An oral exam has to be taken in order to get a grade.

Urban Design

Code: MK5MAG4S04TX17-EN

ECTS Credit Points: 3

Evaluation: mid-semester grade

Year, Semester: 1st, year 1st semester

Prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 0 + 4

Topics:

The subject "Urban Design" focuses on the current problems of contemporary cities and tries to offer solutions for them. During the semester the actual questions of the urbanisation will be also discussed; namely the problems of the post-industrial age, the rehabilitation, the urban sprawls, the legacy of the modernism; and the newest trends of urbanism. During the practical lectures, the students have to solve design problems in groups, focusing on typical problems: renewing dense urban areas, constructing infill ensembles, transforming urban areas, establishing linear city space and new local centres, etc.

Literature:

Compulsory:

1. Pålsson, K., 2017. Public Space and Urbanity. How to Design Humane Cities. DOM Publishers, Berlin. ISBN 978-3869226149
9. Fitz, A. -Krasny, E. -Architekturzentrum Wien, 2019. Critical Care: Architecture and Urbanism for a Broken Planet. The MIT Press, Cambridge/London. ISBN 978-0-262-53683

Schedule

1st week Registration week	
2nd week: **Lecture:** Historical outline. Trends in urban design and urban evolution.	**3rd week:** **Lecture:** Short presentations by the students. Mandatory attendance!
4th week: Field trip (joint: Urban Renewal Processes, Urban Morphology)	**5th week:** Design Studio – discussion, topics, groups.
6th week: Design Studio: territory mapping, problems, analyses – group work.	**7th week:** **Lecture:** Urban block revitalization.

	Design Studio: individual work, work in groups. Evaluation.
8th week: 1st drawing week	
9th week: **Lecture:** Industrial heritage – how to transform neglected urban areas. Design Studio: individual work, work in groups. Evaluation.	10th week: **Lecture:** Establishing linear city space. Design Studio: individual work, work in groups. Evaluation.
11th week: **Lectures:** Renewing local centres. Design Studio: individual work, work in groups. Evaluation.	12th week: Lectures: Densification of modernism's urban areas. Design Studio: individual work, work in groups. Evaluation.
13th week: **Lecture:** Reconstructing urban areas. Design Studio: individual work, work in groups. Evaluation.	14th week: Design Studio: finalization of the projects.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attending lectures is compulsory. Students may not miss more than three lectures during the semester (11+3). In case of further absences, a medical certification or another official certificate from other authorities must be presented. Attendance is recorded by the lecturer. Being late is equivalent to an absence. In case of more than the 3 allowed absences, the subject will not be signed (completed) and the student must repeat the course unless an official certification is presented to the instructor.

B, for grade:

Successful exam. Performance at the lectures and the Urban Design Studio are taken into consideration at the final evaluation.

Smart Cities

Code: MK5TEL4S4TX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 3 + 0

Topics:

Administration: Municipality, Budget, Taxes. Transportation and Infrastructure: Information Technology, Planning and Development, Public Transit and Light Rail, Street Transportation, Roads, Bicycle Transit Systems. Community Services: Housing, Human Services, Library, Neighbourhood Services, Parks and Recreation, Education, Arts & Culture. Economic Development: Aviation, Community and Economic Development. Environment / Sustainability: Environmental Programs, Public Works, Water Services/Water Strategy, Sustainability, Greenfields. Public Safety: Emergency Management, Fire, Police, Human Resources, Law.

Literature:

Required:

- Robert H. Clarke, 1996. Public Works: Engineering in Local Government. Thomas Telford, London.
- K. Wellman, Marcus Spiller, 2012. Urban Infrastructure: Finance and Management. John Wiley & Sons, Hoboken, New Jersey.

Recommended:

- Genevieve Giuliano, Susan Hanson, 2017. The Geography of Urban Transportation, Fourth Edition. Guilford Publications, New York – London.

