BULLETIN

UNIVERSITY OF DEBRECEN

ACADEMIC YEAR 2015/2016

Faculty of Engineering

CIVIL ENGINEERING BSc

Coordinating Center for International Education

Table of Contents

CHAPTER 1
DEAN'S WELCOME

Welcome to the Faculty of Engineering!

This is an exciting time for you, and I encourage you to take advantage of all that Faculty of Engineering UD offers you during your bachelor's or master's studies. I hope that your time here will be both academically productive and personally rewarding. Think creatively and be confident.
The Faculty of Engineering of the University of Debrecen is at the forefront of the education and training of engineers in the North-Great-Plain Region of Hungary. It is a dynamically developing Faculty with over 3000 students and a highly-qualified and enthusiastic teaching staff of about 80 members. We offer a great variety of BSc, MSc courses and post-graduate training courses tailored to suit the rapidly changing world of engineering and focusing on European and international trends.
In order to optimize the quality of training the Faculty continuously strives to expand the number of industry and educational partners at home and abroad.
The Faculty was awarded the Quality Prize in 2011 by the Ministry of Education as recognition of its efforts in this field.
I wish you every success in your studies and hope to meet you personally in the near future.

Best wishes,

Edit Szűcs
Dean

CHAPTER 2
THE HISTORY OF THE UNIVERSITY AND DEBRECEN

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 asin 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 the University of Debrecen is classified as a “University of National Excellence” and offers the highest number of academic programs in the country, hence it is one of the best universities in Hungary. Its reputation is a 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, of which about 3700 are international students, the University of Debrecen is one of the largest institutions of higher education in Hungary.

CHAPTER 3
ADMINISTRATION UNITS

Dean:	Ms. Edit Szűcs Dr. habil.
E-mail:	dekan@eng.unideb.hu
Vice-Dean for Educational Affairs:	Géza Husi PhD habil.
E-mail:	husigeza@eng.unideb.hu
Vice-Dean for Scientific Affairs:	Ferenc Kalmár PhD
E-mail:	kalmarf@eng.unideb.hu
Head of Directory Office:	Ms. Noémi Dr. Bíró Siposné
E-mail:	bironoemi@eng.unideb.hu
Address:	4028 Ótemető u. 2-4.
Phone:	+36-52-415-155/77741
Head of Students' Administration Office:	Tibor Balla
Phone number:	+36-52-415-155/77767
Administrator for Foreign Students:	Ms. Ágnes György
Phone number:	+36-415-155/77833
e-mail:	agnes@eng.unideb.hu
Head of English Program Office:	Zsolt Tiba PhD habil
International Relationship Coordinator:	Ms. Zita Szilágyi Popovicsné
Address:	4028 Debrecen, Ótemető u. 2-4.
E-mail:	programcoordinator@eng.unideb.hu

CHAPTER 4
DEPARTMENTS OF THE FACULTY OF ENGINEERING

DEPARTMENT OF ARCHITECTURE

Ótemető u. 2-4., Debrecen, 4028
Telephone: +36 (52) 415-155/ 78704
Web: http://epitesz.eng.unideb.hu/

Professor, Head of Department		Antal Puhl DLA, habil
College Professor		Gábor Mátyás Csanády DLA
		Marcel Ferencz DLA
Associate Professor		Balázs Falvai DLA
		Péter Kovács M.D., DLA, Ph.D., D.Sc.
		Tamás Szentirmai DLA
		Dávid Török DLA
Assistant Lecturer		Béla Bogdándy
		Miklós János Boros
		Ferenc Kállay
	Ms.	Anita Kántor
		Gábor Zombor
Secretary	Ms.	Anita Tóth-Szél

DEPARTMENT OF BASIC TECHNICAL STUDIES

2-4 Ótemető street, Debrecen, 4028
Telephone: +36-52-415-155 / 77730
E-mail: magdi@eng.unideb.hu, Web: http://www.eng.unideb.hu/userdir/mat/

College Professor, Head of Department		Imre Kocsis Ph.D.
College Professor		Gusztáv Áron Sziki Ph.D.
College Associate Professor	Ms.	Mária Krauszné Princz Ph.D.
		Balázs Kulcsár Ph.D.
	Ms.	Rita Nagyné Kondor Ph.D.
Assistant Lecturer	Ms.	Éva Csernusné Ádámkó
		Csaba Gábor Kézi
	Ms.	Erika Perge
		Attila Vámosi
Secretary	Ms.	Sándorné Anton
Secretary	Ms.	Sándorné Anton

DEPARTMENT OF BUILDING SERVICES AND BUILDING ENGINEERING

Ótemető street 2-4., Debrecen, 4028
Telephone: +36-52-415-155 / 77770 Fax: +36-52-415-155 / 77713
Web: http://www.eng.unideb.hu/userdir/eglt/

college professor, head of department		Ferenc Kalmár Ph.D.
college associate professor, deputy head of department		Ákos Lakatos Ph.D.
College Associate Professor	Ms.	Tünde Klára Kalmár Ph.D.
Assistant Lecturer		Béla Bodó
		Imre Csáky
		Sándor Hámori
		Gábor L. Szabó
		Ferenc Szodrai
		Zoltán Verbai
Departmental Engineer		Attila Kerekes
Emeritus		András Zöld DSc
Secretary		Lola Csibi

DEPARTMENT OF MECHANICAL ENGINEERING

2-4 Ótemető street , Debrecen, 4028
Telephone: +36-52-415-155 / 77776
Web: http://www.eng.unideb.hu/userdir/gepesz/

college professor, head of department	Ms.	Istvánné Ráthy Dr. Ph.D.
College Professor, Deputy Head of Department		Lajos Fazekas Dr. Ph.D.
		Tamás Mankovits Ph.D.
College Professor		Zsolt Tiba Dr. habil.
Associate Professor	Ms.	Ágnes Battáné Gindert-Kele Dr. Ph.D.
		György Juhász Ph.D.
College Associate Professor		Sándor Bodzás Ph.D.
Assistant Lecturer		Gábor Balogh
		Krisztián Deák
		József Menyhárt
		Sándor Pálinkás Ph.D.

Departmental Engineer		Zsolt Békési
		András Gábora
		Dávid Huri
Senior Lecturer		Sándor Hajdu
Technical Lecturer		Márton Lévai
		István Székács
Secretary	Ms.	Judit Bak

DEPARTMENT OF ENGINEERING MANAGEMENT AND ENTERPRISE

2-4 Ótemető street , Debrecen, 4028
Telephone: +36-52-415-155 / 77762
E-mail: sztanyir@eng.unideb.hu, Web: http://www.eng.unideb.hu/index.php?pageid=muszaki_menedzsment_es_vallalkozasi_tanszek

College Professor, Dean, Head of Department	Ms.	Edit Szűcs Dr. habil.
Titular Professor		Tibor Szász Ph.D.
College Professor		Géza Lámer Ph.D.
College Senior Lecturer	Ms.	Éva Dr. Bujalosné Kóczán
Associate Professor		István Budai Ph.D.
	Ms.	Judit T. Kiss Ph.D.
Master Lecturer	Ms.	Tünde Jenei
Assistant Lecturer		Tibor Balla M.Sc.
	Ms.	Anita Dr. Mikó-Kis
		Attila Halczman M.Sc.
	Ms.	Kata Anna Váró
Departmental Engineer		Róbert Sztányi
Engineering Lecturer		Gyula Mikula
Senior Lecturer	Ms.	Éva Diószeginé Zentay
	Ms.	Andrea Emese Matkó Ph.D.
Secretary	Ms.	Sándorné Anton

DEPARTMENT OF CIVIL ENGINEERING

2-4 Ótemető street, Debrecen, 4028
Telephone: +36-52-415-155 / 77764 Fax: +36 (52) 418-643
E-mail: info@eng.unideb.hu, Web: http://www.epito.eng.unideb.hu

college professor, head of department		Imre Kovács Ph.D.
College Professor		György Csomós Ph.D.
		János Major Ph.D. habil.
Associate Professor		József Garai Ph.D. habil.
	Ms.	Kinga Nehme Ph.D.
College Associate Professor		Sándor Fehérvári Ph.D.
	Ms.	Gabriella Hancz Ph.D.
Assistant Lecturer	Ms.	Krisztina Kozmáné Szirtesi
	Ms.	Beáta Pataki
		Ádám Ungvárai
		Zsolt Vadai
		Zsolt Varga
		László Tamás Vincze
Departmental Engineer		József Kovács
		Zsolt Martonosi
	Ms.	Beáta Szakács
		László Tarcsai
Engineering Lecturer		János Bíró
Senior Lecturer	Ms.	Herta Czédli Ph.D.
		László Radnay Ph.D.
Assistant Lecturer Practitioner		János Bíró
Invited Lecturer		Zoltán Bereczki
		Titusz Igaz
		Péter Lugosi
		István Szabó
Secretary	Ms.	Mónika Tóthné Csákó

DEPARTMENT OF ELECTRICAL ENGINEERING AND MECHATRONICS

2-4 Ótemető street, Debrecen, 4028
Telephone: +36-52-415-155 / 77742
Web: http://eem.eng.unideb.hu/

Associate Professor, Head of Department	Géza Husi Ph.D. habil.
Associate Professor	Péter Tamás Szemes Ph.D.
College Associate Professor	János Tóth Ph.D.
Master Lecturer	István Ákos Bartha
Assistant Lecturer	Sándor Piros Ph.D.
	Attila Vitéz
Departmental Engineer	Gyula Attila Darai
	István Nagy
Secretary	Ms. Nóra Tóth
PhD Student	Ms. Emese Bánóczy-Sarvajcz
	István Pógár

DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

2-4 Ótemető street, Debrecen, 4028
Telephone: +36-52-415-155 / 77827
E-mail: labodaneandi@eng.unideb.hu, Web: http://eng.unideb.hu/userdir/kvt/

college professor, head of department	Ms. Ildikó Bodnár Ph.D.
College Assistant Professor	Sándor Fórián
College Professor	Lajos Gulyás Ph.D.
College Associate Professor	Norbert Boros Ph.D.
	Ms. Andrea Keczánné Üveges Ph.D.
Assistant Lecturer	Dénes Kocsis
Secretary	Ms. Andrea Dr. Labodáné Makay

COORDINATING CENTER FOR INTERNATIONAL EDUCATION

Nagyerdei körút 98., Debrecen, 4032
Telephone: +36-52-512-900/62796
E-mail: info@edu.unideb.hu

Assistant	Ms. Ibolya Kun
Administrator	Ms. Ágnes Czibere

English Program Office

Ótemető u. 2-4., Debrecen, 4028
Telephone: +36-52-415-155/78707, 78708
E-mail: programcoordinator@eng.unideb.hu, Web: http://www.eng.unideb.hu

Head of English Program Office		Zsolt Tiba Dr. habil.
International Relationship Coordinator	Ms.	Zita Popovicsné Szilágyi

CHAPTER 5
ACADEMIC CALENDAR OF THE FACULTY OF ENGINEERING

Faculty calendar of the academic year 2015/2016	
Faculty of Engineering, University of Debrecen	
Opening ceremony of the academic year	6th September 2015
1st semester registration week	From 7th September till 11th September 2015.
Repeat period of exam courses announced for the 1st semester of the academic year 2015/2016	From 7th September till 11th September 2015
1st semester study period of BSc program	From 14th September till 18th December 2015 (14 weeks). In case of finalist courses: from 14th September till 13th November 2015 (10 weeks).
1st semester study period of BSc dual program	From 14th September till 11th December 2015 (13 weeks).
Reporting period (Drawing week) of BSc and BSc dual program	From 2nd November till 6th November 2015 (5 working days without scheduled lessons, consultation schedule announced previously).
Reporting period (Drawing week, term for elaborating tasks apart from the finalist courses) of BSc program	From 14th December till 18th December 2015 (5 working days without scheduled lessons, consultation schedule announced previously).
1st semester exam period	From 21th December 2015 till 5th February 2016 (7 weeks). From 16th November till 18th December 2015 (5 weeks) for graduating students
Deadline of submitting degree theses and dissertations	According to the decision of the departments but in 21 days in proportion to the first day of the final exam.
Final exams (according to the decision of the departments)	At least one occasion in January 2016. The departments shall advertise the date of the final exam until 15th September 2015.
2nd semester registration week	From 8th February till 12th February 2016.
2nd semester study period of BSc program	From 15th February till 20th May 2016 (14 weeks). In case of finalist courses: from 15th February till 29th April 2016 (10 weeks).
2nd semester study period of BSc dual program	From 15th February till 13th May 2016 (13 weeks).
Reporting period (Drawing week) of BSc and BSc dual program	From 4th April till 8th April 2016. (5 working days without scheduled lessons, consultation schedule announced previously)
Reporting period (Drawing week, term for elaborating tasks apart from the finalist courses) of BSc program	From 16th May till 20th May 2016 (5 working days without scheduled lessons, consultation schedule announced previously).

2nd semester exam period	From 23rd May till 8th July 2016 (7 weeks) From 2nd May till 3rd June 2016 (5 weeks) for graduating students.
Deadline of submitting degree theses and dissertations	According to the decision of the departments but in 21 days in proportion to the first day of the final exam.
Final exams (according to the decision of the departments)	At least one occasion in June 2016. The departments shall advertise the date of the final exam until 15th February 2016.

CHAPTER 6
THE ECTS CREDIT POINT SYSTEM

The European Credit Transfer System (ECTS) is a system based on allocation and transfer of academic credits. It was developed and tested in a pilot scheme by 145 European institutions of higher education from all Member States and EFTA countries. 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 programmes and student achievement. ECTS in no way regulates the content, structure and or equivalence of study programmes. These are issues of quality which have to be determined by the higher education institutions themselves when establishing a satisfactory basis for co-operation agreements, bilaterally or multilaterally.

The main characteristics of ECTS are:

Credits are allocated to each course unit. The starting point is the normal pattern of courses a student would have to take in an academic year. 60 credits represent the workload of an academic year of study. Each institution produces an information package as a guide to all courses available to ECTS students. The courses are described not only in terms of content but also have credits added to each course. Before the student leaves for the host institution, the home institution, the host institution and the student sign a learning agreement in which the study programme abroad is agreed upon. A transcript of records which gives all details of previous higher education is attached to the learning agreement. The transcript of records lists all successfully completed courses together with details on the course, code, content and credits. The home institution guarantees full academic recognition. The study period abroad replaces a comparable period of study at the home university. In order to promote a universal implementation of ECTS as part of ERASMUS, the European Commission respects the right of each institute of higher education, to choose whatever recognition methods or agreements best suit their particular needs. If, however, student mobility is to provide universal academic recognition, as many universities as possible should give thought to a system of recognition using commonly understood measurements. ECTS has so far proved the best instrument to create transparency. Universities that receive financial support for their ERASMUS programmes should envisage measurements to implement ECTS at their institution - or if it is already in use, to try to progress ECTS implementation within further departments/ faculties.

Hungarian Grading Scale Definition ECTS Grading Scale Percentage of successful students usually achieving this grade

5 - Excellent: Outstanding performance with only minor errors - A - 10

4 - Good: Above the average standard but with some errors -B - 25

3 - Good: Generally sound work with a number of notable errors - C - 30

3 - Satisfactory: Generally sound work with a number of notable errors - D - 25

2 - Sufficient: Performance meets the minimum criteria - E - 10

1 - Fail: Some more work required before the credit can be awarded - F - 0

On the following pages the mandatory courses are listed within the framework of the usual schedule of studies for students of medicine at the University of Debrecen. Here incoming ERASMUS students can find the allotted number of ECTS credit points, as well as a brief description of the course content and the assessment requirements. International students study the English or Hungarian Program of the University of Debrecen. The curriculum parallels that of the Hungarian Engineering Program.

CHAPTER 7
ACADEMIC PROGRAM FOR CIVIL ENGINEERING BSC

Department of Basic Technical Studies

Subject: **INFORMATICS FOR ENGINEERS I**
Year, Semester: 1st year/1st semester
Seminar: **2**

1st week:
Seminar: Introduction to informatics.

2nd week:
Seminar: Computer structures. Operating systems.

3rd week:
Seminar: Computer networks, the Internet.

4th week:
Seminar: Theoretical and practical data structures.

5th week:
Seminar: Algorithms.

6th week:
Seminar: Spreadsheets: entering data, records, fields, creating a table.

7th week:
Seminar: Sorting and filtering data.

8th week:
Seminar: Mid-term test.
Self Control Test

9th week:
Seminar: Expanding databases, formatting databases.

10th week:
Seminar: Relational databases.

11th week:
Seminar: SQL language.

12th week:
Seminar: Normalizing databases.

13th week:
Seminar: Securing databases (confidentiality, integrity and availability).

14th week:
Seminar: Keys, transactions.

15th week:
Seminar: End-term test
Self Control Test

Requirements

Topics: Introduction to informatics. Computer structures. Operating systems. Computer networks, the Internet. Theoretical and practical data structures. Algorithms. Spreadsheets: entering data, records, fields, creating a table, sorting and filtering data, expanding databases, formatting databases. Relational databases, SQL language, normalizing databases, securing databases (confidentiality, integrity and availability), keys, transactions.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.
During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the tests the grade for the tests is given according to the following table: Score Grade 0-49 fail (1) 50-64 pass (2) 65-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

J. Walkenbach: Excel 2007
Wiley Publishing Inc.,
C. N. Prague, M. R. Irwin, J. Reardon: Access 2003 Bible
Wiley Publishing Inc., 2003.

Subject: **MATHEMATICS I**
Year, Semester: 1st year/1st semester
Lecture: **2**
Seminar: **3**

1st week:
Lecture: Arithmetic of real and complex numbers.
Seminar: Arithmetic of real and complex numbers.

2nd week:
Lecture: Algebra of vectors in 2 and 3 dimensions.
Seminar: Algebra of vectors in 2 and 3 dimensions.

3rd week:
Lecture: Coordinate systems. Functions and their graphs.
Seminar: Coordinate systems. Functions and their graphs.

4th week:
Lecture: Composition of functions. Inverse functions.
Seminar: Composition of functions. Inverse functions.

5th week:
Lecture: Sequences and series of numbers, and convergence criteria.
Seminar: Sequences and series of numbers, and convergence criteria.

6th week:
Lecture: Sequences and series of functions, power series, convergence criteria.
Seminar: Sequences and series of functions, power series, convergence criteria.

7th week:
Lecture: Real functions. Polynomials.
Seminar: Real functions. Polynomials.

8th week:
Lecture: The mid-term test.
Self Control Test

9th week:
Lecture: Limits, continuity. Interpolation.
Seminar: Limits, continuity. Interpolation.

10th week:
Lecture: Arithmetic of matrices. Determinants.
Seminar: Arithmetic of matrices. Determinants.

11th week:
Lecture: Systems of linear equations. Cramer's

rule.
Seminar: Systems of linear equations. Cramer's rule.

12th week:
Lecture: Linear space, subspace, generating systems.
Seminar: Linear space, subspace, generating systems.

13th week:
Lecture: Bases, orthogonal and orthonormal bases.
Seminar: Bases, orthogonal and orthonormal bases.

14th week:
Lecture: Linear transformations, eigen vectors, eigenvalues.
Seminar: Linear transformations, eigen vectors, eigenvalues.

15th week:
Lecture: The End-term test.
Self Control Test

Requirements

Topics: Arithmetic of real and complex numbers. Algebra of vectors in 2 and 3 dimensions. Coordinate systems. Functions and their graphs. Composition of functions. Inverse functions. Sequences and series of numbers, and convergence criteria. Sequences and series of functions, power series, convergence criteria. Real functions. Polynomials. Limits, continuity. Interpolation. Arithmetic of matrices. Determinants. Systems of linear equations. Cramer's rule. Linear space, subspace, generating systems, bases, orthogonal and orthonormal bases. Linear transformations, eigenvectors, eigenvalues.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up any practice with another group. The attendance on practice classes will be recorded by the practice leader. Being late is equivalent with 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, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in an exam grade (ESE). The grade for the test is given according to the following table: Score Grade 0-49 fail (1) 50-64 pass (2) 65-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

S. Minton: Calculus Concept and Connections
McGraw Hill , 2006. ISBN: 0-07111200-6
Addison Wesley : Thomas' Calculus
11th.2005. ISBN: 0-321-24335-8

Department of Chemical and Environmental Engineering

Subject: **TECHNICAL CHEMISTRY**
Year, Semester: 1st year/1st semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Sciences and chemistry, Quantitative laws in chemistry, basic concepts of stoichometry

2nd week:
Lecture: Characterization of macroscopic chemical systems, states of matter

3rd week:
Lecture: Solutions

4th week:
Lecture: Thermochemistry

5th week:
Lecture: Reaction rates

6th week:
Lecture: Equilibrium

7th week:
Lecture: Acid-base equilibriums, Heterogeneous equilibriums

8th week:
Lecture: Redox reactions

9th week:
Lecture: The structure of atoms

10th week:
Lecture: The structure of the nucleus

11th week:
Lecture: Quantum mechanical model of the atom

12th week:
Lecture: The chemical bond

13th week:
Lecture: Structures and bonding in chemical systems

14th week:
Lecture: Principles of determination a chemical structure

15th week:
Lecture: Theoretical models of solid materials: band theory and its applications to metals. Superconductivity and its applications. Commercial methods of metal production.

Requirements

A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes 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. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.
B, for a grade (ESE): A test after the completion of the semester, no midterm tests, sample test questions provided on the website in the beginning of December. Website: http://www.inorg.unideb.hu/ All lecture materials are posted at least one day before the lecture. The grade for each test is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, once students can take a retake test of the whole semester material.

Required reading materials

Tom Holme, Larry Brown: Chemistry for Engineering Student
Brooks Cole, 2006. ISBN: 0534389740
James O. Glanville: General Chemistry for Engineers
Preliminary Edition . Prentice Hall, 2000. ISBN: 978-0130325143
Darrell Ebbing, Steven D. Gammon: General Chemistry
9th. Brooks Cole, 2007. ISBN: 978-06188574871
John McMurry – Robert C. Fay: Chemistry
6th. Prentice Hall , ISBN: 0321704959

Department of Civil Engineering

Subject: **GEOINFORMATICS I**
Year, Semester: 1st year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Geoids, reference of ellipsoid and the earth's gravity field. Elementary geometry of the ellipsoid.
Practical: Adding angles.

2nd week:
Lecture: Determination of geodetic position in terms of geographical coordinates. Geodetic datum concepts and geodetic surveying.
Practical: Transferring whole circle bearing

3rd week:
Lecture: Map projections, conformal projection. Coordinate systems in the plane. Geodetic Control Networks.
Practical: Measuring slope distances. Calculations of distance.

4th week:
Lecture: Measuring angles. The Horizontal Reading. The Zenith Angle. The theodolite. Geodetic telescopes.
Practical: Levelling an instrument, Setting up a theodolite.

5th week:
Lecture: Methods of circle reading, A graduated microscope and the coincidence method. Horizontal and vertical circles.
Practical: Practicing of circle reading.

6th week:
Lecture: Systematic errors of angle measurements.
Practical: Compute an orientation angle. Computing WCB.