Schedule

1st week Registration week	
2nd week: **Lecture:** Administration: Municipality, Budget, Taxes.	**3rd week:** **Lecture:** Transportation and Infrastructure: Information Technology, Planning and Development, Public Transit and Light Rail, Street Transportation, Roads, Bicycle Transit Systems. Part I
4th week: **Lecture:** Transportation and Infrastructure: Information Technology, Planning and Development, Public Transit and Light Rail, Street Transportation, Roads, Bicycle Transit Systems. Part II	**5th week:** **Lecture:** Community Services: Housing, Human Services, Library, Neighbourhood Services, Parks and Recreation, Education, Arts & Culture. Part I
6th week:	**7th week:**

Lecture: Community Services: Housing, Human Services, Library, Neighbourhood Services, Parks and Recreation, Education, Arts & Culture. Part II	**Lecture:** Economic Development: Aviation, Community and Economic Development. Part I
8th week: 1st drawing week	
9th week:	**10th week:**
Lecture: Economic Development: Aviation, Community and Economic Development. Part II	**Lecture:** Environment / Sustainability: Environmental Programs, Public Works, Water Services/Water Strategy, Sustainability, Greenfields. Part I
11th week:	**12th week:**
Lecture: Environment / Sustainability: Environmental Programs, Public Works, Water Services/Water Strategy, Sustainability, Greenfields. Part II	**Lecture:** Public Safety: Emergency Management, Fire, Police, Human Resources, Law.
13th week:	**14th week:**
Lecture: Case studies. Part I	**Lecture:** Case studies. Part II
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at lectures is compulsory. Students have to attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor.

B, for a grade:

An oral exam has to be taken in order to get a grade.

Real Estate Development and Management

Code: MK5TEL3S3TX17-EN

ECTS Credit Points: 3

Evaluation: exam

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

Development of the land market; changes in the ownership and tenure system. Land evaluation procedures. History, structure, aims and role of real estate registers. Real estate law (national and community level). Real estate management versus settlement economics and site management. Evolution of modern immovable property. Identification of real property. Real estate financing. Residential property development: processes and actors. Real property analysis. Real estate marketing: demand, supply and adjustment. Overview of real estate markets (Hungary, EU, USA). Housing policy.

Literature:

Required:

- Emerging Trends in Real Estate Europe 2016 (https://www.pwc.ch/en/publications/2016/emerging-trends-in-real-estate-europe-2016.pdf)
- Vulnerabilities in the EU residential real estate sector (November 2016) (https://www.esrb.europa.eu/pub/pdf/reports/161128_vulnerabilities_eu_residential_real_estate_sector.en.pdf)
- Real Property Law and Procedure in the European Union (Reports 2015) http://www.eui.eu/DepartmentsAndCentres/Law/ResearchAndTeaching/ResearchThemes/ProjectRealPropertyLaw.aspx

Recommended:

- Real Property Law and Procedure in the European Union (General Report) Final Version, 2005) (http://www.eui.eu/Documents/DepartmentsCentres/Law/ResearchTeaching/ResearchThemes/EuropeanPrivateLaw/RealPropertyProject/GeneralReport.pdf)

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction to the basic terms in real estate management: Properties. Property deed. Real estate management. Landuse. Forms of management.	**3rd week:** **Lecture:** The land, as the base of real estate management: History and current situation of the methods and structure of landuse in Hungary. Changes in the property and ownership after the Second World War.
4th week: **Lecture:** Land and real estate register: The history of land and real estate registration. Aims and significance of land and real estate registration. Principles by real estate	**5th week:** **Lecture:** Sources of law related to real estates: Conceptual definition of real estate law. Hungarian sources of real estate laws. Quasi sources of law. Community regulations related to real estates.

laws. Parts of registration. Steps in land and real estate registration.

6th week:

Lecture: Basic issues related to settlement economics and site management: Subjects and objects of settlement economics, roles and characters. Enforcement of public role and community interests in settlement economics. Set of instruments of settlement economics. Economic policy of local governments. "Environmental" relations of settlements. Asset management in urban environments.

7th week:

Lecture: Property management: Evolution of the modern property management. Economic and property cycle. Role of property management. Property financing. Types of properties owned by local governments. Tasks of the Real Estate Management Groups in the local governments.

8th week: 1st drawing week

9th week:

Lecture: Real estate development in practice: Definition of real estate development. Development of residential properties: process and actors. Role and methods of market research in real estate development. Property market analyses. Introduction to the most important related indicators and statistics.

10th week:

Lecture: Construction sector and settlement planning: Legislation related to construction industry. Planning and approval of settlement management. Elements of spatial planning and environmental impact assessment.

11th week:

Lecture: Real estate marketing I: Definition of marketing (actors, concepts, marketing-mix, advertising campaign). Introduction of the most important components of marketing activities from the aspect of the real estate market. Sales vs. marketing. Market research methods in residential property developments.

12th week:

Lecture: Real estate marketing II: Impacts of the EU accession on the real estate markets of the Member States. Opportunities and regulations in the real estate market in the EU and in the Member States.

13th week:

Lecture: Housing policy in Hungary and in the European Union: Overview of the Hungarian housing policy: from the socialist years (1953-1990) to the present. Fluctuations in the rent rate. Changes in the state share in the number of new flats. EU measures related to housing policy. Comparison of housing policy on the level of Member States. Changes in the real estate stock of the European Union.

14th week:

Lecture: Real estate financing and the system of housing support: Financial sources. Bank loans for property development. Banking experience in real estate financing. Special financing instruments: leasing. Comparison of loans and housing supports on the level of property owners. Efficiency of the banking and supporting systems. Housing preferences and other support forms. Tax advantages, expense advantages,

	exemption from expenses. Employer residential support (after 2014). Family Housing Allowance.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Attendance at lectures is recommended, but not compulsory.

B, for a grade:

The course ends in a colloquium.

Municipal Administration

Code: MK5TEL5S3TX17-EN

ECTS Credit Points: 3

Evaluation: exam

Year, Semester: 1st year, 2ndsemester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

The primary goal of this course is to familiarize students with the roles that municipalities fulfil in local affairs. To achieve this, the course focuses on three areas in this semester:

- the basic elements of self-governments,
- the most important international trends,
- and the characteristics of municipal tasks.

The course also aims to cover all important municipal bodies and their operation.

Literature:

Required:

- Panara, Carlo - Varney, Michael R. (eds), Local Government in Europe. The 'Fourth Level' in the EU Multi-Layered System of Governance, Routledge, 2015, ISBN: 978-1-138-93004-9
- Schaap, Linze - Daemen, Harry (eds), Renewal in European Local Democracies. Puzzles, Dilemmas and Options, VS Verlag für Sozialwissenschaften, 2012, ISBN: 978-3-531-18763-1

- Loughlin, John - Hendriks, Frank - Lidstrom, Anders, The Oxford Handbook of Local and Regional Democracy in Europe, Oxford University Press, 2012, ISBN: 978-0-19-956297-8

Recommended:

- Bowman, Ann O'M. - Kearney, Richard C., State and Local Government, Wadsworth Publishing, 2016, ISBN: 978-1-305-38847-5
- Stenberg, Carl W. - Austin, Susan Lipman, Managing Local Government Services. A Practical Guide, International City/County Management Association, 2013, ISBN: 978-0-87-326709-0

Schedule

1st week Registration week	
2nd week: **Lecture:** Local administration, self-governments and municipal administration: evolution, history and models.	3rd week: **Lecture:** Basic questions of local governance in international documents. The most important regulations of the European Charter of Local Self-Government.
4th week: **Lecture:** Types of local self-governments. The attributes of local self-governmental tasks. Cases and examples.	5th week: **Lecture:** Scope of self-government's duties and authority; the role of self-governments in municipal administration.
6th week: **Lecture:** The tasks of councillors and the principles of corporative operations. Direct methods of local governance.	7th week: **Lecture:** The mayor's scope of duties. Cases and examples.
8th week: 1st drawing week / 1st test	
9th week: **Lecture:** Cooperation in municipal administration, the partnerships of self-governments I.	10th week: **Lecture:** Cooperation in municipal administration, the partnerships of self-governments II. Special rules of capital cities, catchment areas and middle level self-governments.
11th week: **Lecture:** Connections of local self-governments and central organs I.	12th week: **Lecture:** Connections of local self-governments and central organs II. A short outlook: the property and economy of municipal administration.

13th week:	14th week:
Lecture: New tendencies of self-governments' regulation I. An international overview.	**Lecture:** New tendencies of self-governments' regulation II. What is the future of municipal administration?
15th week: 2nd drawing week / 2nd test	

Requirements

A, for a signature:

Attendance is **compulsory**. Students have to attend the lectures and may not miss more than three lectures during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded. In case of further absences, a medical certificate needs to be presented. Active student's participation should be required.

B, for a grade:

Students have to **submit all the two tests** as scheduled minimum at a sufficient level. In order to take a **mid-semester grade** – minimum (2) pass grade, – minimum point of test has to be taken. The minimum and the maximum points related to the tests can be obtained are the follows:

Tests:				
1. Test:	Maximum:	**50 points**	Minimum:	**30 points**
2. Test:	Maximum:	**50 points**	Minimum:	**30 points**
Summa points:	Maximum:	**100 points**	Minimum:	**60 points**

Built Heritage Protection

Code: MK5TEL6S3TX17-EN

ECTS Credit Points: 3

Evaluation: exam

Year, Semester: 2nd year, 1st semester

Its prerequisite(s): -

Further courses are built on it: No

Number of teaching hours/week (lecture + practice): 2 + 0

Topics:

Definition and types of historic buildings and monuments. Evolution of the concept of historic building protection. The Athens Charter (1933), the Venice Charter (1964), the

Washington Charter (1987), the Valletta Principles (2011). Physical ageing and functional ageing. Urbanization ageing – necessity or pretence? Renewal of historic towns: case studies from Hungary (Eger, Pécs, Székesfehérvár, Budapest, Debrecen, etc.) and other European countries (Warsaw, Southampton, Edinburgh, Greifswald, Gdansk, etc.) Tourism and protection in historic towns.