7th week:
Lecture: The 1st fundamental task of surveying. The 2nd fundamental task of surveying
Practical: The1st fundamental task of surveying. The 2nd fundamental task of surveying. (Computing coordinates)

8th week:
Lecture: Mid-term theoretical test Orientation. An orientational angle.
Practical: The 1st qualifier practice.
Self Control Test

9th week:
Lecture: Distance measurements. Principles of Traversing.
Practical: Computing mean orientation angle.

10th week:
Lecture: Types of traverse lines. Free traverse. Inserted traverse. Closed line traverse.
Practical: Computing orientation with circle reading.

11th week:
Lecture: Localizing blunders in observations. Distance observations. Angular observations.
Practical: Computation of a closed line traverse.

12th week:
Lecture: Principle of tacheometry. Horizontal coordinates. Vertical coordinates. Detail surveys using tacheometry.
Practical: Computation of the inserted traverse. Computing the corrected coordinate differences.

13th week:
Lecture: Setting out straight lines, angles, points in given elevation, center line of roadworks and curves.
Practical: Setting out points with geometric criteria with theodolite and telemeter.

14th week:
Lecture: Electronic tacheometers (Total Stations). Operation of Total Stations. Important software of Total Stations.
Practical: Using Total Stations.

15th week:
Lecture: End-term theoretical test
Practical: 2nd qualifier practice

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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. Attendance at practice classes will be recorded by the practice leader. In case of further absences, a medical certificate needs to be presented. Missed practice classes should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests. During the semester there are two qualifier practice tasks: the first one in the 8th week and the second one in the 15th week. Students have to complete all the two qualifier tasks as scheduled minimum at a sufficient level.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the qualifier practice tasks and the average of the test results, the mid-semester grade is calculated as an average of them: ((No. 1 practical test result + No. 2 practical test result)/2 + Mid-term theoretical test result + End-term theoretical test result)/3.

Required reading materials

Wolfgang Torge, Jürgen Müller : Geodesy
2012. ISBN: 978-3-11-025000-8
Wolfgang Torge : Geodesy
2001. ISBN: 3-11-017072-08
James A. Elithorp, Jr. and Dennis D. Findorff: Geodesy for Geomatcs and GIS Professionals
2nd.

Subject: **URBAN & REGIONAL DEVELOPMENT**
Year, Semester: 1st year/1st semester
Lecture: **2**

1st week:
Lecture: Urban sprawl. Classification of cities and towns in Hungarian and global relations. Types of cities regarding their sizes, morphology, function, economic and administrative roles.

2nd week:
Lecture: Urban planning theories: Rational planning, Synoptic planning, Participatory Planning, Incrementalism, Mixed scanning model, Transactive planning, Advocacy planning, Bargaining model, Communicative approach.

3rd week:
Lecture: Comparison of planning and development processes: examples from the United States, the European Union, Japan, China, and Hungary.

4th week:
Lecture: The role of participants: citizens, local governments, bodies of the public administration, the national government, real estate developers, and financial organizations.

5th week:
Lecture: Integrated sustainable urban development: urban development policy of the European Union. Objectives for 2014-2020 programming period.

6th week:
Lecture: Urban planning in Hungary. Legacy of the state socialism and reforms after transition. Effects of the EU's urban development policies on Hungary's urban planning process.

7th week:
Lecture: New deals for the 2014-2020 programming period: Regional and Urban Development Operational Program.

8th week:
Lecture: Taxonomy of regions from different approaches. Introducing the EU's NUTS system.

9th week:
Lecture: Economic development theories I: Export Base Theory, Capital Fundamentalism, Neoclassical Growth Theory, Endogenous Growth Theory, Trade Theory and Location, Cumulative Causation and Polarization.

10th week:
Lecture: Economic development theories II: Regional Industry Clusters, Entrepreneurship Theories, Functional Specialization, Innovation and Innovational Systems, Growth versus Development, Government & Economic Development.

11th week:
Lecture: Economic development theories III: The growth pole strategy by Perroux.

12th week:
Lecture: History of regional development in Hungary from 1945 to 2004.

13th week:
Lecture: Regional development in Hungary after the EU accession.

14th week:
Lecture: Components of regional development: Economy, housing, transport, and environment.

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the mid-term and the end-term results, the mid-semester grade is calculated as an average of them: - the average grade of the two tests (50-50%) The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test covering the whole semester material.

Required reading materials

Andy Pike, Andres Rodriguez-Pose, John Tomaney: Local and Regional Development
Taylor & Francis, 2006.
John Glasson, Tim Marshall: Regional Planning.
Routledge, Abingdon, 2007.
Nigel Taylor: Urban Planning Theory since 1945
Sage, London, 2007.

Department of Engineering Management and Enterprise

Subject: **EUROPEAN STUDIES**
Year, Semester: 1st year/1st semester

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the mid-term and the end-term results, the mid-semester grade is calculated as an average of them: - the average grade of the two tests (50-50%) The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test covering the whole semester material.

Required reading materials

Ali El-Agraa: The European Union: Economics and Policies
Cambridge University Press, 2007.
Federiga Bindi: The Foreign Policy of the European Union: Assessing Europe's Role in the World
Brookings Institution Press, 2010.
Martin Sajdik, Michael Schwarzinger: European Union Enlargement: Background, Developments, Facts
Transaction Publishers, 2011.

Subject: **INTERNATIONAL COMMUNITIES AND ORGANIZATIONS**
Year, Semester: 1st year/1st semester
Lecture: **2**

1st week:
Lecture: General overview of international communities.

2nd week:
Lecture: The European Union I: history, enlargement and politics.

3rd week:
Lecture: The European Union II: economics, finance and the monetary system.

4th week:
Lecture: The African Union. African economic communities.

5th week:
Lecture: The Association of Southeast Asian Nations. Asian economic communities.

6th week:
Lecture: North American Free Trade Agreement. North American economic communities.

7th week:
Lecture: Southern Common Market. South American economic communities.

8th week:
Lecture: Mid-term test Proposed economic communities.
Self Control Test

9th week:
Lecture: Organization for Economic Co-operation and Development. The BRICS.

10th week:
Lecture: International Monetary Fund. The World Bank.

11th week:
Lecture: North Atlantic Treaty Organization.

12th week:
Lecture: World Trade Organization.

13th week:
Lecture: G7, G8, G20.

14th week:
Lecture: Hungary's participation in international communities and organizations.

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: The main aim of the lecture is to give a comprehensive overview on international communities, such as European Union, African Union, ASEAN, NAFTA, Mercosur, and international organizations, such as OECD, IMF, World Bank, and WTO.
A, for a signature: Attendance at lectures is recommended, but not compulsory.
B, for a grade: The course ends in a mid-semester grade. Based on the average of the marks of the mid-term and the end-term results, the mid-semester grade is calculated as an average of them: - average grade of the two tests (50-50%) The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake-test of the whole semester material.

Required reading materials

Federiga Bindi: The Foreign Policy of the European Union: Assessing Europe's Role in the
Brookings Institution Press, 2010.
Martin Sajdik, Michael Schwarzinger: European Union Enlargement: Background, Developments, Facts
Transaction Publishers, 2011.
Ali El-Agraa: The European Union: Economics and Policies
Cambridge University Press, 2007.
Akira Iriye: Global Community: The Role of International Organizations in the Making of
University of California Press, 2002.

Department of Mechanical Engineering

Subject: **ENGINEERING PHYSICS**
Year, Semester: 1st year/1st semester
Lecture: **2**

1st week:
Lecture: The basics of kinematics and dynamics of particles: Giving the position of a particle.

2nd week:
Lecture: Position-time function, velocity and acceleration.

3rd week:
Lecture: Newton's laws. Types of forces.

4th week:
Lecture: The concept of mechanical work, potential and kinetic energy.

5th week:
Lecture: Work-energy theorem.

6th week:
Lecture: The basics of electricity and magnetism. Electrostatics, electrical potential.

7th week:
Lecture: electric fields around conductors, capacity and capacitors.

8th week:
Lecture: Mid-term test.
Self Control Test

9th week:
Lecture: Transport processes. Electric current, AD circuits.

10th week:
Lecture: Heat transfer: thermal conductions, convection and radiation.

11th week:
Lecture: The fields of moving charges

12th week:
Lecture: Magnetic fields, electromagnetic induction.

13th week:
Lecture: Maxwell's equations.

14th week:
Lecture: AC circuits, electric and magnetic fields in matter.

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: The basics of kinematics and dynamics of particles. Giving the position of a particle. Position-time function, velocity and acceleration. Newton's laws. Types of forces. The concept of mechanical work, potential and kinetic energy. Work-energy theorem. The basics of electricity and magnetism. Transport processes. Electrostatics, electrical potential, electric fields around conductors, capacity and capacitors. Transport processes. Electric current, AD circuits. A heat transfer: thermal conduction, convection and radiation. The fields of moving charges, magnetic fields, electromagnetic induction and Maxwell's equations, AC circuits, electric and magnetic fields in matter.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up a practice with another group. The attendance at practice classes will be recorded by the practice leader. Being late is equivalent with

an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't 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 are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in an exam grade (ESE). The grade for the test is given according to the following table: Score Grade 0-49 fail (1) 50-64 pass (2) 65-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Alvin Halpern : 3,000 Solved Problems in Physics (SCHAUM'S SOLVED PROBLEM SERIES)
McGraw-Hill, 1988. ISBN: 0-07-025734-5
Michael Browne : Physics for Engineering and Science
McGraw-Hill, 1999. ISBN: 0-07-161399-6
Robert Balmer: Thermo-dynamics, 868 pages
Jaico Publishing House , 2006. ISBN: 817224262X

Subject: **TECHNICAL DRAWING I**
Year, Semester: 1st year/1st semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Introduction to the multiview depiction
Seminar: Introduction to the multiview depiction

2nd week:
Lecture: On regular solids
Seminar: Tranceted polyhedrons

3rd week:
Lecture: Introduction to the Monge's method of projecting
Seminar: Introduction to the Monge's method of projecting

4th week:
Lecture: Intersection tasks I.
Seminar: Intersection tasks I.

5th week:
Lecture: Intersection tasks II.
Seminar: Intersection tasks II.

6th week:
Lecture: Methods of the replacing image-planes
Seminar: Methods of the replacing image-planes

7th week:
Lecture: Mid-term test
Self Control Test

8th week:
Lecture: Metrical problems I.
Seminar: Metrical problems I.

9th week:
Lecture: Metrical problems II.
Seminar: Metrical problems II.

10th week:
Lecture: Polyhedrons: prisms and pyramids
Seminar: Polyhedrons: prisms and pyramids

11th week:
Lecture: Intersection of the polyhedrons with lines and planes
Seminar: Intersection of the polyhedrons with lines and planes

12th week:
Lecture: Intersection of two polyhedrons I.
Seminar: Intersection of two polyhedrons I.

13th week:
Lecture: Intersection of two polyhedrons II.
Seminar: Intersection of two polyhedrons II.

14th week:
Lecture: Curved surfaces
Seminar: Curved surfaces

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: Monge's method of projecting: methods of projection, an image-plane system, representation of spatial elements, reconstruction. The fundamentals of intersections: line-plane and plane-plane intersections. Metrical problems: distance and angle tasks, perpendicularity, rotation of a plane to parallel to an image plane, methods of replacing image-planes, constructing an illustrative picture using new image-planes, visibility. Polyhedrons: their representation, their intersection with a line, plane and the other polyhedron. Curved surfaces: construction and representation of curved surfaces, their intersection with a line, a plane.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, to be discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't 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 some homework related to each topic and there are two tests: the mid-term test is in the 7th week and the end-term test in the 15th week. Conditions for the signature: to reach the 50 % score on both tests. to hand the homeworks in time.
B, for a grade: The course ends in an mid-semester grade (AW5). During the exam period there is another test on all the topics of the semester. This test is accepted with minimum 50 % score. The total score of the semester is the sum of the scores of all tests (mid-term, end-term, exam) and the homework tasks, and the grade is given according to the following table: Score Grade 0-99 fail (1) 100-129 pass (2) 130-159 satisfactory (3) 160-179 good (4) 180-200 excellent (5)

Required reading materials

Vlasta Szirovicza: Descriptive geometry
Self-published, Zagreb, Croatia, 2007. ISBN: 978-953-95667-0-6
Paré, E. G.: Descriptive geometry
Prentice Hall, 1997.
Gordon, V. O.: A course in descriptive geometry
Mir, 1980.

Subject: **TECHNICAL DRAWING II**
Year, Semester: 1st year/1st semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Introduction to the multiview depiction
Seminar: Introduction to the multiview depiction

2nd week:
Lecture: On the regular solids
Seminar: Tranceted polyhedrons

3rd week:
Lecture: Introduction to the Monge's method of projecting
Seminar: Introduction to the Monge's method of projecting.

4th week:
Lecture: Intersection tasks I.
Seminar: Intersection tasks I.

5th week:
Lecture: Intersection tasks II.
Seminar: Intersection tasks II.

6th week:
Lecture: Methods of the replacing image-planes
Seminar: Methods of the replacing image-planes

7th week:
Lecture: Mid-term test
Self Control Test

8th week:
Lecture: Metrical problems I.
Seminar: Metrical problems I.

9th week:
Lecture: Metrical problems II.
Seminar: Metrical problems II.

10th week:
Lecture: Polyhedrons: prisms and pyramids
Seminar: Polyhedrons: prisms and pyramids

11th week:
Lecture: Intersection of the polyhedrons with lines and planes
Seminar: Intersection of the polyhedrons with lines and planes

12th week:
Lecture: Intersection of two polyhedrons I.
Seminar: Intersection of two polyhedrons I.

13th week:
Lecture: Intersection of two polyhedrons II.
Seminar: Intersection of two polyhedrons II.

14th week:
Lecture: Curved surfaces
Seminar: Curved surfaces

15th week:
Lecture: End-term test

Requirements

Topics: The series of lectures are based on the relevant standards. It reviews the fundamental rules and formal requirements of the technical drawing, the drawing of projections, views and sections, auxiliary and sectional views. Representations of threaded parts, and threaded fasteners, gears, splines and keys. Drawing standardized machine elements and the concept of manufacturing tolerance and fitting, dimensional specification, geometrical and positioning tolerancing, surface roughness and the rules of elaboration of the workshop drawing and detailed drawings of simple machine elements. In seminar there are six tasks to elaborate: workshop drawing of different machine elements and components.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practices and my 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 can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments for the course to each occasion. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence because of the lack of active participation in class. Students have to submit all the six drawing tasks as scheduled minimum on a sufficient level. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in a mid-semester grade. Based on the average of the marks of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the six drawing tasks - the average grade of the two tests The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Required reading materials

Vlasta Szirovicza: Descriptive geometry
Self-published, Zagreb, Croatia, 2007. ISBN: 978-953-95667-0-6
Paré, E. G.: Descriptive geometry
Prentice Hall, 1997.
Gordon, V. O.: A course in descriptive geometry
Mir, 1980.

Department of Basic Technical Studies

Subject: **INFORMATICS FOR ENGINEERS II**
Year, Semester: 1st year/2nd semester
Seminar: **2**

1st week:
Seminar: Database basics. Elements of relational databases: tables, records, fields, keys, primary keys, indexes. Relationship between tables, relationship types. A user interface of software.

2nd week:
Seminar: Create a new database. Create and import tables. Data types. Create relations between tables. Referential integrity. Insert, delete, update records, fields.

3rd week:
Seminar: Format. Input masks. Fast finding, Filtering, and Sorting Data. Queries (Select, Crosstab). Calculated fields. Summarizing Data.

4th week:
Seminar: Queries (Making table queries, appending queries, Updating queries, deleting queries)

5th week:
Seminar: Creating forms using the Form wizard. Creating reports using the Report wizard. Formatting a report.

6th week:
Seminar: Modeling and creating a new database.

Practicing the learned material.

7th week:
Seminar: 1st Mid-term exam.
Self Control Test

8th week:
Seminar: 2nd module: LABVIEW Virtual instruments. A user interface of software. Main components: a front Panel, a block Diagram, an icon and a connector pane. Data types. Elements of a block diagram: nodes, functions, subVÍs.

9th week:
Seminar: A data flow model. Troubleshooting and debugging. Decision making: using selection. Using case structure.

10th week:
Seminar: Loops: While loop. For Loop. Iterative data transfer: Use Shift register. Timing.

11th week:
Seminar: Modularity. Functions and SubVIs. Three types of Functions: Express VIs, Standard VIs, Functions. Creating SubVIs.

12th week:
Seminar: File I/O. Graph Indicators.

13th week:
Seminar: Create codes. Practice the learned material.

14th week:
Seminar: 2nd Mid-term exam.
Self Control Test

15th week:
Seminar: Make up or improve grades: End-term exam.

Requirements

A, for a signature: Participation at practice classes is compulsory. Students have to attend the practice classes and mustn't miss more than three occasions during the semester. In case a student does more so, the subject will not be signed and the student must repeat the course. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented.
B, for a grade (AW5): Everybody has to take two mid-term exams during the semester at the end of the modules. The minimum requirement for the mid-term exams is 50%. Based on the score of the mid-term exams, the grade for each exam is given according to the following table: Score Grade 0-49 % fail (1) 50-62 % pass (2) 63-75 % satisfactory (3) 76-88 % good (4) 89-100 % excellent (5) Both modules must be obtained at least pass (grade 2). Students can make up or improve their grades at the last week of the semester. At the end of the semester everybody will get a final grade based on the average of his/her all grades: If the average is for example (3.5) then the lecturer decides if it is (3) or (4).

Subject: **MATHEMATICS II**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Seminar: **3**
Practical: **5**

1st week:
Lecture: Derivatives, linear approximation. Differentiation rules.
Seminar: Derivatives, linear approximation. Differentiation rules.

2nd week:
Lecture: Applications in physics. Taylor polynomials.
Seminar: Applications in physics. Taylor

polynomials.

3rd week:
Lecture: Extreme values. Monotony and convexity testing.
Seminar: Extreme values. Monotony and convexity testing.

4th week:
Lecture: Mean value theorems, l'Hospital's rule, Taylor's theorem.
Seminar: Mean value theorems, l'Hospital's rule, Taylor's theorem.

5th week:
Lecture: Antiderivatives. Integration by parts and by substitution.
Seminar: Antiderivatives. Integration by parts and by substitution.

6th week:
Lecture: Integration in special classes of functions.
Seminar: Integration in special classes of functions.

7th week:
Lecture: The Riemann integral. The Newton-Leibniz theorem. Improper integrals.
Seminar: The Riemann integral. The Newton-Leibniz theorem. Improper integrals.

8th week:
Lecture: Mid-term test.
Self Control Test

9th week:
Lecture: Applications of the integration in geometry and physics. Fourier series.
Seminar: Applications of the integration in geometry and physics. Fourier series.

10th week:
Lecture: Classification of differential equations. Initial value problems, boundary value problems. First order differential equations.
Seminar: Classification of differential equations. Initial value problems, boundary value problems. First order differential equations.

11th week:
Lecture: Slope fields. Euler's and Runge-Kutta methods. Problems leading to differential equations.
Seminar: Slope fields. Euler's and Runge-Kutta methods. Problems leading to differential equations.

12th week:
Lecture: Problems leading to differential equations. Separable differential equations.
Seminar: Problems leading to differential equations. Separable differential equations.

13th week:
Lecture: Second order differential equations. The theory of linear differential equations.
Seminar: Second order differential equations. The theory of linear differential equations.

14th week:
Lecture: Method of variation of parameters, method of undetermined coefficients, application of the Laplace transform.
Seminar: Method of variation of parameters, method of undetermined coefficients, application of the Laplace transform.

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up any practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in an exam grade (ESE). The grade for the test is given according to the following table: Score Grade 0-49 fail (1) 50-64 pass (2) 65-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Addison Wesley : Thomas' Calculus
11th.2005. ISBN: 0-321-24335-8
S. Minton: Calculus Concept and Connections
McGraw Hill , 2006. ISBN: 0-07111200-6
M. D. Greenberg: Fundamentals of engineering analysis
Cambridge University Press, ISBN: 978-0-521-80526-1

Department of Civil Engineering

Subject: **CAD MODELLING I**
Year, Semester: 1st year/2nd semester
Practical: **4**

1st week:
Practical: Presentation of the history of CAD. Presentation of the screen. Usage of palettes and tools.

2nd week:
Practical: Presentation of draw settings, customizing and settings. Detailed presentation of drop-down boxes and toolbars. Giving the coordinates and drawing with coordinates.

3rd week:
Practical: Introduction of draw (line, polygon, circle, arch, line chain, etc.) and draw modifying commands (erase, copy, mirror, array, move, rotate, etc.).

4th week:
Practical: Drawing practice.

5th week:
Practical: 1st test
Self Control Test

6th week:
Practical: Presentation of draw settings, customizing and settings, drawing slab plan.

7th week:
Practical: Presentation of draw settings, customizing and settings, drawing slab plan.

8th week:
Practical: 2nd test
Self Control Test

9th week:
Practical: Presentation of draw settings, customizing and settings for ground plan.

10th week:
Practical: Presentation of draw settings, customizing and settings, drawing ground plan.

11th week:
Practical: Presentation of draw settings, customizing and settings, drawing ground plan.

12th week: **Practical:** Settings of printing. Semester summary. **13th week:** **Practical:** Drawing practice.	**14th week:** **Practical:** 3rd test **Self Control Test** **15th week:** **Practical:** Repeat test.

Requirements

Topics: Making construction plans in ArchiCAD software. Settings of the program, applying styles for construction plans. Making foundation, reinforced concrete, steel and wooden construction plans. Presentation of the history of CAD. Presentation of the screen. Giving the coordinates and drawing with coordinates. Introduction of draw (line, polygon, circle, arch, line chain, etc.) and draw modifying commands (erase, copy, mirror, array, move, rotate, etc.). Managing the layer and introduction of features, settings. Settings of the line type, context and dimension style. Usage of palettes and tools. Creating and using blocks and references. Introduction of inquiries. Presentation of draw settings, customizing and settings. Detailed presentation of drop-down boxes and toolbars. Usage of model space and paper space. Settings of printing and printing. Making construction plans in AutoCAD software. Settings of the program, applying styles for construction plans. Making foundation, reinforced concrete, steel and wooden construction plans. Presentation of the history of CAD. Presentation of the screen. Giving the coordinates and drawing with coordinates. Introduction of draw (line, polygon, circle, arch, line chain, etc.) and draw modifying commands (erase, copy, mirror, array, move, rotate, etc.). Managing the layer and introduction of features, settings. Settings of the line type, context and dimension style. Usage of palettes and tools. Creating and using blocks and references. Introduction of inquiries. Presentation of draw settings, customizing and settings. Detailed presentation of drop-down boxes and toolbars. Usage of model space and paper space. Settings of printing and printing.

A, for a signature: Participation at practice classes is compulsory. Students must attend the practices 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 can’t make up a practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being 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 every class. If a student’s behavior or conduct doesn’t meet the requirements of active participation, the teacher may evaluate his or her participation as an absence due to the lack of active participation in class. Students have to submit all the six drawing tasks as scheduled minimum on a sufficient level.

B, for a grade: The course ends in a mid-semester grade (AW5). The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student can't take any repeated test.

CHAPTER 7

Subject: **CONSTRUCTION MATERIALS I**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Seminar: **1**

1st week: **Lecture:** Basic definitions. History of material constructions. Development of material constructions. Grouping of material constructions.	**Seminar:** Weight, density of solid and liquid types of material. Discussing the homework topics.

Requirements

Topics: The lectures are focused on the material properties of material constructions. It reviews the manufacturing and the requirements of different material constructions and those components. Basic topics are the following: Design of aggregate and normal concrete (concrete recipes). New concrete technologies (SFRC, SCC, HSC). Recycling of concrete. Steel. Load bearing glass types. Types of ceramic, plastic and wooden material, etc. The presentations are in connection with laboratory tests of material constructions.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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. Ine case of missed practice classes, a student can attend a practice class with another group, being discussed with the tutor. Attendance at practice will be recorded by the practice leader. Students are required to bring a calculator for the course to each practice class. Students have to submit all the laboratory tasks in a form of a report as a scheduled minimum at sufficient level. During the semester there is one test: the end-term test in the 15th week and the deadline for the homework is also the 15th week. The homework: to write an essay about a type of building material, which is freely chosen by the student and previously to be discussed with the tutor.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the test result and homework, the mid-semester grade is calculated as 70% of the test (max. 70 points) + 30% of homework (max. 30 points): • The minimum requirement for the end-term test and homework is 50%. At least min. 50% of the test (min. 35 points) and also of the homework (min. 15 points) should be collected. Based on the score of the tests and homework, the grade is given according to the following table: Score Grade 0-49 fail (1) 50-62 pass (2) 63-75 satisfactory (3) 76-87 good (4) 88-100 excellent (5) If the score of the test is below 35 points, the student once can take a retake test covering the whole semester material.

Required reading materials

Stephen Timoshenko : Strength of Materials: Elementary Theory and Problems
Van Nostrand, 1955.
Hegger M., Auch-Schwelk V., Fuchs M., Rosenkranz T. : Construction Materials Manual
Birkhäuser Edition . ISBN: 3-7643-7570-1
Kind-Barkauskas, Kauhsen, Polonyi, Brandt: Concrete Construction Materials Manual
Birkhäuser Edition .2002. ISBN: 3-7643-6724-5
Pankhardt, K. : Load bearing glasses
Lambert Academic Publishing, 2012. ISBN: 978-3-8473-2191-0
Schulitz, Sobek, Habermann W.: Steel Construction Manual
Birkhäuser Publishers, 2000. ISBN: 3-7643-6168-6
Herzog T., Natterer J., Schweizer R., Volz M. , Winter W. : Timber Construction Manual

Birkhäuser Edition . Birkhäuser Publishing, 2004. ISBN: 3-7643-7025-4
Pfeifer G., Ramcke R., Achtziger J. et. al. : Masonry Construction Manual
Birkhäuser Publishing, 2001. ISBN: 978-3-7643-6543-1
Knippers J., Cremers J., Gabler M., Lienhard J.: Plastic and Membranes Construction Manual
Birkhäuser Architecture, 2012. ISBN: 978-3-0346-0726-1

Subject: **GEOINFORMATICS II**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Mapping the survey. Digital mapping. Analog and digital data sources. Attributes. Introducing Digicart's ITR5.
Practical: Digital mapping with ITR5.

2nd week:
Lecture: Fundamentals of photogrammetry. Analog and digital photogrammetry. Orthophotography.
Practical: Digital mapping with ITR5.

3rd week:
Lecture: Fundamentals of topography. Topographical databases.
Practical: Topographical practice. Drawing contour-map.

4th week:
Lecture: Intersections. Foresection with inner angles. Foresection with WCBs. Different types of intersections.
Practical: Digital mapping with ITR5.

5th week:
Lecture: Resection. Resection – the dangerous circle. Arcsection.
Practical: Digital mapping with ITR5.

6th week:
Lecture: Types of errors. Basics of error theory. Systematic errors. Random errors. The aim of processing the observations. Error propagation.
Practical: Digital mapping with ITR5.

7th week:
Lecture: Adjusting the observations of a single quantity. The 'a priori' and the 'a posteriori' mean errors. The process of adjustment. When the 'a priori' mean error of observations is equal.
Practical: Digital mapping with ITR5.

8th week:
Lecture: Mid-term theoretical test. Land management. Land registry. Organizations of the Hungarian land surveying. FÖMI.
Practical: No.1 qualifier practice

9th week:
Lecture: The principle of trigonometric heighting. Trigonometric leveling. The determination of the heights of buildings.
Practical: Trigonometric heightening.

10th week:
Lecture: Structure of levels. The principle of leveling. The Surveyor's level. Elements of surveyor's level.
Practical: Line leveling with surveyor's optical level.

11th week:
Lecture: Adjusting the level. Systematic error in leveling. Procedure of leveling. Line leveling. Processing leveling data
Practical: Line leveling with surveyor's digital level.

12th week:
Lecture: The 'a priori' mean error of leveling. Computation of heightening lines and joints.
Practical: Computation of heightening lines (leveling)

13th week:
Lecture: Global Navigation Satellite Systems.

History of GPS. GPS Satellite Concept. GPS System Segments. Principle of Positioning. GPS codes and the determination of travel time. Accuracies / Error sources.
Practical: Line leveling – two-way (the rise and fall method)

14th week:
Lecture: Application of GNSS in Surveying. Absolute vs. Relative positioning. The GNSS infrastructure and its evolution. Transformation of WGS-84 coordinates to the national coordinate system.
Practical: GNSS measuring - Real-time kinematic observations

15th week:
Lecture: End-term theoretical test2nd qualifier practice
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practice classes and may not miss more than three times 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 practice classes will be recorded by the practice leader. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests. During the semester there are two qualifier practice tasks: the first qualifier practice in the 8th week and the second qualifier practice in the 15th week. Students have to complete all the two qualifier practice tasks as scheduled minimum on a sufficient level.
B, for a grade: The course ends in an exam (ESE). Based on the average of the marks of the qualifier practice tasks and the average of the test results, the mid-semester grade is calculated as an average of them: ((1st practical test result + 2nd practical test result)/2 + Mid-term theoretical test result + End-term theoretical test result)/3. The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test covering the whole semester material.

Required reading materials

James A. Elithorp, Jr. and Dennis D. Findorff: Geodesy for Geomatcs and GIS Professionals
2nd.
Wolfgang Torge : Geodesy
2001. ISBN: 3-11-017072-08
Wolfgang Torge, Jürgen Müller : Geodesy
2012. ISBN: 978-3-11-025000-8

Subject: **HYDRAULICS I**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Hydrostatics. Physical properties of water and various fluids. An ideal fluid. Fluid viscosity. Pressure conditions of fluids in absolute or relative static-state. Pressure, pressure distribution, hydrostatic force. Euler-

equation of hydrostatics.
Practical: Density, specific weight. Elastic compressibility. Thermal volume expansion. Capillarity- Role of adhesive and cohesive forces as well as surface tension. The governing equation in gravity field. Pascal's law. Hydrostatic pressure head.

2nd week:
Lecture: Hydrostatics. Absolute and relative equilibrium. Pressure (head) distribution and resultant pressure forces on various impervious rigid surfaces. The governing equation in the Earth gravity field. The governing equation of hydrostatics in relative equilibrium in accelerating systems.
Practical: Hydrostatic pressure distribution and pressure forces on horizontal plane surfaces. Pressure distribution and pressure forces on vertical impervious plane surfaces with constant width. Pressure distribution and pressure forces on inclined impervious plane surfaces.

3rd week:
Lecture: Determination of a pressure centre. Pressure head distribution and pressure force on prismatic surfaces. Pressure head distribution and pressure force on cylinder shape surfaces. Pressure head distribution and pressure force on surfaces with arbitrary shapes.
Practical: Decomposition to horizontal and vertical components. Pressure distribution and pressure forces on plane surfaces with arbitrary shapes and inclination. Pressure head distribution and pressure force on prismatic surfaces.

4th week:
Lecture: Flow velocity. Laminar and turbulent motion. Laminar flow in a tube. Typical states of motion. The Reynolds-number. Subcritical, critical and supercritical flows. Hydraulic jump. The Froude-number. Classification of steady-state flows.upon the rate of spatial variation. Classification of unsteady flows upon the rate of space-time variation
Practical: Examples on the role of turbulence. Some more facts on the role of turbulence. Some more evidence on the presence of turbulence in the ecosystem.

5th week:
Lecture: Fluid dynamics. Euler equation for ideal fluid in hydrodynamic conditions. Application of the Bernoulli equation on the entire cross-section of a flow.
Practical: Steady-state dynamic equilibrium of ideal fluids in gravity field: the Bernoulli equation. Dynamic equilibrium in case of an elementary stream-tube. The Bernoulli-equation on real (viscous) fluids.

6th week:
Lecture: Application of the Bernoulli-equation. Bernoulli equation for real (viscous) fluids. Head losses.
Practical: Issuing from a tank through a small orifice. Velocity-, contraction- and discharge coefficients.

7th week:
Lecture: Fluid dynamics. Velocity and shear stress distribution in steady-state pipe flows. Head losses.
Practical: Velocity distribution and head losses in steady-state pipe flows. Radial distribution of the shear stress.

8th week:
Lecture: Laminar velocity distribution and head loss. Radial distribution of the velocity in laminar flows. Friction loss in long pipes. The Moody-diagram.
Practical: Head losses in laminar flows. Velocity distribution in terms of the Re number. Velocity distribution and head losses in turbulent pipe flows.

9th week:
Lecture: Outflow (issuing) through a large orifice. The Bazin-weir. Circular weirs. The Poncelet-weir.
Practical: Issuing through a large orifice. Overtopping with a backwater effect. Overtopping and outflow examples from River Tisza, 2001.

10th week:
Lecture: The Thomson-weir, The Cipoletti-weir.
Practical: Weirs developed by nature.

11th week:
Lecture: Chézy-formula, Chézy velocity coefficient and its estimation, Bed roughness and smoothness.
Practical: Hydraulic sizing of free surface channels. Regular trapezoidal channel cross-section.

12th week:
Lecture: Sizing of open channels, Critical (threshold) velocities, international methods to solve the formula on water depth.
Practical: Application of the fix point iteration on the Chézy formula. Calculating free surface gradually varying flows in channels.

13th week:
Lecture: Subcritical, critical and supercritical flows. Flow depth - specific energy curve (Braun-curve). Flow depth - specific discharge curve (Koch-curve). Suddenly varying flow: the hydraulic jump.
Practical: Subcritical and supercritical flow. Specific discharge at constant energy head: Koch-curve. Free hydraulic jump and its corresponding depths. Shortening the length of the reach to be protected by a stilling basin.

14th week:
Lecture: The Darcy-law and its validity. An analysis of groundwater and deeper aquifer abstraction wells.
Practical: Example to a simplified problem solution: Capacity of groundwater wells.

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend the practice classes and may not miss more than three times during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. A student can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If students' behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence because of the lack of active participation in class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Required reading materials

CHADWICK A., MORFETT J., BORTHWICK M.: Hydraulics in civil and environmental engineering
Spoon Press , 2004.
GERHART P. M.: Fundamentals of fluid mechanics
Addison Wesley , 1992.
MUNSON B. R., YOUNG D. F., OKIISHI T. H.: Fundamentals of Fluid Mechanics
John Wiley and Sons , 2009. ISBN: 978-0470262849
ROBERTSON J.A.: Engineering fluid mechanics
Houghton Miffin , 1985.
WEBBER N.B.: Fluid mechanics for civil engineers Chapman and Hall, 1985.

Subject: **MECHANICS I**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Introduction, definitions, concurrent forces in a plane
Practical: Forces in a plane

2nd week:
Lecture: Forces in a plane
Practical: Forces in a plane

3rd week:
Lecture: Simple structures, statical determinacy
Practical: Simple structure

4th week:
Lecture: kinds of compound structure
Practical: Compound structure, Issuing task 1.

5th week:
Lecture: Truss analysis I.
Practical: Truss analysis I.

6th week:
Lecture: Truss analysis II.
Practical: Truss analysis II.

7th week:
Lecture: Distributed forces in a plane
Practical: Summary of the practice.

8th week:
Lecture: Drawing week, Submitting task 1.
Practical: Mid-term test
Self Control Test

9th week:
Lecture: Internal force diagrams
Practical: Internal force diagrams

10th week:
Lecture: Internal force diagrams II
Practical: Internal force diagrams III

11th week:
Lecture: Internal force diagrams III
Practical: Internal force diagrams III

12th week:
Lecture: Force systems in three dimensional space.
Practical: Force systems in three dimensional space.

13th week:
Lecture: Force systems in three dimensional space.
Practical: Force systems in three dimensional space.

14th week:
Lecture: kinds of structure in three dimensional space
Practical: kinds of structure in three dimensional space

15th week:
Lecture: Drawing week, Submitting task 2.
Practical: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up any practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are

required to bring calculators to each practice class. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.
During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to reach the minimum level of points on each test (60 %). Students have to submit all the tasks as scheduled minimum at a sufficient level. If the score of any test is under 60%, the student once can take a retake test in both topics.
B, for a grade: The course ends in an examination grade (ESE) based on the points of the tasks, tests and exam. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Ferdinand P. Beer, E. Russell Johnston and Phillip J. Cornwell: Vector Mechanics for Engineers Hardcover, 2012. ISBN: 0077402324, 97800774

Department of Mechanical Engineering

Subject: **INTRODUCTION TO ETHICS**
Year, Semester: 1st year/2nd semester
Lecture: **2**

1st week:
Lecture: The code of engineering ethics. Rights to engineering services.

2nd week:
Lecture: An engineer's obligations to society. Obligations to his/her profession, employers and clients.

3rd week:
Lecture: Roles of engineering societies in ethics.

4th week:
Lecture: Ethical behavior versus management. Internal and external procedures for considering dissenting views.

5th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

6th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

7th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

8th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

9th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

10th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

11th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

12th week:
Lecture: Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

13th week: **Lecture:** Case studies. Discussing and analyzing the case studies in terms of engineering ethics. **14th week:** **Lecture:** Case studies. Discussing and analyzing the case studies in terms of engineering ethics.	**15th week:** **Lecture:** Case studies. Discussing and analyzing the case studies in terms of engineering ethics.

Requirements

Topics: This course is intended to introduce students to the study of ethics, the branch of philosophy that aims to understand what actions are right and wrong, what states of affairs are good and bad, and what traits of personality are desirable and undesirable. Our central question will be "What should I (morally) do?" Similarly, although it is impossible to separate the discussion of ethical theories from their application to particular moral problems, this course will emphasize the former. The most well-developed and carefully formulated ethical theory that addresses our central question is utilitarianism: what I should do to make the world a better place. In the second half of we review of the growth and development of professions, engineering ethics, obligations to employers and their peers, limits of professional responsibility, codes of ethics and enforcement. Traditional function of engineering societies. Ethical engineers and the lows, the public interest analyzing some case studies.
A, for a signature: Participation at lectures is compulsory. Students must attend the lecture and may not miss more than three practice during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. A student can't make up a lecture with another group. Attendance at lecture will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Missed lectures should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the lecture in every lecture. If a student's behavior or conduct doesn't meet the requirements of active participation, the lecturer may evaluate his/her participation as an absence because of the lack of active participation in class. Each student must give one short presentation about a case study during the semester. The presenter has to show his or her ability to present the case study clearly, focuses on the most important parts in a concise manner and answers the questions raised by the audience or the lecturer. Student has to analyze his or her case study in terms of ethical behavior, obligation to the profession, to the society, to the employer and the client.
B, for a grade: The course ends in an examination (ESE). Based on the grades of the presentation and the examination, the exam grade is calculated as an average of them: The minimum requirement for the examination is 60%. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any tests is below 60, the student can take a retake test in conformity with the EDUCATION AND EXAMINATION RULES AND REGULATIONS. An offered grade: it may be offered for students if the grade of the presentation is at least satisfactory (3).

Required reading materials

Charles E. Harris, Michael S. Pritchard, Michael J. Rabins: Engineering Ethics: Concepts and Cases
2008.

Department of Basic Technical Studies

Subject: **MATHEMATICS FINAL EXAM**
Year, Semester: 2nd year/1st semester

Subject: **MATHEMATICS III**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Functions of several variables, and scalar fields.
Seminar: Functions of several variables, and scalar fields.

2nd week:
Lecture: Continuity, differential calculus, partial derivatives, gradients.
Seminar: Continuity, differential calculus, partial derivatives, gradients.

3rd week:
Lecture: Young's theorem. Local and global extrema.
Seminar: Young's theorem. Local and global extrema.

4th week:
Lecture: Double and triple integrals. The Jacobian determinant.
Seminar: Double and triple integrals. The Jacobian determinant.

5th week:
Lecture: Vector-valued functions and curves.
Seminar: Vector-valued functions and curves.

6th week:
Lecture: Derivatives. Linear approximation.
Seminar: Derivatives. Linear approximation.

7th week:
Lecture: Curvature, torsion.
Seminar: Curvature, torsion.

8th week:
Lecture: Mid-term test
Self Control Test

9th week:
Lecture: Motion in space, velocity, acceleration.
Seminar: Motion in space, velocity, acceleration.

10th week:
Lecture: Vector fields. Derivatives. Divergence and curl.
Seminar: Vector fields. Derivatives. Divergence and curl.

11th week:
Lecture: Line and surface integrals.
Seminar: Line and surface integrals.

12th week:
Lecture: The theorems of Gauss and Stokes, Green's formula.
Seminar: The theorems of Gauss and Stokes, Green's formula.

13th week:
Lecture: Conservative vector fields, potentials.
Seminar: Conservative vector fields, potentials.

14th week:
Lecture: Applications in physics.
Seminar: Applications in physics.

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: Functions of several variables, and scalar fields. Continuity, differential and integral calculus, partial derivatives, gradients, and Young's theorem. Local and global extrema. Double and triple integrals. The Jacobian determinant. Vector-valued functions and curves. Derivatives. Linear approximation. Curvature, torsion. Motion in space, velocity, acceleration. Vector fields. Derivatives. Divergence and curl. Line and surface integrals. The theorems of Gauss and Stokes, Green's formula. Conservative vector fields, potentials. Applications in physics.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up any practice with another group. Attendance at practice class will be recorded by the practice leader. Being late is equivalent with 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. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't 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 are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in an exam grade (ESE). The grade for the test is given according to the following table: Score Grade 0-49 fail (1) 50-64 pass (2) 65-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Addison Wesley : Thomas' Calculus
11th.2005. ISBN: 0-321-24335-8
S. Minton: Calculus Concept and Connections
McGraw Hill , 2006. ISBN: 0-07111200-6
M. D. Greenberg: Fundamentals of engineering analysis
Cambridge University Press, ISBN: 978-0-521-80526-1

Department of Civil Engineering

Subject: **BUILDING CONSTRUCTION I**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Subject of building construction science. Primary and inferior structures of buildings. Effects on buildings, requirements.
Practical: issuing task 1 (homework drawing). Elaborating workshop drawing 1.

2nd week:
Lecture: Horizontal load-bearing structures. Arches. Solid floors. Monolithic and prefabricated RC floor structures.
Practical: consultation of task 1 (homework drawing)

3rd week:
Lecture: Frame-type buildings, architectural features. Structure of monolithic RC frame buildings, space limiting structures.
Practical: consultation of task 1 (homework drawing)

4th week:
Lecture: Foundation.
Practical: consultation of task 1 (homework drawing)

5th week:
Lecture: Under grade insulation
Practical: submitting task 1 (homework drawing). Elaborating workshop drawing 2.

6th week:
Lecture: Pitched roof: roof truss and roofing 1.
Practical: Issuing task 2 (homework drawing). Elaborating workshop drawing 3.

7th week:
Lecture: Mid-term test
Practical: consultation of task 2 (homework drawing)
Self Control Test

8th week:
Lecture: Pitched roof: roof truss and roofing 1.
Practical: consultation of task 2 (homework drawing)

9th week:
Lecture: Flat roof.
Practical: consultation of task 2 (homework drawing)

10th week:
Lecture: Door (external and internal), window.
Practical: submitting task 2 (homework drawing). Issuing task 3 (homework drawing).

11th week:
Lecture: Floor, stairs.
Practical: consultation of task 3 (homework drawing)

12th week:
Lecture: Chimneys and ventilation shafts.
Practical: consultation of task 3 (homework drawing)

13th week:
Lecture: Floor finish.
Practical: consultation of task 3 (homework drawing)

14th week:
Lecture: Façade finish (envelope).
Practical: submitting task 3 (homework drawing).

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: Subjects of building construction science. Primary and inferior structures of buildings. Effects on buildings, requirements. Horizontal load-bearing structures. Arches. Solid floors. Monolithic and prefabricated RC floor structures. Frame-type buildings, architectural features. Structure of monolithic RC frame buildings, space limiting structures. Foundation and under grade insulation. Pitched roof: roof truss and roofing. Flat roof. Door (external and internal), window. Floor, stairs. Chimneys and ventilation shafts. Floor finish, façade finish (envelope). In seminar there are six tasks to elaborate: 3 homework drawings and 3 workshop drawings.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring the drawing tasks and drawing instruments to each practice of the course. Active participation is evaluated by the teacher every class. If a student's behavior or conduct doesn't 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 all the six drawing tasks as scheduled minimum on a sufficient level. During the semester there are two tests: the mid-term test in the 7th week and the end-term test in the 15th week. Students have to sit for the tests. Homework drawings: 3 x 25 points = 75 points Tests: 2 x 25 points = 50 points Workshop drawings: bonus points (max. 5, for all) Mid-semester points 125 points For a signature students must achieve more than 50% of points (63 points).
B, for a grade: The course ends in an exam (ESE). Mid-semester points: 125 points Colloquium (ESE): 50 points 175 points Score Grade 0-87 fail (1) 88-109 pass (2) 110-131 satisfactory (3) 132-153 good (4) 154-175 excellent (5)

Required reading materials

AMBROSE, James E.: Building structures
Wiley, 1993. ISBN: 0471540609
BÖHÖNYEY, J.: Building construction encyclopedia
Iparterv, 1986.

Subject: **CONSTRUCTION MATERIALS II**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Preparation, course-up, description of subject requirements, description of course schedule, description of the course literature lists, registration week.

2nd week:
Lecture: Mortars. Classification of mortals. Masonry. Plasters. Bedding and covering mortals. Surface and wall-forming mortals. Waterproof cement mortar. Special-purpose mortals. Special concrete types. (Mass concrete, fiber, recycled, lightweight concrete, self-compacting, high strength, looking ...)
Seminar: Special concrete types (four kinds of mix / break). Distribute of homework: small expertise: Usage of construction materials through good and bad examples shown.

3rd week:
Lecture: Wood. Structure and organization of a tree, types of wood. Wood defects, tree diseases. Physical and mechanical properties of natural wood. Products of wood. Machining. Protection of wood.
Seminar: Special concrete types (four kinds of mix / break). Distribute of homework: small expertise: Usage of construction materials through good and bad examples shown.

4th week:
Lecture: Metals I. Characterization of metals. Types of metals. Rheology II. Metallic bond. Structure of metal. Production of steel. Mechanical properties of steel. Types of iron and steel. Hardness, impact strength and test tools. Weldability.
Seminar: Construction of wood (moisture content, compressive strength, flexural strength, modulus of elasticity).