Literature:

Required:

- Architectural heritage protection – Guidelines for planning authorities. Dublin, ISBN 0-7557-7006-4
- The Valletta Principles for Safeguarding and Management of Historic Cities, Towns and Urban Areas. ISBN 978-960-93-4331-2

Recommended:

- Ashworth, G.J. – Tunbridge, J.E.: The Tourist-Historic City. Routledge, 1990, ISBN 978-008-04-3675-3
- Jankó, F.: Urban Renewal of Historiv Towns in Hungary: Results and Prospects for Future in European Context. In Csapó, T. – Balogh, A. (eds): Development of Settlement Network in the Central European Countries. Springer –Verlag, 2012, pp. 161-174. ISBN 978-3-642-20313-8
- Hardy, M. (ed): The Venice Charter Revisited: Modernism, Conservation and Tradition in the 21st Century. Cambridge Scholars Publishing, 2008. ISBN 978-184-71-8688-1

Schedule

1st week Registration week	
2nd week: Lecture: Evolution and history of the concept of built heritage protection. From the Athens Charter to the Valletta Principles.	3rd week: Lecture: Physical, functional and urbanization ageing; their role and importance in urban planning and built heritage protection.
4th week: Lecture: Natural and social factors threatening the built heritage.	5th week: Lecture: Special problems of protection of castles, towns-walls, fortresses.
6th week: Lecture: Special problems of protection of tenements houses and public buildings. Churches, monasteries and other parochial buildings. Synagogues, as special group of built heritage.	7th week: Lecture: Protection of residences and mansions as special group of historic buildings. Traditional countryside buildings.
8th week: 1st drawing week	
9th week:	10th week:

Lecture: Ruins. Conservation, renovation, addition, reconstruction.	**Lecture:** Industrial built heritage. Special objects: statues, engineering facilities, graveyards, parks, etc.
11th week:	**12th week:**
Lecture: UNESCO Built Heritage Sites. World Heritage Sites in Hungary. Protected historic sites in Hungary.	**Lecture:** Historic cities and towns. Protection and renovation – case studies from Hungary, Poland, UK and Germany.
13th week:	**14th week:**
Lecture: A historic landscape as a special synthesis of living and built heritage.	**Lecture:** A new challenge: tourism in historic sites.
15th week: 2nd drawing week	

Requirements

A, for a signature: participation in the lectures (at least 11 of 14)

B, for a grade: oral exam or making an essay

DIPLOMA

The diploma shall be issued to the students within thirty days from having successfully passed the final exam at the grandaunt's special request. Otherwise, the diploma shall be awarded to him/her at the graduation ceremony of the Faculty.

The diploma is a public document bearing the coat of arms of the Hungary, certifying that the studies have been successfully completed in the Urban Systems Engineering master program. The diploma displays the name of the HEI (higher education institution), its institutional identification number, the serial number of diploma, the name and the place and date of birth of its holder, the level of qualification or the degree awarded, the program, the specialization, and its mode of attendance, as well as the place, day, month and year of issue. The diploma shall also contain the signature of the rector (in case of incapacitation the vice-rector), and shall bear the stamp of the University of Debrecen.

At the graduate's special request, a certificate on the completion of studies may be issued. The document does not contain any references to the qualification of the graduate, it merely proves that the he/she has taken a successful final exam. The Faculty shall keep a record of the certificates issued.

In the Urban Systems Engineering training program the diploma grade is calculated as the grade average of the results of the following items:

- weighted grade point average, (A)
- average of the grades of the thesis (evaluation of the supervisor and the referee) (B),
- grade for final exam presentation (C).

The diploma grade is calculated as follows: (A + B + C)/3

The diploma shall be assessed on the basis of the calculation of the grade average as follows:

Outstanding	4,81 – 5,00
Excellent	4,51 – 4,80
Good	3,51 – 4,50
Satisfactory	2,51 – 3,50
Pass	2,00 – 2,50

Diploma with honours

A degree/diploma with honours shall be issued to students who receive and excellent grade in all the subjects of the final exam, excellent grade for the thesis, the grade average of all their exam and seminar grades is 4.