5th week:
Lecture: Metals. II Aluminum and its alloys. Other metals used in the construction industry (copper, zinc...)
Seminar: Construction wood (moisture content, compressive strength, flexural strength, modulus of elasticity).

6th week:
Lecture: Plastics. The properties of plastics. usage of special plastics. Composites, for example glass-fiber reinforced plastic, tarpaulins. Adhesives. (Single-and multi-component material) Insulation systems and materials. Heat, water, - sound. Inorganic, organic insulating

materials and their properties. Materials of sound control. Acoustic material characteristics. Waterproofing materials. Bituminous waterproofing membranes, plastic films and sheets for waterproofing.
Seminar: Metal types. Metal products. Steel reinforcing. (hot rolled, cold drawn, tensile strength, yield point, contraction, hardness(Poldi), impact strength at special temperature(Charpy).

7th week:
Lecture: Bitumen and asphalt. The definition of bitumen, tar and asphalt. Bitumen varieties. Usage of bitumen. Sealants, paints, surface protection. Pigments. The binders for paint and thinner types. Other ingredients of paint. The most important properties of paint and their testing.
Seminar: Types of metal. Metal products. Steel reinforcing. (hot rolled, cold drawn, tensile strength, yield point, contraction, hardness(Poldi), impact strength at special temperature(Charpy).

8th week:
Lecture: Types of ceramics. The concept and splitting of building ceramics. The manufacturing technology of ceramics. Porous products. The properties of masonry and tile, their classification, and examinations.
Seminar: Types of plastic. PVC, PE, PP, fire resistance, chemical resistance. Presentation of composite, fiber-reinforced plastics, such as glass, carbon fiber material types.I nsulation systems. Heat, water, - sound insulation of material types and their requirements. Paint. Opacity, layer thickness, coverage.

9th week:
Lecture: A mid-year planning task: semi-annual consultations related tasks previously announced time, writing midterm.

10th week:
Lecture: Types of deformation. (creep, relaxation, spontaneous deformation of different building materials)Rheological material model III.
Seminar: Types of plastic. PVC, PE, PP, fire resistance, chemical resistance. Presentation of composite, fiber-reinforced plastic types, such as glass, carbon fiber material. Insulation systems. Heat, water, - sound insulation material types and their requirements. Kinds of paint. Opacity, layer thickness, coverage.

11th week:
Lecture: Diagnostics (errors and their causes, cracks), quality control.
Seminar: Deformations. Spontaneous deformation, thermal expansion of aluminum, firing shrinkage of ceramic types, swelling, lime at, shrinkage-swelling measurement for example on concrete specimens (Demec, Huggenberger ...) Ceramic. Types: wall, floor, hull components and their requirements, thermal properties.

12th week:
Lecture: Non-destructive testing (Schmidt hammer, ultrasound, x-ray).Submission of homework.
Seminar: Deformation types. Spontaneous deformation, thermal expansion of aluminum, firing shrinkage of ceramic types, swelling, lime at, shrinkage-swelling measurement for example on concrete specimens (Demec, Huggenberger ...) Ceramics. Types: wall, floor, hull components and their requirements, thermal properties.

13th week:
Lecture: Durability-Corrosion I.: Concrete (exposure classes, types of corrosion, construction planning issues)Durability-Corrosion II.: Types of metal and other material (corrosion types, different forms of construction materials), material compatibility. (chemical, physical compatibility for example thermal expansion, working together, technical information .)
Seminar: Diagnostics and devices. (Poldi, Schmidt)Nondestructive testing and evaluation. Durability. Schmidt hammer, ultrasound. Corrosion. Compatibility. Carbonation, chlorides statement and description of phenomena such as efflorescence, improving surfaces.

14th week: **Lecture:** Writing midterm test (theory and practice). **Self Control Test**	**15th week:** **Lecture:** Manufacture and repair of semi-annual planning tasks. Semi-annual consultations related tasks previously announced time, writing midterm and additional midterm tests.

Requirements

Topics: Glass as a building material (types of glasses and properties of different glass types, mechanical and physical properties of glass, introduction in possibilities of creating load bearing glasses.). Wooden materials in building industry, mechanical and hydrotechnical properties (laboratory testing of wood, effect of fiber direction on properties of wood, force-deflection diagrams, determination of Young's modulus etc.). Steel in engineering applications. Mechanical properties of hot and cold formed steels. Stress-strain diagrams. Effects of carbon content on forming and welding of steel. Laboratory tensile testing of steel (reinforcement). Hardness of steel. Effect of temperature on the external work of steel (Charpy-hammer tests). Alloys. Plastics in engineering applications. Organic binder materials (bituminous materials). Ceramic. History of ceramics. Strength and durability of ceramic materials. Laboratory compression tests of bricks.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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. Ine case of missed practice classes, a student can attend a practice class with another group, being discussed with the tutor. Attendance at practice will be recorded by the practice leader. Students are required to bring a calculator for the course to each practice class. Students have to submit all the laboratory tasks in a form of a report as a scheduled minimum at sufficient level. During the semester there are two tests: the end-term test in the 15th week and the deadline for the homework is also on the 15th week. The homework: to write an essay about a type of building material, which is freely chosen by the student and previously being discussed with the tutor.
B, for a grade: The course ends in exam (ESE). Based on the test result and homework, the mid-semester grade is calculated as 70% of the test (max. 70 points) + 30% of homework (max. 30 points): • The minimum requirement for the end-term test and homework is 50%. At least min. 50% of the test (min. 35 points) and also of the homework (min. 15 points) should be collected. Based on the score of the tests and homework, the grade is given according to the following table: Score Grade 0-49 fail (1) 50-62 pass (2) 63-75 satisfactory (3) 76-87 good (4) 88-100 excellent (5) If the score of test is below 35 points, a student once can take a retake test covering the whole semester material.

Required reading materials

Hegger M., Auch-Schwelk V., Fuchs M., Rosenkranz T. : Construction Materials Manual Birkhäuser Edition . ISBN: 3-7643-7570-1
Schulitz, Sobek, Habermann W.: Steel Construction Manual Birkhäuser Publishers, 2000. ISBN: 3-7643-6168-6
Herzog T., Natterer J., Schweizer R., Volz M. , Winter W. : Timber Construction Manual Birkhäuser Edition . Birkhäuser Publishing, 2004. ISBN: 3-7643-7025-4
Schittich, C., Staib, G., Balkow, D., Schuler, M., Sobek, W. : Glass Construction Manual Birkhäuser Publishers, 1999. ISBN: 3-7643-6077-1
Pankhardt, K. : Load bearing glasses Lambert Academic Publishing, 2012. ISBN: 978-3-8473-2191-0
Pfeifer G., Ramcke R., Achtziger J. et. al. : Masonry Construction Manual

Birkhäuser Publishing, 2001. ISBN: 978-3-7643-6543-1
Knippers J., Cremers J., Gabler M., Lienhard J.: Plastic and Membranes Construction Manual
Birkhäuser Architecture, 2012. ISBN: 978-3-0346-0726-1

Subject: **GEOGRAPHICAL INFORMATION SYSTEM (GIS) I**
Year, Semester: 2nd year/1st semester
Lecture: **1**
Practical: **2**

1st week:
Lecture: Introduction to GIS: Definitions and Characteristics of GIS.
Practical: Generic Computer and IT skills.

2nd week:
Lecture: Datums, Projections and Geocoding. Fundamentals of spatial functionality.
Seminar: Using a customized database systems to extract interaction data.

3rd week:
Lecture: Hardware and software components of GIS. An introduction to desktop GIS packages.
Seminar: Multi-criteria evaluation techniques.

4th week:
Lecture: Databases. Spatial Database Concepts.
Practical: Accessing data from various online providers (e.g. FÖMI).

5th week:
Lecture: Data input. Data models and structures.
Practical: Using web-based systems to extract various geographic and attribute data for use in OpenJUMP.

6th week:
Lecture: Spatial Data Models: The Digital Representation of Spatial Data.
Practical: Basic introduction to OpenJUMP customization.

7th week:
Lecture: Spatial Analytical Functionality in GIS.
Practical: Identify, retrieve, sort and exchange geographical information using OpenJUMP.

8th week:
Lecture: Mid-term theoretical test. Spatial Data Quality, Accuracy, Errors and Standards.
Practical: Use of Spatial Analyst for raster data manipulation.
Self Control Test

9th week:
Lecture: Spatial Interpolation and Surface Analysis.
Practical: Use of OpenJUMP for various analyses (spatial selection, spatial query).

10th week:
Lecture: Network Analysis - Route Finding through networks.
Practical: Use of OpenJUMP for various analyses (buffering, overlay, aggregation).

11th week:
Lecture: GIS and Spatial Modelling.
Practical: Using OpenJUMP for various analyses and for production of cartographic, chart and tabular output.

12th week:
Lecture: Data sharing and Legal Issues.
Practical: Use of OpenJUMP for editing and displaying cartographic data.

13th week:
Lecture: Use of key analysis features.
Practical: Filling attribute tables with other relevant information.

14th week:
Lecture: Cartographic output. Conclusions.
Practical: Use of OpenJUMP for production of cartographic output.

15th week:
Lecture: End-term theoretical test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for grade: The course ends in mid-semester grade (AW5). Based on the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the two tests The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test covering the whole semester material.

Required reading materials

CHRISTOPHER B. JONES : Geographical information systems and computer cartography
1997. ISBN: 0582044391
PAUL A. LONGLEY : Geographical information systems and science
2005. ISBN: 047087001X

Subject: **GEOLOGY**
Year, Semester: 2nd year/1st semester
Lecture: **2**

1st week:
Lecture: Course Introduction. Formation and origin of the Earth. Planetary geology. Structure of the Earth. Syllabus, polices.

2nd week:
Lecture: Plate tectonics. See floor spreading. Rock magnetism. Plate boundaries. Subductions. Homework assignment.

3rd week:
Lecture: Minerals. What is mineral? Physical properties. Classification. Crystalline structure. Silicate minerals. Video about the formation of the Earth.

4th week:
Lecture: Rocks. Igneous, platens and volcanoes. Formation, composition and classification. Rock identification.

5th week:
Lecture: Sedimentary rocks and sedimentation. Metamorphism and metamorphic rocks. Rock identification.

6th week:
Lecture: Geologic times (absolute, relative). Fossils, evolution, extinction. Preparation for the first test.

7th week:
Lecture: Midterm Test (100 minutes). Geologic history.
Self Control Test

8th week:
Lecture: Stratigraphy. Principles of stratigraphy. Geologic mapping. Mapping. Problems in stratigraphy.

9th week:
Lecture: Earthquakes. Mechanism, types, observations, scales, prediction. Midterm Test making up.

10th week:
Lecture: Mountain ranges. Geologic structures. Formation of folds and faults. Consultation of the HW assignment.

11th week:
Lecture: Surface processes. Mass wasting, stream, groundwater, glaciers.

12th week:
Lecture: Geologic evolution of Hungary. Reading and understanding geologic maps.

13th week:
Lecture: Hydrogeology. Geologic resources. Environmental geology. Climate changes. Milankovic cycles. Problem solving. Preparation for the second test.

14th week:
Lecture: End-semester test. Homework assignment. Preparation for the verbal exam.
Self Control Test

15th week:
Lecture: Making up the end-semester test.

Requirements

A, for a signature: Attendance: Participation at lectures is a critia to successful completion of this course. Participation at laboratory/problem solving classes is compulsory. More than 3 causeless absences result non-completion of the course. There is not any make-up lab with another group. Test and examination questions will include items covered in lectures that are not covered in the textbook or other distributed notes.
B, for a grade: Completion of the course: Submitting the laboratory reports and the homework assignments. Participating at least 70% at laboratory/problem solving. D or higher grades for both tests. There is one make up test for each. Grading of tests: Score Grade 0-60 (F) fail (1) 61-70 (D) pass (2) 71-80 (C) satisfactory (3) 81-90 (B) good (4) 91-100 (A) excellent (5) Grading of the course: Midterm test 20% End-semester test 20% Final (verbal exam) 60% A verbal exam (ESE) is taken at the end of the semester in the exam period. Students have to sign up for the scheduled exam minimum two days in advance in the Neptune.

Required reading materials

Bell, F. G.: Fundamentals of engineering geology
Butterwords, 1983.
Bell, F. G.: Engineering geology
2nd. Elsevier, 2007.
Thomson, G.R. and Turk, J.: Modern Physical Geology
Sounders College Publishing,
A division of Holt
Rinehart and Winston Inc, 1991.

Subject: **HYDROLOGY AND HYDROGEOLOGY I**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Introduction to hydrology and hydrogeology: the focus of hydrology. Sub-disciplines and interdisciplinary areas of

hydrology. The role of hydrology in society and economy.
Seminar: issuing task 1: Short (10-15 pages long) paper and ppt presentation on a given topic

2nd week:
Lecture: Physical forms of water. Hydrologic cycle and water budget. Water balance equation. The effect of climate changing on the elements of hydrological cycle.
Seminar: consultation of task 1

3rd week:
Lecture: Precipitation: forms and types of precipitation. Theories of precipitation formation. Quantity variables – in time and space. Rain characteristics. Measurement of precipitation (different types of data). Analyses of data. The rule of Montanari. Areal averages of precipitation.
Seminar: issuing task 2: Calculation of precipitation extrema. (Montanari method)

4th week:
Lecture: Evaporation: the physics of evaporation. Evaporation of open water surface, soil and vegetation – evaporation, transpiration and evapotranspiration Measurement and estimation of evaporation.
Seminar: issuing task 3: calculation of evaporation

5th week:
Lecture: Infiltration: process and characteristics. The infiltration curve. Measurement of infiltration. Water forms in the soil. Hydrogeology and groundwater.
Seminar: submitting task 2, consultation: paper and ppt presentation on the selected topic

6th week:
Lecture: Classification of sediments and groundwater types. Characterization of ground-water regimes. Physical, chemical and bacteriological properties of ground water. Unconfined, confined, artesian andkarstic ground water. Springs and wells.
Seminar: submitting task 1: students' ppt presentations

7th week:
Lecture: The runoff process. The importance watershed. Estimation of watershed characteristics. Time of concentration, the runoff ratio. Methods of effective precipitation estimation in terms. A unit hydrograph and its estimation by a classical method: the S-curve technique.
Seminar: submitting task 3, issuing task 4: Watershed delineation. Construction of runoff maps.

8th week:
Lecture: Types of surface water. Hydrology of streams (potamology). Cross- and longitudinal sections of streams and their valleys. Stream characterization. Types and characteristics of lakes.
Seminar: Performing double transformations for rainfall-runoff calculations. A classical method of unit hydrograph estimation.

9th week:
Lecture: Water-level and discharge: measurement of a stage and discharge, hydrometric databases. Characteristics of stages. Basics of hydrography. Data analyses.
Seminar: issuing task 1: ppt presentation of students

10th week:
Lecture: Relation between water-level and discharge – QH curve.The method of moments in the calculation of a unit hydrograph. An instantaneous unithydrograph.
Seminar: Rating curve transformation with the help of equivalent stages. Factors influencing the a rating curve.

11th week:
Lecture: Streamflow regimes. Frequency and duration. Permanent and non-permanent rating curves.
Seminar: Issuing task 5: calculation frequency and duration curves of stages

12th week:
Lecture: Extrapolation of a rating curve. Flood routing. Flash floods. Flood defense.
Seminar: submitting task 5, Consultation

13th week:
Lecture: Sediment and ice regimes of rivers. Types of sediment and ice. Measurement, data analyses.
Seminar: Visiting a hydrological measurement station

14th week:
Lecture: Hydrology in water management and civil engineering practice. Modeling of hydrological elements.
Seminar: Visiting a hydrological measurement station

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. The practice leader records attendance. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring calculators to each practice class. The activity of participation is evaluated by the teacher. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence because of the lack of active participation in class. Students have to submit all the five calculation tasks as scheduled minimum at a sufficient level.
During the semester there is one test: the end-term test in the 15th week. The minimum requirement for the end-term test is 60%. If the score of the test is below 60, the student once can take a retake test covering the whole semester material: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) B, for a grade: The course ends in a terminal examination, which includes a written and an oral exam (ESE).

Required reading materials

Martin R. Hendriks : Introduction to Physical Hydrology
Oxford Press, 2010. ISBN: 978-0-19-929684-2
Roy Ward and Mark Robinson : Principles of Hydrology
4th. McGraw-Hill International , 2000. ISBN: 0 07 709502 2
Philip B. Bedient, Wayne C. Huber and Baxter E. Vieux : Hydrology and Floodplain Analysis
5th.2012. ISBN: 978-0132567961
Lecture notes of the International Post-Graduate Course on Hydrology
a copy available at Bea Pataki. UNESCO-VITUKI,

Subject: **MECHANICS II**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Introduction to Strength of MaterialsElastic beam model
Seminar: Introduction to Strength of Materials and Internal force diagrams (repetition)

2nd week:
Lecture: Moments of inertia, main directions
Seminar: Moments of inertia, main directions

3rd week:
Lecture: Tension/compression, simple shear
Seminar: Tension/compression, simple shear

4th week:
Lecture: Torsion, bending.
Seminar: Torsion, bending.

5th week:
Lecture: Unaxial bending. Kinds of stress and strain. Stress diagrams
Seminar: Unaxial bending. Kinds of stress and strain. Stress diagrams

6th week:
Lecture: Bending and shear
Seminar: Rating practice

7th week:
Lecture: Drawing week
Seminar: Drawing week

8th week:
Lecture: Mid-term test
Seminar: Bending and shearing

9th week:
Lecture: Stress and strain states, most important stress and strain.
Seminar: Stress and strain states, most important stress and strain.

10th week:
Lecture: Elastic and plastic torsional load bearing capacity of cylindrical bars.
Seminar: Elastic and plastic torsional load bearing capacity of cylindrical bars.

11th week:
Lecture: Buckling of columns. Energy methods (Betti's theorem). Stress Transformations.
Seminar: Buckling of columns. Energy methods (Betti's theorem). Stress Transformations.

12th week:
Lecture: Calculation of displacement
Seminar: Calculation of displacement

14th week:
Lecture: Mid-term test
Seminar: Summary of the practice

15th week:
Lecture: Drawing week
Seminar: Drawing week

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up any practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring calculators to each practice class. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class. Students have to submit all the tasks as scheduled minimum at a sufficient level.
During the semester there are two tests: test 1 in the 7th week and the test 2 in the 15th week. Students have to reach the minimum level of points on each test. If the score of any test is below 15 from 30 points, the student once can take a retake test in both topics.
B, for a grade: The course ends in an examination grade (ESE) based on the points of the tasks, tests and exam. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Ferdinand P. Beer, E. Russel Johnston, Jr., John T. DeWolf : Mechanics of Materials
4th. University of Connecticut , 2006. ISBN: 9780073107950
Budynas: Advanced Strength and Applied Stress Analysis
2nd.1998. ISBN: 13978-0070089853

Subject: **THEORY OF DESIGN**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Introduction. Reviewing the basic knowledge of mechanics and mathematics.
Practical: Training Tasks of mechanics and mathematics. Issue of homework.

2nd week:
Lecture: Building and supporting structures; supporting structures requirements; its forms of failure. Modeling Issues: Capability ways of buildings; idealized support, public support, hierarchical structures, a two-dimensional structural model.
Practical: Presentation of different structural buildings. Modeling of structures on horizontal loads, reinforcement of buildings, potential stability problems, spatial burden. Training tasks on mechanics and mathematics.

3rd week:
Lecture: Theory of Scaling basics; capacity, safety, risk, life, the concept of reliability; strength and stability.
Practical: The primary structural systems, deconstructing, contacts, supports. Demonstrating them on simple buildings. Mathematics and mechanics tests.

4th week:
Lecture: Theoretical interpretation of the concept of limit state probabilities and different boundary conditions, distributed security, the partial factor method.
Practical: Burden concept: focused and distributed, static and dynamic, constant and possible burden.

5th week:
Lecture: Constant burden: weight; inclusion of standard payload.
Practical: Examples to weight analysis, the dead load and determine the payload. Sketch Plan submission.

6th week:
Lecture: Meteorological loads: a snow load, a wind load
Practical: Examples of weight analyses, a dead load and determining a payload. Examples of snow and wind load determination.

7th week:
Lecture: Wind load (continued), the effect of temperature
Practical: Examples of snow load and wind load determination. Keeping consultation. Accountability of work doing. Correction to a successful solution.

8th week:
Lecture: 1ST MIDTERM Knowledge, using the concepts learned. Dead weight, and any useful cargo value calculation
Self Control Test

9th week:
Lecture: Burden under construction; extraordinary burden, fire effects.
Practical: Examples of the determination of charges under construction presentation of the impact of fire and earthquakes.

10th week:
Lecture: Taking into account the impact of an earthquake

Practical: Examples of taking into account the impact of an earthquake. Keeping consultation. Accountability of the work done. Correction to a successful solution. **11th week:** **Lecture:** Simultaneity, different load conditions; Preparation of standard load combinations. **Practical:** Examples of standard load combinations. **12th week:** **Lecture:** Standard load combinations (continued) Simple stresses for holding standard.	The dimensioning of structures specific questions. State of emergencies. **Practical:** Examples of standard load combinations. Keeping consultation. Accountability of the work done. Correction to a successful solution. **13th week:** **Lecture:** 2ND MIDTERM Knowledge, using the concepts learned. Internal forces calculation in case of complex structures and load combinations. **Practical:** Submission of homework. Overviewing, the eligibility assessment.

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice is compulsory. Students must attend the practices and may not miss more than three times during the semester. In case a student misses does so, the subject will not be signed and the student must repeat the course. Half-year plan task: within the framework of the six-month task students have to prepare the full burden analysis of an optional building adequately. The instructions are given in the consultations and the practical occupations. In addressing this task, the following details must be mentioned: - A3 size plan sheet for presentation of the chosen building (history, location, environment, photo documentation) - the presentation of a sketch plan on 2-3 plan sheets with an optional size (ground-plan, see-through plan, mending plan, segments, facades) 1:100 scales - fixing of recorded statics models on an A3 size plan sheet. -detailed static calculation, which includes the burden analysis, and the definition of the strains of the structural elements selected by the teacher. Basics of the mechanics and mathematics test: assignment of mathematical and mechanics knowledge repeated on the first and second educational week.
Topics: simple and complex, statically fixed structures base reactions, take-up diagrams, load function, practical processing depending on the relations between the sheer force and bending functions, polynomials integration, derivation. Two opportunities are assured to make up the tests. The definition of the basic rate of burdens test: To the test writing it is useful to bring a calculator and the title is "Burdens and Effects". The definition of strains, a full burden analysis testwo opportunities are assured to make up the tests. Students have to sit for the tests.
B, for a grade: Written and oral examination: during the written exam students have to prepare the burden analysis of a simple building or a structural element adequately as recorded in the wording of the task. During the oral part of the examination the teacher asks theoretical and practical questions according to the knowledge obtained in the course of a half-year. The course ends in mid-semester grade (AW5). Based on the average of the test results and the homework, the mid-semester grade (AW5) is calculated as an average of them: The minimum requirement for the end-term tests and homework is 80%. At least min. 45% of the test (min.45 points) and also of the homework (min. 80 points) should be collected. Based on the score of the tests and homework, the grade is given according to the following table: Score Grade 0-49 fail (1) 50-62 pass (2) 63-75 satisfactory (3) 76-88 good (4) 89-100 excellent (5)

Required reading materials

Eurocode: MSZ-EN-1990-2002/A1
Eurocode: MSZ-EN-1991-1-7
Eurocode: MSZ-EN-1998-1

Department of Engineering Management and Enterprise

Subject: **ECONOMICS FOR ENGINEERS**
Year, Semester: 2nd year/1st semester
Lecture: **3**

1st week:
Lecture: Introduction to economics. The method of economics. Microeconomics and Macroeconomics. Introduction to Macroeconomics. Economic Policy and economic problems. Economics in practice.

2nd week:
Lecture: Measuring national output and national income (Gross Output, Gross Domestic Product, calculating GDP, real versus nominal GDP, the components of the GDP, the expenditure approach, the income approach, GDP deflator, Gross National Income, and Gross National Disposable income). Calculation exercises.

3rd week:
Lecture: Measuring the cost of living (GDP and social welfare, the Consumer Price Index, GDP deflator versus CPI, real and nominal interest rates. Sustainable development).Calculation exercises.

4th week:
Lecture: The Keynesian Theory of consumption, consumption function, marginal propensity to consume, planned investment, saving function, marginal propensity to saving, aggregate output, determination of equilibrium output, the multiplier, IS curve. Calculation exercises.

5th week:
Lecture: The government and fiscal policy. Government purchases, taxes, disposable income, government budget deficits and surpluses, determination of equilibrium output, fiscal policy, the government spending multiplier, the tax multiplier. Average tax rates, tax wedges, and marginal tax rates. Calculation exercises.

6th week:
Lecture: Open-Economy, Equilibrium output in an Open Economy, net exports. Imports and exports and Trade Feedback effect. Calculation exercises.

7th week:
Lecture: Mid-term test. The meaning of money, the functions of money, measuring the supply of money. The creation of money, required reserve ratio. The money multiplier. Open market operations. Calculation exercises.
Self Control Test

8th week:
Lecture: Demanding money. Supplying and demanding in the money market. The equilibrium interest rates. The IS-LM model. The equilibrium price-level.

9th week:
Lecture: Aggregate demand and aggregate supply. The effects of a shift in aggregate demanding. Labour market. Labour demand and supply curve. Calculation exercises.

10th week:
Lecture: The demand for labour, the supply of labour, labour force, working-age population, active and inactive population, labour participation rate, Unemployment, the unemployment rate, the activity rate. Okun law. Calculation exercises.

11th week:
Lecture: Inflation; (Price level, inflation rate, definition and measuring of inflation, types and causes of inflation, The Philips curve). Calculation exercises.

12th week:
Lecture: Growth (sources of economic growth, increasing in the quality of labour, human capital, education and skills), Economic growth around the world.

13th week: **Lecture:** Basic tools of finance. Investment and interest rates (measuring the time value of money, future values and present values, compounding, trading off between risk and return, the efficient market hypothesis). Investments analysis. Calculation exercises.	**14th week:** **Lecture:** Comparative analysis. Case studies. **15th week:** **Lecture:** End-term test **Self Control Test**

Requirements

Topics: This course focuses on the theory and application of the following: Measuring national income and output (real vs. nominal GNP, GDP, NNP, NDP, the problem of double counting). Consumption and Investment. IS model. Economic role of government (externalities). Fiscal policy and output determination. The role of money in the economy, the evolution of money, central bank, commercial banking, supply and demand for money. Monetary policy (varieties and problems of monetary policy). IS-LM analysis: the integration of the goods and money market models. Aggregate demand and supply. Labour market. Unemployment and inflation.
A, for a signature: Attendance at lectures is recommended, but not compulsory.
B, for a grade: The course ends in an exam grade (ESE). Attendance at lectures is recommended, but not compulsory. During the semester there are two tests: the mid-term test in the 7th week and the end-term test in the 15th week. Based on the cumulative results of the 2 tests written in Economics for Engineers, students are offered an exam grade. The students can either accept or refuse the offered grades. If a student does not accept the grade offered by the lecturer, they should sit for a written exam during the examination period. Evaluation of the written exam (ESE) is according to the following table: Score Grade 0 - 49 fail (1) 50 - 62 pass (2) 63 - 75 satisfactory (3) 76 - 88 good (4) 89 - 100 excellent (5)

Required reading materials

T. KISS, J., : Introduction to Macroeconomics for Engineers and technical Managers
Debrecen University Press, 2014. ISBN: 978 963 318 416 5
SAMUELSON P.A., NORDHAUS W.D.: Economics
18th. Academic Internet Publishers Inc., 2006. ISBN: 0072872055
PARKIN, M., POWELL, M. & MATTHEWS, K. : Economics
7th. Harlow: Addison, 2008. ISBN: 9780132041225

Department of Chemical and Environmental Engineering

Subject: **BASICS OF ENVIRONMENTAL ENGINEERING**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Seminar: **1**

Requirements

Topics: The main goals of the course are: to help understanding the complexity of environmental problems, shaping attitude and broadening knowledge of the new generation of civil engineers to be able to use the system approach in technical planning and for solving comprehensive environmental management, regulation and planning tasks. The course helps to understand the effects of the

engineering activities on the environment.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. The practice leader records the attendance. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring calculator to each practice. The activity of participation is evaluated by the teacher. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class. Students have to submit all the five tasks as scheduled minimum at a sufficient level. During the semester there is one test at the end-term test in the 15th week. The minimum requirement for the end-term test is 60%. If the score of the test is below 60, the student once can take a retake test covering the whole semester material: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)
B, for a grade: The course ends in mid-semester grade (AW5), which includes a written test.

Required reading materials

D. Heinrich and H. Manfred : Atlas of Ecology
Springer Verlag, 1994.
M.E. Jensen and P.S. Bourgeron : A Guidebook for Integrated Ecological Assessments
Springer Verlag , 2001. ISBN: 9780387985831
Guy R. McPherson, Stephen DeStefano : Applied Ecology and Natural Resource Management
Cambridge University Press, 2002.
W. Barthlott and M. Winiger : Biodiversity - A Challenge for Development Research and Policy
Springer, 2001. ISBN: 9783540639497
W. Steffen, J. Jäger, D.J. Carson, C. Bradshaw: Challenges of a Changing Earth
Springer, 2003. ISBN: ISBN 9783540433088
Bruce Wiersma : Environmental monitoring
CRC Press, 2004. ISBN: 9781566706414

Department of Civil Engineering

Subject: **GEOTECHNICS I**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Course Introduction. Geotechnical Engineering. Factors of safety and load. Standards and codes of practice.
Seminar: Syllabus, polices, introduction. Lab. introduction. Eurocode.

2nd week:
Lecture: Soil explorations. Site investigations, boring and sampling.
Seminar: Boring equipments and sampling. Home Work assignment (Preparation of soil mechanics report and recommendations.).

3rd week:
Lecture: Soil particle sizes and distribution. Weight-volume relationships of soils.
Seminar: Sieving and sedimentation test.

4th week:
Lecture: Index tests and classification of soils. Soil compaction.
Seminar: Atterberg limit tests. Liquid (Casagrande and fall cone tests), Saturated, Plastic and Shrinkage tests. Proctor test.

5th week:
Lecture: Darcy's law for ground water. Seepage, permeability. Field measurement of permeability. Permeability of laminated soil.
Seminar: Preparation for Test 1. Problem solving.

6th week:
Lecture: Mid term test (100 minutes).
Seminar: Determining the permeability coefficient by constant, and falling head permameter tests.
Self Control Test

7th week:
Lecture: Stress in soils (total and effective).
Seminar: Making up for the midterm test.

8th week:
Lecture: Mohr's circle. Shear strength of soil.
Seminar: Solving total, effective and neutral stress problems.

9th week:
Lecture: Measurement of shear strength. Triaxial compression tests. Shear strength of granular and fine-grained soil types.
Seminar: A Shear box and triaxial test. Soil strength problems.

10th week:
Lecture: Compressibility of soil. Theory for one dimensional consolidation. Odometer test, including wetting-induced collapsibility of loss and overconsolidation ratio.
Seminar: Odometer test.

11th week:
Lecture: Shrinkage and swell problems. Ground freezing.
Seminar: Requirements, structure and content of the soil mechanics report/recommendation.

12th week:
Lecture: Capillarity. Seepage pressures and hydraulic failing. Theory of filter criteria. Liquefaction.
Seminar: Drawing supplements of the HW (Plan view, Borehole log, cross section.).

13th week:
Lecture: : Ground water. Yearly change of the water table at continental climate. Predicting water table depths in space and time using a regionalized time series model.
Seminar: Determining the expected highest water level for the HW problem.

14th week:
Lecture: End-semester test.
Seminar: Homework assignment is due. Preparation/instructions for the verbal exam.
Self Control Test

15th week:
Lecture: Making up the end-semester test.

Requirements

A, for a signature: Attendance: Participation at lectures is a critia to successful completion of this course. Participation at laboratory/problem solving classes is compulsory. More than 3 causeless absences result non-completion of the course. There is not any make-up lab with another group. Test and examination questions will include items covered in lectures that are not covered in the textbook or other distributed notes.
B, for a grade: Completion of the course: Submitting the laboratory reports and the homework assignments. Participating at least 70% at laboratory/problem solving. D or higher grades for both tests. There is one make up test for each. Grading of tests: Score Grade 0-60 (F) fail (1) 61-70 (D) pass (2) 71-80 (C) satisfactory (3) 81-90 (B) good (4) 91-100 (A) excellent (5) Grading of the course: Mid term test 15% End of semester 15% Homework assignment 15% ESE (verbal exam) 55% A verbal exam is taken at the end of the semester in the exam period. Students have to sign up for the scheduled exam minimum two days in advance in the Neptune.

Required reading materials

Atkinson, J.: The Mechanics of Soils and Foundations
2nd. Taylor and Francis, 2007.
Powrie, W.: Soil Mechanics Concepts and Applications
3rd. CPR Press, 2014.
Lancelotta, R.: Geotechnical Egineering. Balkema
Brookfield, 1995.
Craig, R. F.: Craig's Soil Mechanics
Spon Press, 2004.
Kempfert, H. G., Gebreselassie, B.: Excavations and Foundations in Soft Soils
Springer, 2006.
Terzaghi, K., Peck, R.: Soil mechanics in engineering practice
John Wiley and Sons, 1943.
Lambe, J., Whitman, G.: Soil mechanics, SI-Version
John Wiley and Sohn, 1979.
Lunne, T., Robertson, P. K., Powell, J. J. M.: Conee penetration testing in geotechnical practice
Spon / Routledge, 2002.
Whitlow, R.: Basic soil mechanics
Longman Scientific and Technical, 1990.
Terzaghi, K.: Theoretical soil mechanics
John Wiley and Sons, 1943.

Subject: **MECHANICS III**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Kinematics of material point.
Practical: Solving tasks about kinematics of material point.

2nd week:
Lecture: Kinematics of rigid subjects.
Practical: Solving tasks about kinematics of rigid subjects.

3rd week:
Lecture: Kinetics of a material point.
Practical: Solving tasks about kinetics of a material point.

4th week:
Lecture: Kinetics of rigid subjects.
Practical: Solving tasks about kinetics of rigid subjects. Issuing task 1.

5th week:
Lecture: Simple collision problems.
Practical: Solving tasks about simple collision problems.

6th week:
Lecture: Central collision of moving mass and elastic structure.
Practical: Solving tasks about central collision of moving mass and elastic structure.

7th week:
Lecture: TEST 1
Practical: Solving tasks of TEST 1. Submitting task 1.
Self Control Test

8th week:
Lecture: Free vibration problems with one degree of freedom.
Practical: Solving tasks about free vibration problems with one degree of freedom.

9th week:
Lecture: Forced vibration problems with one degree of freedom.
Practical: Solving tasks about forced vibration problems with one degree of freedom. Issuing task 2.

10th week:
Lecture: Free vibration problems with multi degrees of freedom.
Practical: Solving tasks about free vibration problems with multi degrees of freedom.

11th week:
Lecture: Forced vibration problems with multi degrees of freedom.
Practical: Solving tasks about forced vibration problems with multi degrees of freedom.

12th week:
Lecture: Vibration forced by support motion
Practical: Solving tasks about vibration forced by support motion with one-, and more degrees of freedom.

13th week:
Lecture: Problems of earthquakes according to the Eurocode standards.
Practical: Solving tasks on problems of earthquakes according to the Eurocode standards.

14th week:
Lecture: Dynamic effects of wind according to the Eurocode standards.
Practical: Solving tasks on dinamic effects of wind according to the Eurocode standards.

15th week:
Lecture: TEST 2
Practical: Solving tasks of TEST 2. Submitting task 2.
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up any practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring calculators to each practice class. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class.
During the semester there are two tests: test 1 in the 7th week and the test 2 in the 15th week. Students have to reach the minimum level of points on each test. If the score of any test is below 15 from 30 points, the student once can take a retake test in both topics.
B, for a grade: The course ends in an examination grade (ESE) based on the points of the tasks, tests and exam. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

BEER F.P., JOHNSTON E.R.: Dynamics
McGraw-Hillcop , 1988. ISBN: 0-07-079926-1
TIMOSHENKO S.: Vibration problems in engineering
Wiley, 1974. ISBN: 0-471-87315-2
PESTEL E. C., THOMSON W. T.: Dynamics McGraw-Hillcop , 1968.
HARRIS C. M., CREDE C. E.: Shock and vibration handbook
McGraw-Hillcop, 1988. ISBN: 0-07-026801-0

Subject: **PUBLIC WORKS I**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: The main features of public works.
Practical: issuing the task 1: Designing pressure water systems and sewer systems.

2nd week:
Lecture: Groups of water resources. Water consumption.
Practical: Drawing a general plan. Consultation.

3rd week:
Lecture: Water quality and classification, water treatment-purification process.
Practical: A longitudinal section. Consultation.

4th week:
Lecture: Designing (dimension) a pressure water system.
Practical: Practicing the presentation methods. Calculate a water demand rate.

5th week:
Lecture: Modelling of a water system.
Practical: Applied dimensional methods to dimension parts. Usual materials of piping. Consultation.

6th week:
Lecture: General prescriptions for dimensioning. Kirchhoff's first and second law.
Practical: Calculate water demand for fire-fighting. A longitudinal profile. The protection distance/area.

7th week:
Lecture: Grouping sewer systems. Combined sewer systems and separated sewer systems.
Practical: submitting task 1, issuing task 2 : designing sewer systems.

8th week:
Lecture: Mid-term test
Practical: Designing, consultation.
Self Control Test

9th week:
Lecture: Pressure sewer systems, vacuum sewer systems.
Practical: Applied dimensional methods to dimension parts. Usual materials of piping. Consultation.

10th week:
Lecture: Dimensional methods of a waste water pipe.
Practical: Applied dimensioning methods to dimension parts. Consultation.

11th week:
Lecture: Dimension methods of a storm water pipe.
Practical: License-free dimensioning programs.

13th week:
Lecture: Building of a water supply system, a sewer system.
Practical: Visiting of practice places.

14th week:
Lecture: Repetition of main relationships in public works.
Practical: Preparing for the end-term test.

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: The series of lectures are based on the relevant standards. This course presents basic technical parameters of water public works, water consumption and its features. Water resources in Hungary(in Europe). Water quality and water classification. Physical, chemical and biological

parameters. Water supply systems. Water distribution systems, networks. Types of sewers. Estimating wastewater flow. Sewers design. Storm water inlets. Manholes. The basic designing instructions are presented for public utilities (pressure water systems, sewer systems).
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up any practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring calculators to each practice class. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class. Students have to submit all the two drawing tasks as scheduled minimum at a sufficient level. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the two drawing tasks - the average grade of the two tests The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grades for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Required reading materials

Jonathan T. Ricketts, M. Kent Loftin, Frederick S. Merritt: Standard Handbook for Civil Engineers
Section 19. Rail-Transportatio. 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

Subject: **REINFORCED CONCRETE STRUCTURES I**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Practical: **1**

1st week:
Lecture: History of concrete and reinforced concrete (RC) structures. Persons, engineers and inventors on the field of concrete construction. Mechanical and physical properties of structural concrete. Strengths, characteristic and design values of strengths, stress-strain relationships for concrete, design models for concrete behavior. Time dependent properties of concrete.

2nd week:
Lecture: Mechanical and physical properties of different reinforcement types (steel bars, welded meshes, prestressing materials). Strengths, characteristic and design values of yield strength, stress-strain relationships for steel bars, design curves for reinforcement. Corrosion of reinforcement. Classification of environmental conditions, determination of the concrete cover and notation.

3rd week:
Lecture: Bonds in concrete. Physical phenomena of a bond between concrete and reinforcement. Strength of a bond, length of anchorage, design length of anchorage. Behavior of an embedded steel bars in tension – unwounded and cracked sections, behavior of elastic and plastic. Normal force – elongation and moment – curvature relationships of

reinforced concrete sections. Outgiving and discussion of the 1st Design Task.

4th week:
Lecture: Determination of moment capacity of reinforced concrete sections in bending having only tensioned reinforcement and having both tensioned and compressed reinforcement. Calculation of under-, normally and over reinforced concrete sections.

5th week:
Lecture: Design of reinforced concrete section only with tensioned and with both tensioned and compressed steel bars. Outgiving and discussion of the 2nd Design Task.

6th week:
Lecture: Calculation of the stress state of different RC cross sections in elastic (I. state of stresses), in cracked (II. state of stresses) and in ultimate limit states (III. state of stresses).

7th week:
Lecture: Design examples for determining the moment capacity of RC cross-sections reinforced on different ways; analysis of under reinforced, normally reinforced and over reinforced RC sections, determination or design of the reinforcement and the cross-section.

8th week:
Lecture: 1st Test. Hand in of the 1st Design Task. Hand in of the 2nd Design Task. Outgiving and discussion of the 3nd Design Task.
Self Control Test

9th week:
Lecture: Shear in RC cross sections. Failure mode and crack pattern of different shear failure. Modeling of shear mechanisms by strut models. Equilibrium state of an inclined RC section. Shear force carried by the compressing concrete zone, dowel action, aggregate interlock, a role of shear reinforcement.

10th week:
Lecture: Determination of shear capacity of RC sections according to different model codes. Design of RC sections in shear.

11th week:
Lecture: Serviceability and Ultimate limit states. Stress limitation, crack limitation and deflection of RC structures. Approximate and accurate methods for serviceability.

12th week:
Lecture: Complex design of RC beams I.

13th week:
Lecture: Complex design of RC beams II.

14th week:
Lecture: Complex design of RC beams III.

15th week:
Lecture: 2nd Test. Hand in of the 3th Design Task
Self Control Test

Requirements

Topics: History of concrete and reinforced concrete (RC) structures. Mechanical properties of fresh and hardened (structural) concrete. Mechanical properties of reinforcing bars and welded meshes, materials of prestressing. Corrosion of concrete and reinforcement. Definition of the environmental conditions, environmental or exposure classes, determination of the concrete cover. Bond in concrete. Normal force – elongation relationship for steel bars embedded in concrete. Moment – curvature relationship of RC cross sections. Definition of the state of stresses for RC sections. Resistance of RC cross section in bending. Design of RC cross-sections. Shear behavior of RC members. Design of RC members in bending and shear. Limit states: design of RC members in ultimate limited states (ULS), analysis of RC members in serviceability states (SLS). Deflection control, crack width control, stress limitation. Complex design of RC beam.
Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice class with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is counted as an absence. In case of further absences, medical certificates needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures with them to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active participation should be required by students. Students have to submit all the two tests and the three design tasks as scheduled minimum at a sufficient level. During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 15th week – and there are seven design tasks. In order to take the mid-semester grade (AW5) – minimum (2) pass grade, – minimum point of the tests and the design tasks has to be taken (Summa minimum 61 points from 100 points). In order to take a mid-semester grade – minimum (2) pass grade – minimum point of tests and design tasks has to be taken. The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: I. Test: Maximum: 30 points Minimum: 18 points II. Test: Maximum: 30 points Minimum: 18 points Summa: 60 points 36 points Three design tasks: 1. Design Task: Maximum: 15 points Minimum: 9 points 2. Design Task: Maximum: 10 points Minimum: 7 points 3. Design Task: Maximum: 15 points Minimum: 9 points Summa: 40 points 25 points Summa points: Maximum: 100 points Minimum: 61 points The course ends with mid-semester grade (AW5). Based on the summa points of the tests and the summa points of the design tasks, the mid-semester grade is defined according to the following calculation: Score Grade 0 – 60 points: fail (no sign) 61 – 70 points: pass (2) 71 – 80 points: satisfactory (3) 81 – 90 points: good (4) 91 – 100 points: excellent (5)

Required reading materials

fib Bulletin 51 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 1. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 52 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 2. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 53 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 3. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 54 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 4. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 62 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 5. Federation International du Béton , 2012. ISBN: 1562-3610, 978-2-883
Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .
MSZ: Design of concrete structures Part 1-1.: General rules and rules for buildings
EN 1992-1-1: 2010 .
MSZ: Design of concrete structures Part 1-2: General rules. Structural fire design
EN 1992-1-2: 2010 .

Subject: **STEEL STRUCTURES I**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Steel usage in structural building. History of steel structures. Failure forms of steel structures.
Seminar: Classification of cross-sections. Specific effects on steel structures.

2nd week:
Lecture: Tensile, compressive, shear and combinated resistance of cross-sections.
Seminar: Tensile calculation, compressive, shear and combinated resistance of cross-sections.

3rd week:
Lecture: Bolted joints of steel structures.
Seminar: Constructing bolted joints.

4th week:
Lecture: Welded joints of steel structures.
Seminar: Calculating welded joints.

5th week:
Lecture: Stability of structural elements. Design of bars under compression.
Seminar: Continue designing joints. Outgiving and discussion of the Design Task.

6th week:
Lecture: Design of structural elements under bending. Lateral torsional buckiling.
Seminar: Design of bars under compression.

7th week:
Lecture: Design of structural elements under bending. Design of second order structural elements under bending.
Seminar: Design of beams under bending.

8th week:
Lecture: TEST1
Self Control Test

9th week:
Lecture: Truss girders
Seminar: Design of beams under bending.

10th week:
Lecture: Design of buildings with steel structures.
Seminar: Lateral torsional buckling and local buckling.

11th week:
Lecture: Fabrication and installation of steel structures.
Seminar: Design of frame structures. Calculating imperfections.