MODEL CURRICULUM OF URBAN SYSTEMS ENGINEERING MSC

The curriculum of the program is available in excel format on the webpage of the Faculty of Engineering (https://eng.unideb.hu/en/node/195).

Nr.	Group	Name of Subject	Kno.	Subject Code	1st Semester				2nd Semester				3rd Semester				4th Semester				Pre requisites:
1	Natural Scienses	Geographic Information Systems (GIS)	2 3	MK5GEO1S05TX17-EN	0	4	m	5													-
2	Social Sciences	Urban Morphology	2 10	MK5TEL1S02TX17-EN	2	0	e	2													-
3		Urbanization	2 10	MK5TEL2S04TX17-EN	3	0	e	4													-
4	Planning Studies	Urban Transportation Planning I.	2 7	MK5KOZ1S04TX17-EN	2	2	m	4													-
5		Urban Transportation Planning II.	2 7	MK5KOZ2S04TX17-EN					2	2	e	4									Urban Transportation Planning I.
6		Public Works I.	2 4	MK5VIZ1S04TX17-EN					2	2	m	4									-
7		Public Works II.	2 4	MK5VIZ2S04TX17-EN									2	2	e	4					Public Works I.
8		Urban Artifacts	2 8	MK5TAR1S03TX17-EN									2	0	m	3					-
9		Urban Environmental Protection	5 2	MK5TKOVK03TX17-EN	2	0	e	3													-
10		Greenfield Management	2 9	MK5KOR1S03TX17-EN					2	0	m	3									-
11		Strategic Environmental Assessment	2 9	MK5KOR2S05TX17-EN									2	2	m	5					-
12		Urban Waste Management	5 6	MK5HUGKK03TX17-EN									2	0	e	3					-
13		Ecological Planning	2 9	MK5KOR3S05TX17-EN					2	2	e	5									-
14		Urban Renewal Processes	2 1	MK5MAG1S03TX17-EN	2	0	m	3													-
15		Urban Planning I.	2 1	MK5MAG2S05TX17-EN					2	2	m	5									-
16		Urban Planning II.	2 1	MK5MAG3S05TX17-EN									2	2	e	5					Urban Planning I.
17		Urban Design	2 1	MK5MAG4S04TX17-EN	0	3	m	4													-
18		Smart Cities	2 10	MK5TEL4S04TX17-EN					3	0	e	4									-
19		Real Estate Development and Management	2 10	MK5TEL3S03TX17-EN	2	0	e	3													-
20		Municipal Administration	2 10	MK5TEL5S03TX17-EN					2	0	e	3									-
21		Built Heritage Protection	2 10	MK5TEL6S03TX17-EN									2	0	e	3					-
22	Opt. Subj.	Elective Course I.											0	2	m	3					-
23		Elective Course II.											0	2	m	3					-
24	Inters.	Internship	2 10	MK5TEL7S05TX17-EN					4 hét		m	5									-
25	Thesis	Thesis		MK5DIP1S30TX17-EN													0	12	m	30	-

560	Sum of Lecture Hours
522	Sum of Seminar Hours
1082	Sum of Contact Hours
12	Sum of Exam
13	Sum of Semester Mark
0	Sum of Sign
120	Credits
20	Mean Contact Hours per Week

Summa:	13	9	**22**	28	15	8	**23**	33	12	10	**22**	29	0	12	**12**	30
Exam:			4				4				4				0	
Mid semester grade:			4				4				4				1	
Signature			0				0				0				0	

Fields of Knowledge:					
	1.	2 1	Studies in construction	M A G	14 15 16 17
	2.	2 3	Studies in geoinformatics	G E O	1
	3.	2 4	Studies in water building engineering	V I Z	6 7
	4.	2 7	Studies in transportation planning	K O Z	4 5
	5.	2 8	Studies in structural engineering	T A R	8
	6.	2 9	Studies in environmental sciences	K O R	10 11 13
	7.	2 1 0	Studies in urban planning	T E L	2 3 18 19 20 21 24
	8.	5 2	Specificity in environmental engineering	K O V	9
	9.	5 6	Environment protection technologies IV	H U G	12
Pre-master courses	1		Introduction to Water Related Public Works		
	2		Introduction to Urban Design		
	3		Introduction to Urban Transportation Infrastructure Planning		
	4		Introduction to the Sustainable Use of Environmental Resource		