12th week:
Lecture: Steel corrosion and fire protection.
Seminar: Consultation

13th week:
Lecture: Reserve week
Seminar: Consultation

14th week:
Lecture: TEST2
Self Control Test

Requirements

Topics: Steel usage in structural building. History of steel structures. Failure forms of steel structures. Tensile, compressive, shear and contaminated resistance of the cross-sections. Bolted joints of steel structures. Welded joints of steel structures. Stability of structural elements. Design of bars under compression. Design of structural elements under bending. Lateral torsional buckling. Design of second order structural elements under bending. Fabrication and installation of steel structures. Steel corrosion and fire protection.
During the semester there are two tests: the 1st test in the 8th week and the 2nd test in the 15th

week – and there are three design tasks. Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. A student must attend practice classes and may not miss more than three times during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. A student can't make up a practice with another group. The attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring the calculator and the printed materials of the lectures to each occasion (both lectures and practice classes). Active participation is evaluated by the teacher in every class. Students1 activity and participation is required.
Students have to submit all the two tests and the design tasks as scheduled minimum on a sufficient level. The minimum point of test and design task has to be taken. The minimum (required to have mid-semester grade) and maximum points can be obtained are the follows: Two tests: I. Test: Maximum: 30 points Minimum: 18 points II. Test: Maximum: 30 points Minimum: 18 points Summa: 60 points 36 ponits Design task: Maximum: 40 points Minimum: 25 points Summa points: Maximum: 100 points Minimum: 61 points The course ends with a mid-semester grade (AW5). Based on the summa points of the tests and the summa points of the design tasks, the mid-semester grade is defined by the following way: Score Grade 0 – 60 points: fail (no sign) 61 – 70 points: pass (2) 71 – 80 points: satisfactory (3) 81 – 90 points: good (4) 91 – 100 points: excelent (5)

Required reading materials

Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
2. EN 1991-1-1:2002 .
MSZ: Design of steel structures Part 1-1.:General rules and rules for buildings
EN 1993-1-1: 2009 .
Eurocode 3: Design of steel structures - Part 1-8: Design of joints
EN 1993-1-8:2005.

Subject: **TRANSPORTATION ENGINEERING I**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Basics of transportation. Territory of a road. Road networks in Hungary. Using regulations.
Seminar: Contour-map, a dale, a saddle-point, a river on the map, points of the compass, a scale. Design parameters.

2nd week:
Lecture: Categories of roads. Parameters of vehicles and roads.
Seminar: Contour gradient. Filling, cutting.

3rd week:
Lecture: Geodesy, geographical and geotechnical parameters in road planning.
Seminar: A site plan. Straight roads, curves. Road axis – contour gradient.

4th week:
Lecture: Dewatering of roads.
Seminar: Calculating horizontal curves. Segmentation.

5th week:
Lecture: Intersections. Sight distances. Road safety.
Seminar: Long-sections. Levels of a site. Levels of a road axis.

6th week:
Lecture: Public transport facilities.
Seminar: Calculating vertical curves.

7th week:
Lecture: Consultation.
Seminar: Consultation.

8th week:
Lecture: Mid-term test
Self Control Test

9th week:
Lecture: Bicycle roads.
Seminar: Sample cross sections.

10th week:
Lecture: Parking facilities
Seminar: Consultation.

11th week:
Lecture: Accessibility.
Seminar: Consultation.

12th week:
Lecture: Structure of pavements. Asphalt pavements.
Seminar: Consultation.

13th week:
Lecture: Concrete and stone pavements
Seminar: Consultation.

14th week:
Lecture: Consultation.
Seminar: Consultation.

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures and practice classes is recommended, but not compulsory. Students have to submit both tests. Students have to finish the project in acceptable quality. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade (AW5): The course ends with a final test. The grade is calculated as an average of the tests: - the mid-term test 25% - the end-term test 25% - the final test 50% The minimum requirement for the final test, the mid-term test and the end-term test is 60%. The grades for the tests is given according to the following table: Score Grade 0-36 fail (1) 37-42 pass (2) 43-48 satisfactory (3) 49-54 good (4) 55-60 excellent (5) If the score of any test is below 37, the student once can take a retake test, of the material of all the tests.

Subject: **TRANSPORTATION ENGINEERING II**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Preparation, curse-up, subject description, literature description
Seminar: Preparation, curse-up, subject description, literature description

2nd week:
Lecture: Elements, a railway track and rolling contacts. Rail transport kinetic knowledge, active and passive forces (traction and resistance).
Seminar: Related to the basic concepts of a railway track dimension and practice calculations. Gauge and cross-section

dimensions, logging.

3rd week:
Lecture: Rail transport kinetics. Motion Graphics motion characteristics. Transitional geometries and transition curves. Super elevation.
Seminar: Calculation of kinds of transport kinetic practice. Practice of associated driving resistance. Calculating kinds of resistance. Standard ramp calculation.

4th week:
Lecture: Arcs and curved arcs in transitional setting. Horizontal and vertical lines.
Seminar: Assigning homework that contains half a year modernization of railway lines in planning stages and higher speeds.

5th week:
Lecture: Lines for detecting and tracks. Methods of subsoil exploration. Planning and licensing.
Seminar: Exercises on main points and detailed setting point in computing tasks. Description of the exercises and the usage of the "Railway setting tables."

6th week:
Lecture: Railway substructure concepts, parts. Objects and defenses. Drainage and dewatering processes. Off-level roads - railway crossings (crossings).
Seminar: Presentation and an exercise instructor contour map of the neutral line of inquiry.

7th week:
Lecture: A railway superstructure concept, development, and parts. Rails, sleepers, fastening elements and couplings. Rail welding. Bedding materials, sizes, design. Special body structures.
Seminar: Presentation of a railway sub-and superstructure construction.

8th week:
Lecture: Mid-term test
Seminar: Consultation
Self Control Test

9th week:
Lecture: The capacity of railway. Loading forces. Rails, sleepers and ballast calculation of the revenue requirement.
Seminar: Consultation

10th week:
Lecture: Railway track dilation. The welded track theory, conditions and requirements of installing.
Seminar: Practical knowledge of a welded track, establishment and maintenance related.

11th week:
Lecture: Concepts of bypasses, crossings, sidings. Concept, types and geometry of their parts.
Seminar: Bypass illustration practice

12th week:
Lecture: Standard and custom track circuits. Usage of switching hubs in tracks, development of rail network. Concepts and types of stations and railway stations.
Seminar: Consultation

13th week:
Lecture: A rail track wear process is inevitable. The process of formation water bags and their restoration. Restoration, (rehabilitation) renovation and modernization concept.
Seminar: Unique presentation of track circuits and calculating exercise triangular projection and systematic processes.

14th week:
Lecture: Establishment of railway, in case of construction and methods. Principles and methods of installing welded rail. The track maintenance concept instances.
Seminar: Consultation

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: Concepts of rail transport and rail tracks, their particularities and elements. Kinetics and kinematics of rail transport, its regularities. The theory and practice of track tracing, the basics of track planning. Substructure and superstructure of a train track, its structural formation, methods of estimating its bearing capacity. Theory of a rail-track without inter-space, its conditions and regulations. Types of railway intersections, creation of track networks, methods and elements of track connections. Ageing of a track, the principles of its building and maintenance.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the two tests The minimum requirement for the mid-term and end-term tests is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-50 fail (1) 51-65 pass (2) 66-80 satisfactory (3) 81-90 good (4) 91-100 excellent (5)

Required reading materials

Jonathan T. Ricketts, M. Kent Loftin, Frederick S. Merritt: Standard Handbook for Civil Engineers
McGraw-Hill Publishing Company, 2003. ISBN: 0-07-136473-0
M-Presse plus s.r.o.: Railvolution
URL: http://www.railvolution.net/

Department of Engineering Management and Enterprise

Subject: **MICROECONOMICS**
Year, Semester: 2nd year/2nd semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Demand and supply analyses. Demand curves, Supply curves; demand, supply and market equilibrium; shift in demand and supply.
Seminar: Calculating problems: equilibrium price and quantity; market demand and individual demand; shifts versus movements along the demand curve (supply curve); market supply and individual supply; shifts versus movements along the supply curve.

2nd week:
Lecture: Consumer theories, consumer preferences, cardinal ranking. Total utility, marginal utility. Principle of diminishing marginal utility. Indifference curves, diminishing marginal rate of substitution.
Seminar: Calculating problems: marginal utility, marginal rate of substitution. Indifference curves with diminishing (increasing marginal rate of substitution).

3rd week:
Lecture: Consumer choice, the budget constraint, budget line, optimal choice. The effects of a change in price, demand curve, the effects of a change in income, Engel curve. Income and substitution effect.
Seminar: Calculating problems: determination of optimal choice, consumption basket, income and substitution effects. Understanding consumer surplus.

4th week:
Lecture: The elasticity of demand (price elasticity of demand, cross price elasticity of demand, income elasticity of demand). The elasticity of supply. Total revenue and the price elasticity of demand.
Seminar: Application of elasticity of demand. Energy and price elasticity. Types of goods (substitutes, complements, independents).

5th week:
Lecture: Production. Inputs and production functions. Total product functions. Marginal and average product of labour.
Seminar: Calculating problems (average product of labour (capital), marginal products of labour (capital), relationship between marginal products and average products.

7th week:
Lecture: Costs of production. (Total, fixed and variable costs, marginal and variable cost). Relationship between marginal and average cost. Total revenue, total profit curves.
Seminar: Costs of production. (Total, fixed and variable costs, marginal and variable cost). Relationship between marginal and average cost. Total revenue, total profit curves.

8th week:
Lecture: Perfectly competitive markets I. (main characteristics of perfect competition, profit-maximizing output, shut down and breakeven points, the competitive firm's supply curve.
Seminar: Calculating problems (marginal average, total revenue, average and marginal profits, profit-maximizing outputs, the marginal cost curve and the supply curve. Determination of the shut down and breakeven points.

9th week:
Lecture: Competitive markets II. Taxes and subsidies. Price ceilings, production quotas, tariffs.
Seminar: Calculating problems (consumer surplus, producer surplus – tariffs, quotas).

10th week:
Lecture: Monopoly (the profit-maximization condition; average revenue, marginal revenue, total revenue curves).
Seminar: Problems (calculation of the profit-maximization output and price. Relationship between the marginal revenue and the linear demand curve).

11th week:
Lecture: First-degree price discrimination, second-degree price discrimination and third-degree price discrimination. Consumer surplus, producer surplus, deadweight loss.
Seminar: Monopoly equilibrium versus perfectly competitive equilibrium.

12th week:
Lecture: Market structure and competition. The main characteristics of oligopoly and monopolistic competition.
Seminar: Comparative analyses.

13th week:
Lecture: Time value of money. Present value calculation, net present value, profitability index.
Seminar: Analysing of an investment possibility. Net present value calculation.

14th week:
Lecture: Payback period and discounted payback period.
Seminar: Analysis of investment possibilities. Annuities.

15th week:
Lecture: End-term test
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his or her participation as an absence due to the lack of active participation in class. During the semester there are two tests: the mid-term test in the 7th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in a mid-semester grade (AW5). The mid-semester grade is calculated as an average of the test results. The minimum requirement for the mid-term and end-term tests is 50%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0 - 49 fail (1) 50 - 62 pass (2) 63 - 75 satisfactory (3) 76 - 88 good (4) 89 - 100 excellent (5) If the score of any test is below 50, the student once can take a retake test of the whole semester material.

Required reading materials

1. BESANKO, DAVID – BREAUTIGAM, RONALD R.: Microeconomics (International Student version)
3rd. John Wiley and Sons, Inc., 2008.
2. BESANKO, DAVID – BREAUTIGAM, RONALD R.: Microeconomics Study Guide
3rd. John Wiley and Sons, Inc., 2008.
GREGORY MANKIW: Principles of Microeconomics
4th. South-Western College Publishing, 2006.

Department of Civil Engineering

Subject: **BUILDING CONSTRUCTION II**
Year, Semester: 3rd year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Wall-type buildings 1.
Practical: issuing the task 1 (homework drawing). Elaborating the workshop drawing 1.

2nd week:
Lecture: Wall-type buildings 2.
Practical: consultation of task 1 (homework drawing)

3rd week:
Lecture: Wall-type buildings 3.
Practical: consultation of task 1 (homework drawing)

4th week:
Lecture: Horizontal load-bearing structures 1.
Practical: consultation of task 1 (homework drawing)

5th week:
Lecture: Horizontal load-bearing structures 2.
Practical: submitting task 1 (homework drawing). Elaborating workshop drawing 2.

6th week:
Lecture: Horizontal load-bearing structures 3.
Practical: Issuing task 2 (homework drawing). Elaborating workshop drawing 3.

7th week:
Lecture: Mid-term test
Practical: consultation of task 2 (homework drawing)
Self Control Test

8th week:
Lecture: Pitched roof 1.
Practical: consultation of task 2 (homework drawing)

9th week:
Lecture: Pitched roof 2.
Practical: consultation of task 2 (homework drawing)

10th week:
Lecture: Pitched roof 3.
Practical: submitting task 2 (homework drawing). Issuing task 3 (homework drawing).

11th week:
Lecture: Roof cladding 1.
Practical: consultation of task 3 (homework drawing)

12th week:
Lecture: Roof cladding 2.
Practical: consultation of task 3 (homework drawing)

13th week:
Lecture: Passive houses 1.
Practical: consultation of task 3 (homework drawing)

14th week:
Lecture: Passive houses 2.
Practical: submitting task 3 (homework drawing).

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: Load bearing structures (walls, frames, floors, stairs, foundation). Wall-type buildings. Load bearing and space-limiting walls. Lintel, ring-beam. Homogeneous and mixed walls. Systems of constructions and buildings (panels and cast wall constructions, frames of reinforced concrete, steel and wood, dry-tech constructions, ready-made buildings). Monolithic RC walls. Partitions. Horizontal load-bearing structures. Dense-rib, floor block, hollow ceramic block, self-form working floors. Comparative evaluation of alternatives. Design principles and rules of floor systems. Balconies. Structures and roofing of pitched roofs, built-in roof spaces. Structural variants of wooden roof trusses. Transitional and engineered roof trusses. Steel and RC pitched roof structures. Roof cladding. Soft sheet and plate covers. Metal structures of roof covers. Variants of sheet metal covers. Energy balance of buildings: components, geometric ratio and ground plan arrangement of buildings, natural ventilation, energetic requirements, specific heat demand, procedure of energetic design and checking. In seminar there are six tasks to elaborate: 3 homework drawings and 3 workshop drawings.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice class. Active participation is evaluated by the teacher every class. If a student's behavior or conduct doesn't 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 all the six drawing tasks as scheduled minimum at a sufficient level. During the semester there are two tests: the mid-term test in the 7th week and the end-term test in the 15th week. Students have to sit for the tests. Homework drawings: 3 x 25 points = 75 points Tests: 2 x 25 points = 50 points Workshop drawings: bonus points (max. 5, for all) Mid-semester points 125 points For signature students must achieve more than 50% of points (63 points). B, for a grade: The course ends in an exam (ESE). Mid-semester points: 125 points Colloquium (ESE): 50 points 175 points Score Grade 0-87 fail (1) 88-109 pass (2) 110-131 satisfactory (3) 132-153 good (4) 154-175 excellent (5)

Required reading materials

AMBROSE, James E.: Building structures
Wiley, 1993. ISBN: 0471540609
BÖHÖNYEY, J.: Building construction encyclopedia
Iparterv, 1986.

Subject: **CONSTRUCTION MANAGEMENT I**
Year, Semester: 3rd year/1st semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Management for Engineers: MFMFE31X03-EN
Seminar: The issue of drawing task 1.Floor plan.

2nd week:
Lecture: Technology, building materials and technology, the foundation, walls and columns / pillars.
Seminar: The issue of drawing tasks. Floor plan + section + nodes

3rd week:
Lecture: Technology: floors, roofs and map overlays, traffic building
Seminar: Building visit

4th week:
Lecture: Technology, building systems, partitions, doors, windows, flooring.
Seminar: Consultation of the drawing task

5th week:
Lecture: Technology, engineering, electrical, mechanical lifts, heating and cooling, finishing work.
Seminar: Visiting a building.

6th week:
Lecture: ISO Utility Structures: scaffolding, supports.
Seminar: Consultation of the drawing task

7th week:
Lecture: An auxiliary structure: pattern sheets, formwork, trench supports
Seminar: Size and quantity statement in a tabular form.

8th week:
Lecture: This week is the preparation of semi-annual week of planning tasks: semi-annual consultations related tasks previously announced date of test writing.
Seminar: This week is the preparation of semi-annual week of planning tasks: semi-annual consultations related tasks previously announced date of test writing and building visiting

9th week:
Lecture: Construction: demolition, excavation design, provide support, drainage, foundation
Seminar: Size and quantity statement in tabular form.

10th week:
Lecture: Construction: masonry, plastering,

concreting, wood structures, steel structures, transportation, lifting
Seminar: Size and quantity statement in a tabular form.

11th week:
Lecture: The budget includes: item systems, overhead hourly rate, job costs, calculating the cost of materials.
Seminar: Preparation of budget, computerized by TERC Common laboratory work and building visit

12th week:
Lecture: Preparation of budget, concepts, models.
Seminar: Preparation of budget computerized by TERC Common laboratory

13th week:
Lecture: Priced aims
Seminar: Preparation of budget computerized by TERC Common laboratory

14th week:
Lecture: The building account
Seminar: Building visit

15th week:
Lecture: Production and repair of semi-annual design tasks since semi-annual consultations related tasks previously announced time, classroom and writing plus test this week.

Requirements

Topics: Students learn about the participants of investments in construction, they are bound to their duties. Parts of a construction contract, together with the documents and the role of historical documents. Budget in construction, location, a role, and a part of the methods of calculation. The concept of overhead hourly wage, the price of construction materials and the method of calculation of the cost. After making a plan of complete budget should be sized calculations and shaped plans. Standard time allowance for labeling and defining technological order.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practice 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 can't make up any practice with another group. Attendance at practice classes will be recorded by the practice leader.. Students have to submit all drawing (a floor plan + section + nodes+cross section+Size and quantity statement in a tabular form) tasks as scheduled minimum on a sufficient level. And a complete budget with technologies. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week.
B, for a grade: The course ends in mid-semester grade (AW5). Based on the average of the marks of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the drawing tasks - the average grade of the two tests Special conditions for signing and examination: Mid-semester (continuous) accountability Creating the task: 1 80 80 points 80 points 50.0% For mid-year signature the performance of the task and the acquisition must be more than 50% , and a conditional-release test is necessary. You need to reach 41 points.

Subject: **DESIGN OF BUILDINGS I**
Year, Semester: 3rd year/1st semester
Lecture: **1**
Practical: **2**

1st week:
Lecture: Introduction, installation, site concept, content description of a master plan.
Practical: First homework- 25 pieces of furniture, fixtures copying in scale 1:50 M

2nd week:
Lecture: Development of housing premises, their link to each other, function diagrams.
Practical: It's the deadline of the first homework.Analysis of function diagrams

3rd week:
Lecture: Description of housing types, freestanding, semi-detached -terraced houses, house chains, atrium - in terms of integration
Practical: Second homework: 5 various built-storied house plans

4th week:
Lecture: Description of a floor plan in residential buildings – function diagrams –such as the boundary, detached, semi-detached houses.
Practical: Deadline for the second homework.

5th week:
Lecture: Description of a floor plan in residential buildings – function diagrams- such as the boundary, detached, semi-detached houses.
Practical: Design of a residential one-floored house.

6th week:
Lecture: Plan systems of two-storey houses, positioning stages, front height - Interpretation of building height.
Practical: Evaluation of the last practice. Third homework. A two-storey house design.

7th week:
Lecture: Two-storey houses plan system, positioning stage, floor plans.
Practical: Calculation of building height. 3rd homework consultation.

8th week:
Lecture: This week is for preparing the main project. Consultation in announced appointments. The week of test writing.

9th week:
Lecture: Multi-unit residential building types, corridor-related systems ground floor plans, function diagrams
Practical: Consultation

10th week:
Lecture: Corridor-related systems, ground floor plans.
Practical: Consultation

11th week:
Lecture: Multi-residential building design, and its problems, parking spaces, common areas, elevators.
Practical: Consultation

12th week:
Lecture: Multi-residential building connections, roof types.
Practical: Consultation. Signature

13th week:
Lecture: Multi-residential building ground floor plans focus on structure design.
Practical: Consultation. Deadline of the 3rd homework.

14th week:
Lecture: Facades.
Practical: Evaluation for the 3rd homework.

15th week:
Lecture: Preparation and correction week for the semi-annual project, consultations only in announced time. The week of the end-term test.

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. 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 behavior or conduct doesn't 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 all the drawing tasks as scheduled minimum at a sufficient level. Students have to earn at least 38 points during the semester for signing and examination. That's minimum of the half-year performance.
B, for a grade: Mid-semester (AW5) : Homework 1 and 2: 2 x 5 = 10 points (min. 2 x 3 = 6 pont) Homework 3: 1 x 30 = 30 points (min. 1 x 16 =16 pont) Practise 1-3: 3 x 10 = 30 pont (min. 3 x 6 = 18 pont) The condition of the signature, and the exam-release is the performance, which have to be more than 50%, min. 40 points. Score Grade 0 - 39 1 (fail) 40 - 47 2 (pass) 48 - 54 3 (satisfactory) 55 - 62 4 (good) 63 - 70 5 (excellent) It is necessary to retake every unsatisfactory performance. (exam, research, project) If the written exam does not exceed the 50%, it is mandatory to retake the exam, repeat all the elements within it.

Required reading materials

Malcolm Millais: Building structures
Philip Garrison: Basic Structures for Engineers and Architects
Ernst Neufert: Arhitects' data
Jürgen Adam, Kathariana Hausmann, Frank Jüttern: Industrial Buildings

Subject: **GEOTECHNICS II**
Year, Semester: 3rd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Course Introduction. Determination of a cross-section area and calculating the volume of soil. Diagrams and distribution of mass.
Seminar: Syllabus, polices, introduction.

2nd week:
Lecture: Parameters, factors for design of slopes. Types of instability of slopes. Stress change on slopes.
Seminar: Homework assignment on slope stability (I/1).

3rd week:
Lecture: Influence of water on the stability of slopes. Stability of infinite slopes. Influence of seepage on stability.
Seminar: Homework assignment on slope stability (I/2).

4th week:
Lecture: Stability of vertical cut. Behavior of simple excavations.
Seminar: Homework assignment on slope stability (I/3).

5th week:
Lecture: A compaction process. Relevant laboratory and field testing for soil properties and compaction. Compaction equipment; application for various materials. Quality control and testing requirements

Seminar: Homework assignment (I) is due.

6th week:
Lecture: Lateral earth pressure at rest. Rankine's lateral earth pressures (active, passive). Earth pressure with sloping backfill.
Seminar: Problem solving for midterm test.

7th week:
Lecture: Midterm Test
Seminar: Homework assignment on a retaining wall (II/1).
Self Control Test

8th week:
Lecture: Graphic solution for Coulomb's active earth pressure (Culmann's solution). Active and passive force with earthquake force. Calculating earth pressures for drained and undrained loading.
Seminar: making up the midterm test.

9th week:
Lecture: Types of retaining structures (Gravity walls, cantilever walls, anchored or propped walls). Pressure on retaining wall due to surcharge. Failure of retaining walls.
Seminar: Homework assignment on a retaining wall (II/2)

10th week:
Lecture: Mechanism based kinematic and equilibrium solutions for gravity retaining walls. Soil strength and factors for design of retaining walls. Stress changes in soil near retaining walls. Influence of water on retaining walls. Reinforced soil walls. Compaction stresses.
Seminar: Retaining wall homework assignment (II/3)

11th week:
Lecture: Dewatering during construction. sump and ditches; deep-well, well-points (conventional and vacuum), horizontal drainage. Well theory. Confined aquifer (full, partial penetration well). Group wells. Filter design (Terzaghi criteria)
Seminar: Homework assignment (II) is due. Homework assignment on dewatering (III/1)

12th week:
Lecture: Cut offs (Cement and chemical grout curtains; Slurry walls; Concrete walls; Steel sheet piling; Freezing) Pumping test. Discharge, environmental problems. Additional settlement from the reduction of a water table.
Seminar: Homework assignment on dewatering (III/2)

13th week:
Lecture: Geosynthetics.
Seminar: Homework assignment on dewatering (III/3)

14th week:
Lecture: End-term test.
Seminar: Homework assignment (III) is due. Preparation/instructions for the verbal exam.
Self Control Test

15th week:
Lecture: Making up the end-term test.

Requirements

A, for a signature: Attendance: Participation at lectures is a critia to successful completion of this course. Participation at laboratory/problem solving classes is compulsory. More than 3 causeless absences result non-completion of the course. There is not any make-up lab with another group. Test and examination questions will include items covered in lectures that are not covered in the textbook or other distributed notes.
B, for a grade: Completion of the course: Submitting the homework assignments in time. Preparing your homework in a professional manner and show all steps and all calculations. Participating at least 70% at laboratory/problem solving. D or higher grades for both tests. There is one make up test for each. Grading of tests: Score Grade 0-60 (F) fail (1) 61-70 (D) pass (2) 71-80 (C) satisfactory (3) 81-90 (B) good (4) 91-100 (A) excellent (5) Grading of the course: Mid term test 15% End of semester 15% Slope stability HWA10% Retaining wall HWA 10%. Dewatering HWA

10 % ESE (verbal exam) 40% A verbal exam (ESE) is taken at the end of the semester in the exam period. Students have to sign up for the scheduled exam minimum two days in advance in the Neptune.

Required reading materials

Bell, F. G.: Engineering Geology and Construction
Taylor and Francis, 2004.
Hausmann, M.: Engineering principles of ground modification
Mc Graw – Hill Publishing Company, 1986.
Kempfert, H. G., Gebreselassie, B.: Excavations and Foundations in Soft Soils
Springer, 2006.
Koerner, R. M.: Designing with Geosynthetics
Prentice Hall, 2005.
Atkinson, J.: The Mechanics of Soils and Foundations
2nd. Taylor and Francis, 2007.
Powrie, W.: Soil Mechanics Concepts and Applications
3rd. CPR Press, 2014.

Subject: **MECHANICS FINAL EXAM**
Year, Semester: 3rd year/1st semester

Subject: **REINFORCED CONCRETE STRUCTURES II**
Year, Semester: 3rd year/1st semester
Lecture: **2**
Practical: **1**

1st week:
Lecture: Theory of elastic slabs. Loads and stresses of elastic slabs. Differential equitation of elastic slabs. One and two way slabs. Examples for one-way and two-way RC slabs. Outgiving and discussion of the 1st Design Task.
Practical: Outgiving and discussion of the 1st Design Task.

2nd week:
Lecture: Approximate solutions of slabs, Marcus type solutions, FEM methods. Further examples for one-way and two-way RC slabs.Outgiving and discussion of the 2nd Design Task.
Practical: Outgiving and discussion of the 2nd Design Task.

3rd week:
Lecture: Design and reinforcement details of one-way and two-way slabs by the usage of individual steel bars, reinforcement Examples for one-way and two-way RC slab design.
Practical: Outgiving and discussion of the 3rd Design Task.

4th week:
Lecture: Design and reinforcement details of one-way and two-way slabs by the usage of welded steel meshes. Examples for one-way and two-way RC slab design.
Practical: Outgiving and discussion of the 4th Design Task.

5th week:
Lecture: Complex design of RC slabs I. (One way type) / Laboratory practice.

6th week:
Lecture: Complex design of RC slabs II. (Two way type) / Laboratory practice.

7th week:
Lecture: 1st Test

Practical: Hand in of the 1st Design Task. Hand in of the 2nd Design Task
Self Control Test

8th week:
Lecture: Classification of flat slabs. Design approaches for flat slabs. Reinforcement layout of flat slabs.
Practical: Outgiving and discussion of the 5th Design Task.

9th week:
Lecture: Shearing in flat slabs. Punching shear of flat slabs. Design of punching shear reinforcement, detail of punching shear reinforcement. Examples for punching shear design.

10th week:
Lecture: Plastic analysis of reinforced concrete struts. Static and kinematic methods for determining the plastic capacity of RC cross sections. Plastic hinge. Examples for determination of plastic capacity.

11th week:
Lecture: Plastic analysis of reinforced concrete slabs. Yield line theory. Application of static and kinematic methods for RC slabs. Examples for the determination of the plastic capacity of slabs.
Practical: Outgiving and discussion of the 6th Design Task. Outgiving and discussion of the 7th Design Task. Handing in of the 6th Design Task. Handing in of the 7th Design Task

12th week:
Lecture: Plastic analyses of reinforced concrete slabs II. Two-way and flat slab analysis. Examples for plastic capacity determination of slabs.

13th week:
Practical: Selected design problems of the plastic capacity of RC struts ad RC slabs I.

14th week:
Practical: Selected design problems of the plastic capacity of RC struts ad RC slabs II. Hand in of the 5th Design Task

15th week:
Lecture: 2nd Test
Practical: Hand in of the 6th Design Task. Hand in of the 7th Design Task
Self Control Test

Requirements

Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Students' active participation is required. Students have to submit all the two tests and the seven design tasks as scheduled minimum at a sufficient level. During the semester there are two tests – the 1st test in the 7th week and the 2nd test in the 15th week – and there are seven design tasks. In order to get the signature, minimum points of tests and design tasks have to be taken (min. 50 points from 80 points). In order to take an exam grade (ESE) – minimum (2) pass grade – minimum points of tests and design tasks as well as exam points have to be taken (Summa minimum 61 points from 100 points). The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: Test I: Maximum: 15 points Minimum: 9 points Test II: Maximum: 15 points Minimum: 9 points Summa: 30 points 18 points Seven design tasks: Design Task 1: Maximum: 5 points Minimum: 3 points Design Task 2: Maximum: 10 points Minimum: 7 points

Design Task 3: Maximum: 5 points Minimum: 3 points Design Task 4: Maximum: 10 points Minimum: 7 points Design Task 5: Maximum: 15 points Minimum: 9 points Design Task 6: Maximum: 2 points Minimum: 1 points Design Task 7: Maximum: 3 points Minimum: 2 points Summa: 50 points 32 points Points required for signature: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points of the Tests and of the Design Tasks, signature can be obtained) Exam: Maximum: 20 points Minimum: 11 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade (ESE). Based on the summa points of the tests, the summa points of the design tasks and the summa point of the exam, the exam grade is defined according to the following calculation: 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)

Required reading materials

fib Bulletin 51 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 1. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 52 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 2. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 53 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 3. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 54 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 4. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 62 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 5. Federation International du Béton , 2012. ISBN: 1562-3610, 978-2-883
Eurocode EN 1990:2002/A1:2005 : Basis of structural design
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
2. EN 1991-1-1:2002 .
MSZ: Design of concrete structures Part 1-1.: General rules and rules for buildings
EN 1992-1-1: 2010 .
MSZ: Design of concrete structures Part 1-2: General rules. Structural fire design
EN 1992-1-2: 2010 .
MSZ: Concrete Part 1: Specification, performance production, conformity, and rules of application of MSZ
4798-1:2004. EN 206-1 in Hungary,

Subject: **STEEL STRUCTURES II**
Year, Semester: 3rd year/1st semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Preparation, description of subject requirements, course schedule descriptions, describing of the course literature list, registration week.

2nd week:
Lecture: Different forms of steel structures. Ductile properties of kinds of steel material. Material models.
Seminar: Outgiving and discussion of design tasks.

3rd week:
Lecture: Taking into account the secondary effects on steel structures.
Seminar: Controlling the sketch plan and the load combinations.

4th week:
Lecture: Classification of structural elements under compression and bending. Calculating the resistance of structural elements under compression and bending.
Seminar: Classification of structural elements of the design task. Calculating the resistance of the structural elements.

5th week:
Lecture: Calculating the resistance of structural elements under simultaneous compression and bending.
Seminar: Example tasks on calculating the resistance of structural elements under simultaneous compression and bending.

6th week:
Lecture: Design of split-section bars.
Seminar: Example tasks on calculating the resistance of split-section bars.

7th week:
Lecture: Design of steel frame structures.
Seminar: Consultation

8th week:
Lecture: TEST1
Self Control Test

9th week:
Lecture: Construction and resistance of end-plate connections.
Seminar: Example tasks on calculating the resistance of end-plate connections.

10th week:
Lecture: Stiffness of end-plate connections.
Seminar: Example tasks on calculating the stiffness of end-plate connections.

11th week:
Lecture: Simplified design of end-plate connections.
Seminar: Example tasks on using the simplified design of end-plate connections.

12th week:
Lecture: Stiffness of joints. Categorization. Design of structures with semi-rigid joints.
Seminar: Example tasks on calculating the resistance of split-section bars.

13th week:
Lecture: Fatigue and brittle fracture of steel structures.
Seminar: Consultation.

14th week:
Lecture: TEST2
Self Control Test

15th week:
Lecture: Consultation.
Seminar: Consultation. Handing in of the Design Task

Requirements

Attendance at lectures is strongly recommended, but not compulsory. Participation at practice class is compulsory. Students must 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 can't make up a practice class with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring the calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active student's participation should be required. Students have to submit all the two tests and the design task as scheduled minimum at a sufficient level.
During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 14th week – and there is a design task. In order to get the signature, minimum point of test and design

task has to be taken (min. 50 points from 80 points). In order to get an exam grade (ESE) – minimum (2) pass grade – minimum point of tests and design tasks as well as exam points has to be taken (Summa minimum 61 points from 100 points). The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: Test I: Maximum: 20 points Minimum: 12 points Test II: Maximum: 20 points Minimum: 12 points Summa: 40 points 24 points Design task: Maximum: 40 points Minimum: 26 points Points required for sign: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points from the Tests and from the Design Tasks, sign can be obtained) Exam: Maximum: 20 points Minimum: 11 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade (ESE). Based on the summa points of the tests, the summa points of the design tasks and the summa points of the exam, the exam grade is defined according to the following calculation: 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)

Required reading materials

Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .
MSZ: Design of steel structures Part 1-1.:General rules and rules for buildings
EN 1993-1-1: 2009 .
Eurocode 3: Design of steel structures - Part 1-8: Design of joints
EN 1993-1-8:2005.

Subject: **THEORY OF GIRDERS I**
Year, Semester: 3rd year/1st semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Internal forces for statically determinate structures.
Seminar: Internal forces for statically determinate structures.

2nd week:
Lecture: Work theorems – Principles of virtual displacements and forces
Seminar: Work theorems

3rd week:
Lecture: Displacements by work theorems.
Seminar: Displacements by work theorems.

4th week:
Lecture: Calculation of statically indeterminate structures by the force method, principles, fix loads
Seminar: Force methods.

5th week:
Lecture: Application of the force method for grids
Seminar: Application of the force method for grids

6th week:
Lecture: Calculation of planar frames by the displacement method, principles
Seminar: Rating practice

7th week:
Lecture: Drawing week
Seminar: Drawing week

8th week:
Lecture: Mid-term test

Seminar: Calculation of planar frames by the displacement method, principles
Self Control Test

9th week:
Lecture: Application of the displacement method for planar frames
Seminar: Application of the displacement method for planar frames

10th week:
Lecture: Calculation of planar frames by the moment distribution method
Seminar: Calculation of planar frames by the moment distribution method

11th week:
Lecture: A cross table for moment distribution.
Seminar: A cross table for moment distribution.

12th week:
Lecture: Matrix analysis of planar frames
Seminar: Matrix analysis of planar frames

13th week:
Lecture: Drawing week
Seminar: Drawing week

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice class. Active participation is evaluated by the teacher every class. If a student's behavior or conduct doesn't 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 all the tasks as scheduled minimum at a sufficient level. During the semester there are two tests: test 1 in the 8th week and the test 2 in the 15th week. Students have to reach the minimum point level on each test. If the score of any test is below 15 from 30 points, the student once can take a retake test in both topics.
B, for a grade: The course ends in examination grade (ESE). Based on the points of the tasks, tests and the exam. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Aslan Kassimali : Structural Analysis
2014. ISBN: 1133943896

Subject: **WATER MANAGEMENT AND HYDRAULIC STRUCTURES**
Year, Semester: 3rd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: the aim of water management; the impacts of climate change on water management
Seminar: river basin planning according to Directive 2000/60/EC

2nd week:
Lecture: the relation between water management and hydraulic structures
Seminar: issuing task 1: study of one specific

river basin management plan from given aspects

3rd week:
Lecture: the aim and technical measures of harnessing and using water resources
Seminar: examples for technical measures of harnessing and using water resources

4th week:
Lecture: the aim and technical measures of the prevention of negative water related events in plain areas
Seminar: examples for technical measures of prevention of floods and excess water in plain areas; issuing the task 2:open channel design

5th week:
Lecture: the aim and technical measures of irrigation
Seminar: examples for water saving technical measures of irrigation; issuing the task 3:culvert design

6th week:
Lecture: the aim and technical measures for the prevention of negative water related events in hilly areas
Seminar: examples for technical measures for erosion and flood control in hilly areas; issuing task 4: designing a check dam

7th week:
Lecture: urban water management issues
Seminar: examples for special cases like thermal water management, sewerage of small settlements, stormwater management, etc.

8th week:
Lecture: submitting tasks 1,2,3,4
Seminar: examples for environmental impacts of existing water management measures

9th week:
Lecture: classification of hydraulic structures by purpose and types
Seminar: examples for purposes and types of hydraulic structures

10th week:
Lecture: storage structures and dams; types of reservoirs
Seminar: functional elements of water reservoirs

11th week:
Lecture: types of dams (structure, material, purpose, advantages, disadvantages)
Seminar: examples for different types of dams

12th week:
Lecture: factors for selection of site of dam
Seminar: examples for site selection

13th week:
Lecture: energy dissipaters; sedimentation behind the dam; losses
Seminar: examples for sedimentation behind dams and technical measures to avoid sedimentation

14th week:
Lecture: End-term test; technical measures of artificial recharge of groundwater
Seminar: examples for technical measures of artificial recharge of groundwater
Self Control Test

15th week:
Lecture: possibility for the improvement of End-term test result

Requirements

Topics: Hydraulic structures are engineering structures constructed for the purposes of harnessing and using water resources (groundwater, surface water, lakes, sea, etc) or for the prevention of the negative and destructive actions (floods, shore erosion, etc) of water on the surrounding environment. There are a large variety of hydraulic structures to serve a lot of purposes for which water resources are put to use. Also case studies from Hungary's complex water management issues - water resources management, excess water problems, flood management, settlement-scale water management issues, thermal water management, water quality control management, etc. - are

discussed. However, several issues like water utilities, water treatment and water resources management are discussed in the frame of other courses; they get less emphasis during this course. Main topics are Classification of hydraulic structures by purpose and types; Site selection factors; design of gravity dams; classification of reservoirs;
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice is compulsory. Students must attend the practice classes and may not miss more than three times during the semester. Students have to submit all the four tasks in time at a sufficient level. During the semester there is one test in the 14th week. Students have to sit for the test. If the score of the test is below 60, the student once can take a retake test covering the whole semester material.
B, for a grade: The course ends in a mid-semester grade (AW5). It is based on the test results. The minimum requirement of the end-term test is 61% it is needed to have a mid-semester grade. Based on the score of the test, the mid-semester grade is given according to the following table: Score Grade 0-60 fail (1) 61-70 pass (2) 71-80 satisfactory (3) 81-90 good (4) 91-100 excellent (5)

Required reading materials

WFD: Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
2000.
ICPDR: A PRACTICAL GUIDE TO INTEGRATED LAND MANAGEMENT METHODS INTENDED TO IMPROVE LAND USE AND WATER MANAGEMENT EFFICIENCY IN THE TISZA RIVER BASIN
2010.
Larry W. Map: Hydraulic design handbook
McGraw-Hill Education, ISBN: 0-07-041152-2

Department of Engineering Management and Enterprise

Subject: **BASICS OF QUALITY MANAGEMENT**
Year, Semester: 3rd year/1st semester
Lecture: **1**
Seminar: **1**

1st week:
Lecture: Quality and global competitiveness
Seminar: Discussion with different dispute methods, case studies.

2nd week:
Lecture: Strategic management: planning and execution
Seminar: Discussions with different dispute methods, case studies.

3rd week:
Lecture: Quality management and ethics, and communication and interpersonal relations.
Seminar: Case studies, situational tasks.

4th week:
Lecture: Total quality management.
Seminar: Discussions with different dispute methods, case studies.

5th week:
Lecture: Quality improvement techniques.
Seminar: Case studies, group work, situational tasks.

6th week:
Lecture: Statistical concepts
Seminar: Discussion with different dispute methods, case studies.

7th week:
Lecture: Control charts for variables, control chart interpretations and analyses, other variable control charts.
Seminar: Case studies, group work.

8th week:
Lecture: Control charts for variables, control chart interpretations and analyses, other variable control charts.
Seminar: Case studies, group work.

9th week:
Lecture: Fundamentals of probability. Reliability.
Seminar: Discussion with different dispute methods, case studies.

10th week:
Lecture: Quality costs
Seminar: Discussion with different dispute methods, case studies.

11th week:
Lecture: Quality function deployment. Design of experiments
Seminar: Case studies, group work.

12th week:
Lecture: Quality systems: ISO 9000
Seminar: Case studies, group work.

13th week:
Lecture: Quality systems: ISO 9000
Seminar: Case studies, group work.

14th week:
Lecture: Six Sigma
Seminar: Case studies, group work.

15th week:
Lecture: End-term test
Self Control Test

Requirements

Topics: This course focuses on making the theories and principles of total quality both practical and useful ways. Practitioners in a corporate setting will find it a valuable guide in helping them to learn how to be effective agents of the total quality approach, to understand and implement total quality.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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. Attendance at practice classes will be recorded by the practice leader. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class. During the semester there is an end-term test in the 15th week. Students have to sit for the test.
B, for a grade: The course ends in a mid-semester grade (AW5) based on the average of the grades for the participation and the average of the test results, the mid-semester grade is calculated as an average of them: - an average grade of the practice - a grade of the test The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the test, the grade for the test is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of the test is below 60, once the student can take a retake test of the whole semester material.

Required reading materials

Goetsch D. L. – Davis, S: Quality management: introduction to total quality management for production
Pearson Prentice Hall, 2006. ISBN: 0131189298, 97801311
Dale, B. G. : Managing Quality
Wiley-Blackwell, 2003. ISBN: 0631236147, 97806312

Subject: **STATE ADMINISTRATION AND LAW**
Year, Semester: 3rd year/1st semester
Lecture: **2**

1st week:
Lecture: Introducing the law systems of the world, especially the common law and the e continental law system by explaining details of the main characteristics of the two systems.

2nd week:
Lecture: The constitutional basics of the municipality structure, state organization, municipality levels, basic civil rights, a historical overview of the civil institutions. Operation of municipalities, their organization system, statutory supervision, and the major rules and regulations of the municipal, state and administrative procedures

3rd week:
Lecture: The main characteristics and structure of the Hungarian Law System. The sources of law.

4th week:
Lecture: The main rules of the administration system.

5th week:
Lecture: The major rules of commercial law and proprietary rights. The major forms of responsibility (compensation, indemnity) related to the activity, and general rules and regulations of concluding a contract.

6th week:
Lecture: The major forms of responsibility (compensation, indemnity) related to the activity, and general rules and regulations of concluding a contract.

7th week:
Lecture: The basics of contract law (written and oral contracts, the contracts of corporations)

8th week:
Lecture: Mid-term test

Self Control Test

9th week:
Lecture: The evolution, history and development of the European integration: the integration issue after the second world war.

10th week:
Lecture: The Rome treaty and the establishment of the European Economic Community. .; The EU after Maastricht, new enlargements, the Amsterdam Treaty, and the Treaty of Nice, the further enlargements with the Eastern European countries, The Lisbon Treaty, the future of the EU.

11th week:
Lecture: The law of the European Union: the Community law, the sources of the Community law (primary and secondary legal sources, and other sources) The features of the Community legal system.

12th week:
Lecture: The European Court of Justice. Human rights and the Universal Declaration of Human Rights.

13th week:
Lecture: The characteristics of the Hungarian municipality structure in light of the EU municipality systems. The sources of law in the EU.

14th week:
Lecture: Informal conversation with the students about their homeland's law system.

15th week:
Lecture: Consultation

Requirements

Topics: Legal systems of the world, civil and human rights, the main characteristics and structure of the Hungarian Law System, major rules of commercial law and proprietary rights, evolution, history and development of the European integration.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. A student must 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. A student can't make up a practice with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with 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, being discussed with the tutor. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.
B, for a grade: The course ends in mid-semester grade (AW5) based on the average grade of the two tests. The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Required reading materials

Zoltán Horváth: Handbook on the European Union
HVG-ORAC, 2011.
Péter Smuk: The transformation of the Hungarian Legal System 2010-2013
Complex, 2013.

Department of Civil Engineering

Subject: **CONSTRUCTION MANAGEMENT II**
Year, Semester: 3rd year/2nd semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Preparation, Course-up, presenting academic requirements, course schedule description, description of subject bibliography, registration week

2nd week:
Lecture: Spatial organization: Site Buildings, structures, roads. Energy and utilities board.
Seminar: Case task 1.Calculation of Working Time Standards Collecting and spending time laboratory work using the TERC

3rd week:
Lecture: Spatial organization: storage of building materials and products. Internal mass transport
Seminar: Preparation of construction and substructure work

4th week:
Lecture: Spatial organization: the auxiliary. Creating spatial organizational plans
Seminar: Constructional work

5th week:
Lecture: Time management: Concepts. Types of rate plans. Portrayal of the Schedule
Seminar: Kinds of roof and interior finishing work.

6th week:
Lecture: Time scheduled basic elements: training processes. Analyses of processes: process of time and labor expenses. The combination of processes (determine relative time positions
Seminar: Facades and outdoor finishing work +building visit

7th week:
Lecture: The time scheduled basic elements: The mesh design - critical path. A continuous band-like construction management, construction management. Technology-based construction management (business management
Seminar: Staff and equipment schedule. Organizational technical description+building visit

8th week:
Lecture: Basic elements of the schedule: The recommended process of planning time. The time scheduled update. Standard data.
Seminar: Case 1. administration tasks

10th week:
Lecture: A project as a process. The task of setting Project participants (Facility Director, preparation, foremen, technicians etc. ..) tasks and roles through practical examples, in addition to types of constructional work, participants, tasks and roles.
Seminar: Picking material. Select Timing Machine auxiliary

11th week:
Lecture: Workspace delivery and the receipt of a report in the way of finishing
Seminar: A small practical exercise in small group handover

12th week:
Lecture: Implementation - organizing implementation. Building log and diary survey, What is what, when to use it?
Seminar: Requirements of a building plant room (social spaces, warehouses ...)Practical examples are included) Afternoon diary entries through an example; answers, comments, deadlines)

13th week:
Lecture: The transfer - technical work handover.
Seminar: Temporary utilities (water, sewer, electricity ...)

14th week:
Lecture: Operation. Aftercare - post-transfer tasks.
Seminar: Administration task 2

15th week:
Lecture: Production and repair of semi-annual design tasks since semi-annual consultations related tasks previously announced time, classroom and writing plus test this week

Requirements

Topics: Create a budget based on the total of the previous semester band prepared schedule, making machine schedule, preparation of staff schedules. Creating organizational layout in three phases. Substructure work types, structural work and during the final phase of work. Learning about temporary structures, temporary utilities, roads and means of disposal solutions and marking of installed equipment. Efforts should be made for both the installation and closed freely available land to be planned!
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Students have to submit all the drawings(band prepared schedule, making machine schedule, preparation of staff schedules + organizational layout in three phases) tasks as scheduled minimum at a sufficient level. During the semester there are two tests: the mid-term test in the 8th week and the end-term test in the 15th

week.
B, for a grade: The course ends in a mid-semester grade (AW5). Based on the average of the marks of the drawings and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of the drawing tasks - the average grade of the two tests Special conditions for signing and examination: Mid-semester (continuous) accountability Creating the task: 1 80 80 points 80 points 50.0% Performance of the task and the conditional-release test must be more than 50% for a mid-year signing,. You need to reach 41 points.

Subject: **FEM MODELLING I**
Year, Semester: 3rd year/2nd semester
Seminar: **4**

1st week:
Seminar: The FEM method.

2nd week:
Seminar: Presentation of the features of an applied FEM software.

3rd week:
Seminar: Modeling simple structures as a beam, cantilever.

4th week:
Seminar: Modeling a truss girder in plane.

5th week:
Seminar: Modeling a steel frame in plane.

6th week:
Seminar: Modeling a steel hall building in 3D – first order structures.

7th week:
Seminar: Modeling a steel hall building in 3D – second order structures.

8th week:
Seminar: Modeling of timber roof structures in 2D.

9th week:
Seminar: Modeling of complex timber roof structures in 3D.

10th week:
Seminar: Modeling of a simple concrete slab.

11th week:
Seminar: Modeling of a concrete slab, supported with beams and columns.

12th week:
Seminar: Modeling of a concrete a staircase with elevator shaft. Modeling of a concrete pool.

13th week:
Seminar: Modeling of structures with dynamic loads.

14th week:
Seminar: Special features of the program.

15th week:
Seminar: retaking of tasks

Requirements

A, for a signature: Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate her/his participation as an absence due to the lack of active

participation in class. Students have to upload models on the online education surface every week from the third week. Five chosen models will be rated at the end of the semester. If the score of any model is below 10 from 20, the student can repeat modeling that structure in the last week of the semester.
B, for a grade: The course ends in a mid-term grade (AW5), based on the points of the tasks. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

BOJTÁR I., GÁSPÁR Zs.: The finite element method for engineers
Terc, 2003.
ZIENKIEVICZ O.C., TAYLOR R.L.: The finite element method I
Butterworth-Heinemann, 2000. ISBN: 0 7506 6320 0
BELYTSSCHKO T., LIU W.K., MORAN B.: Nonlinear finite elements for continua and structures
John Wiley, 2000. ISBN: 0 471 98774 3
Guide of the AXIS-VM program
URL: http://www.axisvm.co.uk/up-demo-docs/English/Documents/manual11.pdf

Subject: **GEOTECHNICS III**
Year, Semester: 3rd year/2nd semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Course Introduction. Types of foundations. Shallow strip foundations (footings). The concept of upper and lower bound solutions. Simple lower bound (safe) and upper bound (unsafe) solutions. Undrained analyses (simple circular arc, theories of Prandl and Reissner). Drained analyses (Terzaghi's theory)
Seminar: Syllabus, polices, introduction.

2nd week:
Lecture: Bearing capacity enhancement factors to account for shape, depth and weight. Bearing capacity of homogeneous and layered soils. The effect of a water table. Shallow foundations subject to horizontal and moment loads.
Seminar: Shallow foundation HWA (I/1)

3rd week:
Lecture: Soil structure interaction principles. Contact pressure distribution. Factors influencing contact pressure distribution beneath rigid and flexible footings. Concentrically and eccentrically loaded cases.
Seminar: Shallow foundation HWA (I/2)

4th week:
Lecture: Idealized elastic soil behavior. Stress distribution under foundations. Consolidation theories.
Seminar: Shallow foundation HWA (I/3)

5th week:
Lecture: Settlement analysis of shallow foundations on clay and sand.
Seminar: Shallow foundation HWA (I/4)

6th week:
Lecture: Balancing bearing capacity and settlement in design. Allowable total and differential settlement of structures. Raft foundations. Heave and settlement of foundations due to changes of groundwater.
Seminar: Problems preparing for the midterm test.

7th week:
Lecture: Midterm Test
Seminar: Settlement estimation HWA (II/1)

8th week:
Lecture: Fundamentals of Deep Foundations. Pile Foundations. Pile types. Pile driving and allowable stresses. Construction, inspection, specifications and case histories.
Seminar: Test making up (Midterm).

9th week:
Lecture: Structural issues and design. Drilled Shaft Foundations. Other types of foundations (micropiles, helical anchors, anchors, soil nails etc.) Static Capacity Design of Deep Foundations.
Seminar: Settlement estimation HWA (II/2)

10th week:
Lecture: Soil-Structure Interaction for Deep Foundations. Axial loading of deep foundations. Base resistance of a single pile.
Seminar: Piled foundation HWA (III/1)

11th week:
Lecture: Load testing of deep foundations. Static analyses of piles and drilled shafts in clays and in sand. Time dependency of capacities. Field Load Testing of Foundations.
Seminar: Piled foundation HWA (III/2).

12th week:
Lecture: Pile testing and driving formulas. Wave equation analyses. Capacity of pile groups
Seminar: Piled foundation HWA (III/3)

13th week:
Lecture: Special foundations. Foundation design in relation to ground movements. Foundation on recent refuse fills. Design of Foundation for seismic forces. Foundations on swelling soils.
Seminar: Problems preparing for the end-semester test.

14th week:
Lecture: End-semester Test
Seminar: Preparation/instructions for the verbal exam.
Self Control Test

15th week:
Lecture: Test making up (End of Semester).

Requirements

A, for a signature: Attendance: Participation at lectures is a criteria to successful completion of this course. Participation for the problem solving classes is compulsory. More than 3 causeless absences result non-completion of the course. There is not any make-up lab with another group. Test and examination questions will include items covered in lectures that are not covered in the textbook or other distributed notes.
B, for a grade: Completion of the course: - Submitting the homework assignments in time. - Preparing your homework in a professional manner and show all steps and all calculations. - Participating at least 70% of laboratory/problem solving. - D or higher grades for both tests. There is one make-up test for each. Grading of the tests: Score Grade 0-60 (F) fail (1) 61-70 (D) pass (2) 71-80 (C) satisfactory (3) 81-90 (B) good (4) 91-100 (A) excellent (5) Grading of the course: Mid term Test 12% End-semester Test 12% Shallow foundation HWA 20% Settlement estimation HWA 6% Piled foundation HWA 10% Final ESE (verbal exam) 40% A verbal exam is taken at the end of the semester in the exam period. Students have to sign up for the scheduled exam minimum in the Neptune two days in advance.

Required reading materials

Chang-Yu Ou: Deep Excavations
Taylor and Francis, 2006.
Dandy, G., Walker, D., Daniell, T., Warner, R.: Planning of Engineering Systems
Taylor and Francis, 2006.
Fang, H. S.: Foundation Handbook
Chapman and Hall, 1990.

Lancelotta, R.: Geotechnical Egineering. Balkema
Brookfield, 1995.
Mitchell, J. K.: Fundamentals of soil behaviour
1976. ISBN: John Wiley and Sons
Moseley, M. P., Kirsch, K.: Ground Improvement
Taylor and Francis, 2004.
Tomlinson, M. J.: Foundation design and construction
Pearson Education, 2001.
Atkinson, J.: The Mechanics of Soils and Foundations
2nd. Taylor and Francis, 2007.
Powrie, W.: Soil Mechanics Concepts and Applications
3rd. CPR Press, 2014.
Das, B.M. : Principles of Geotechnical Engineering
7th, 8th. Thomson Publishing , 2006.
Duncan, J.M . and Wright, S.G.: Soil Strength and Slope Stability
Wiley, 2005.

Subject: **REINFORCED CONCRETE STRUCTURES III**
Year, Semester: 3rd year/2nd semester
Lecture: **2**
Practical: **1**

1st week:
Lecture: Shear between web and flange of T section. Shear transfer between different time concrete. Design examples for T beams.
Practical: Outgiving and discussion of the 1st Design Task.

2nd week:
Lecture: Torsion of concrete and reinforced concrete sections. Interaction of shear and torsion. Interaction of bending moment, shear and torsion. Examples.

3rd week:
Lecture: Effects of normal force on RC cross-section. The method of ultimate force and ultimate eccentricity. Moment – normal force interaction curves for in-plane and for out-plane situations. Examples.
Practical: Outgiving and discussion of the 2nd Design Task.

4th week:
Lecture: Types, loads, classification and design considerations for RC columns. Braced and unbraced columns. Eccentricities, imperfections, second order effects. Design possibilities of RC columns.

5th week:
Lecture: Loads and stresses of RC frames. Approximate determination of frame loads for vertical and horizontal loads. (I.)
Practical: Outgiving and discussion of the 3rd Design Task. Handing in of the 1st Design Task. Handing in of the 2nd Design Task

6th week:
Lecture: Loads and stresses of RC frames. Approximate determination of frame loads for vertical and horizontal loads. (II.)

7th week:
Lecture: Beam and disturb zones and joints of RC frames, Analyses of different types of frame corners.

8th week:
Lecture: Test I
Self Control Test

9th week:
Lecture: Beam and disturbing zones and joints of RC frames, Analyses of corbels, half-end

beams.
Practical: Handing in of the 3rd Design Task

10th week:
Lecture: Reinforced concrete walls. Loads and design of reinforced concrete walls. Special problems of under reinforced structures subjected normal force. Examples.
Practical: Outgiving and discussion of the 4th Design Task.

11th week:
Lecture: Elastic analysis of in-plane structures – in-plane stresses and in-plane displacements.

12th week:
Lecture: Elastic analysis of reinforced concrete deep beams and shear walls. Examples.
Practical: Outgiving and discussion of the 5th Design Task.

13th week:
Lecture: : Plastic analysis of reinforced concrete walls, shear walls and deep beams by strut-and-tile models. Examples.

14th week:
Practical: Examples for different types of in-plane RC structures.

15th week:
Lecture: Test II
Practical: Handing in of the 3rd Design Task. Handing in of the 4th Design Task. Hand in of the 5th Design Task
Self Control Test

Requirements

Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Students' active participation is required. Students have to submit all the two tests and the five design tasks as scheduled minimum at a sufficient level. During the semester there are two tests – the 1st test in the 7th week and the 2nd test in the 15th week – and there are seven design tasks. In order to get the signature, minimum points of tests and design tasks have to be taken (min. 50 points from 80 points). In order to take an exam grade (ESE) – minimum (2) pass grade – minimum points of tests and design tasks as well as exam points have to be taken (Summa minimum 61 points from 100 points). The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: Test I: Maximum: 15 points Minimum: 8 points Test II: Maximum: 15 points Minimum: 8 points Summa: 30 points 16 points Five design tasks: Design Task 1: Maximum: 15 points Minimum: 11 points Design Task 2: Maximum: 7 points Minimum: 4 points Design Task 3: Maximum: 15 points Minimum: 11 points Design Task 4: Maximum: 6 points Minimum: 4 points Design Task 5: Maximum: 7 points Minimum: 4 points Summa: 50 points 34 points Points required for a signature: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points from the Tests and from the Design Tasks, signature can be obtained) Exam: Maximum: 20 points Minimum: 11 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade (ESE). Based on the summa points of the tests, the summa points of the design tasks and the summa point of the exam, the exam grade is defined according to the following calculation: 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)

Required reading materials

fib Bulletin 51 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 1. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 52 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 2. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 53 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 3. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 54 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 4. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 62 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 5. Federation International du Béton , 2012. ISBN: 1562-3610, 978-2-883
Eurocode EN 1990:2002/A1:2005 : Basis of structural design
MSZ: Design of concrete structures Part 1-1.: General rules and rules for buildings
EN 1992-1-1: 2010 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .

Subject: **STEEL STRUCTURES III**
Year, Semester: 3rd year/2nd semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Preparation, description of subject requirements, course schedule description, description of the course literature lists, registration week. Short summary of the previously discussed problems of steel structures.

2nd week:
Lecture: Fabrication and construction technologies of steel structures.

3rd week:
Lecture: The most commonly used welding technologies constructing steel structures.
Seminar: Outgiving and discussion of the design task.

4th week:
Lecture: Presentation of different steel based construction systems, Chapter I: Lindab System.
Seminar: Using of the Lindab Design Guidelines in practice

5th week:
Lecture: Presentation of different steel based construction systems, Chapter II: Lindab
Seminar: Usage of the Lindab Design Guidelines in practice

6th week:
Lecture: Presentation of different steel based construction systems, Chapter III: Astron System.
Seminar: Usage of the Astron Design Guidelines in practice. Consultation.

7th week:
Lecture: Special design problems of welded steel girders I.
Seminar: Design examples for welded steel girders I.

8th week:
Lecture: TEST1
Self Control Test

9th week:
Lecture: Special design problems of welded steel girders II.
Seminar: Design example for welded steel girders II.

10th week:
Lecture: Classifications and types of steel struts I.
Seminar: Design of steel struts. Different design examples for steel struts I.

11th week:
Lecture: Classifications and types of steel struts II.
Seminar: Design of steel struts. Different design examples for steel struts II.

12th week:
Lecture: Industrial visit I – Visit at a prefabrication industry.

13th week:
Lecture: Industrial visit II – Visit at a steel portal hall

14th week:
Lecture: TEST2
Self Control Test

15th week:
Lecture: Consultation.
Seminar: Consultation. Handing in of the Design Task

Requirements

Topics: Portal frames. Typical arrangement of portal frames. Imperfection. Load effects of frames. Elastic and plastic global analysis of frames. Design of members (cross-section resistance, member buckling resistance). Design of joints. Truss structures. Typical arrangement of truss structures. Hollow section joints, types of joints in hollow sections. Failures for hollow section joints. Welded joints between CHS members. Welded joints between CHS or RHS brace members and RHS chord members. Welded joints between CHS or RHS brace members and I or H section chords. Welded joints between CHS or RHS brace members and channel section chord members.
Attendance at lectures is strongly recommended, but not compulsory. Participation at practice is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and practice classes will be recorded by the staff of the department. Being late is counted 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher every class. Students' active participation is required.
Students have to submit all the two tests and the design task as scheduled minimum at a sufficient level. During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 14th week – and there is a design task. In order to get the signature, the minimum points of test and design task have to be taken (min. 50 points of 80 points). In order to take an exam grade – minimum (2) pass grade – minimum points of tests and design tasks as well as exam points have to be taken (Summa minimum 61 points of 100 points). The minimum and the maximum points related to the tests and the design task can be obtained are the following: Two tests: Test I: Maximum: 20 points Minimum: 12 points Test II: Maximum: 20 points Minimum: 12 points Summa: 40 points 24 points Design task: Maximum: 40 points Minimum: 26 points Points required for a signature: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points from the Tests and from the Design Task, signature can be obtained) Exam: Maximum: 20 points Minimum: 11 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade. Based on the summa points of the tests, the summa points of the design task and the summa point of the exam, the exam grade is defined according to the following calculation: Score Grade 0 – 60 points: fail (no sign) 61 – 70 points: pass (2) 71 – 80 points: satisfactory (3) 81 – 90 points: good (4) 91 – 100 points: excellent (5)

Required reading materials

Eurocode: Basis of structural design EN 1990:2002/A1:2005 .
MSZ: Design of steel structures Part 1-1.:General rules and rules for buildings EN 1993-1-1: 2009 .
Eurocode 3: Design of steel structures - Part 1-8: Design of joints EN 1993-1-8:2005.
Eurocode 1 EN 1991-1-1:2002 : Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
Design of Steel Portal Frames for Europe University of Edinburgh, 2011.

Subject: **THEORY OF GIRDERS II**
Year, Semester: 3rd year/2nd semester
Lecture: **1**
Seminar: **2**

1st week:
Lecture: Structures in 3D
Seminar: Structures in 3D

2nd week:
Lecture: Force and displacement influence lines of statically determinate structures.
Seminar: Force and displacement influence lines of statically determinate structures.

3rd week:
Lecture: Force and displacement influence lines of statically determinate structures.
Seminar: Force and displacement influence lines of statically determinate structures.

4th week:
Lecture: Maximal internal forces of cross sections.
Seminar: Maximal internal forces of cross sections.

5th week:
Lecture: Diagrams of maximal internal forces.
Seminar: Diagrams of maximal internal forces.

6th week:
Lecture: Frames
Seminar: Frames

7th week:
Lecture: Trusses
Seminar: Trusses

8th week:
Lecture: Mid-term test
Seminar: Submitting the task 1.
Self Control Test

9th week:
Lecture: Strengthened structures and continuous beams.
Seminar: Strengthened structures and continuous beams. Issuing task 2.

10th week:
Lecture: The moment distribution method
Seminar: The moment distribution method

11th week:
Lecture: Orthogonal plane frames
Seminar: Orthogonal plane frames

12th week:
Lecture: Continuous beams
Seminar: Continuous beams

13th week:
Lecture: Calculation of discs using the Airy function
Seminar: Consultation

14th week:
Lecture: Theory of thin plates, Navier method
Seminar: Consultation

15th week:
Lecture: End-term test
Seminar: Submitting task 2.
Self Control Test

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each practice class. Active participation is evaluated by the teacher every class. If a student's behavior or conduct doesn't 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 all the tasks as scheduled minimum at a sufficient level. During the semester there are two tests: test 1 in the 8th week and the test 2 in the 15th week. Students have to reach the minimum point level on each test. If the score of any test is below 15 from 30 points, the student once can take a retake test in both topics.
B, for a grade: The course ends in examination grade (ESE). Based on the points of the tasks, tests and the exam. Based on points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

Budynas: Advanced Strength and Applied Stress Analysis
2nd.1998. ISBN: 13978-0070089853
Popov: Mechanics of materials
ISBN: 978-0135713563

Subject: **TIMBER & MASONRY STRUCTURES**
Year, Semester: 3rd year/2nd semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: History of timber building structures: floors, roofs, walls and frames.
Seminar: History of timber building structures

2nd week:
Lecture: Mechanical properties of structural timber: yield strength, ultimate strength, elongation at failure; elastic modules, design values of material coefficients.
Seminar: Mechanical properties of structural timber

3rd week:
Lecture: Resistance of cross-section: tension, compression, bending moment, shear, bending and shearing, bending and axial force, bending, shear and axial force, torsion.
Seminar: Resistance of cross-section

4th week:
Lecture: Buckling resistance of members, uniform members in compression, and uniform members in bending.
Seminar: Buckling resistance of members

5th week:
Lecture: Connectors for timber structures. Engineering timber structures. Mechanical properties of masonry structures: yield strength, ultimate strength, elastic module, and design values of material properties.
Seminar: Connectors for timber structures

6th week:
Lecture: Reinforced and unreinforced masonry

structures.
Seminar: Reinforced and unreinforced masonry structures.

7th week:
Lecture: Resistance of cross-section: compression, bending moment, shear, bending and shearing, bending and axial force, bending, shear and axial force.
Seminar: Resistance of cross-section: compression

8th week:
Lecture: Brick Structures , Design methods according to EC6.
Seminar: Brick Structures

9th week:
Lecture: Types and strength characteristics of masonry. Non-reinforced and reinforced walls.
Seminar: Types and strength characteristics of masonry

10th week:
Lecture: Stone Structures, Design and valuation of load-bearing stone structures.
Seminar: Stone Structures

11th week:
Lecture: Mixed (stone and brick) walls
Seminar: Consultation

12th week:
Lecture: Consultation
Seminar: Consultation

13th week:
Lecture: Consultation
Seminar: Consultation

14th week:
Lecture: Consultation
Seminar: Consultation

15th week:
Lecture: Consultation
Seminar: Consultation

Requirements

Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice class with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is counted as an absence. In case of further absences, medical certificates needs to be presented. Missed practices should be made up for at a later date, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures with them to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active participation should be required by students. Students have to submit all the two tests and the three design tasks as scheduled minimum at a sufficient level.
During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 15th week – and there are seven design tasks. In order to take the mid-semester grade – minimum (2) pass grade, – minimum point of the tests and the design tasks has to be taken (Summa minimum 61 points from 100 points). In order to take a mid-semester grade – minimum (2) pass grade – minimum point of tests and design tasks has to be taken. The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: I. Test: Maximum: 30 points Minimum: 18 points II. Test: Maximum: 30 points Minimum: 18 points Summa: 60 points 36 points Three design tasks: 1. Design Task: Maximum: 15 points Minimum: 9 points 2. Design Task: Maximum: 10 points Minimum: 7 points 3. Design Task: Maximum: 15 points Minimum: 9 points Summa: 40 points 25 points Summa points: Maximum: 100 points Minimum: 61 points The course ends with mid-semester grade (AW5). Based on the summa points of the tests and the summa points of the design tasks, the mid-semester grade is defined according to the

following calculation: Score Grade 0 – 60 points: fail (no sign) 61 – 70 points: pass (2) 71 – 80 points: satisfactory (3) 81 – 90 points: good (4) 91 – 100 points: excellent (5)

Required reading materials

Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1 EN 1991-1-1:2002 : Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
MSZ: Design of timber structures. Part 1-1: General. Common rules and rules for buildings
EN 1995-1-1: 2010 .
MSZ: Design of timber structures. Part 1-2: General. Structural fire design
EN 1995-1-2: 2005 .
MSZ: Design of masonry structures. Part 1-1: General rules for reinforced and unreinforced masonry structures
EN 1996-1-1: 2009 .
MSZ : Design of masonry structures. Part 2: Design considerations, selection of materials and execution of masonry
EN 1996-2: 2006 .
MSZ: Design of masonry structures. Part 3: Simplified calculation methods for unreinforced masonry structures
EN 1996-3: 2006 .
MSZ: Design of masonry structures. Part 1-2: General rules. Structural fire design
EN 1996-1-2: 2005 .
Eurocodes, EN 1990 and to applications use : Basis of structural design, Guide to Interpretative Documents for Essential Requirements
4th. Watford, 2001.
Jack Porteous & Abdy Kermani: Structural Timber Design to Eurocode 5
Blackwell Publishing , 2009. ISBN: 978-14051-4638-8

Department of Engineering Management and Enterprise

Subject: **MANAGEMENT FOR ENGINEERS**
Year, Semester: 3rd year/2nd semester
Lecture: **1**
Seminar: **3**

1st week:
Lecture: The history of management. A classical school, integrating management theories, emerging management positions
Seminar: group work, situational tasks, discussion with different dispute methods

2nd week:
Lecture: Organization structures. Matrix, Functional, Divisional, Line
Seminar: SWOT analysis

3rd week:
Lecture: Management gurus. Fayol, Taylor, Mitzberg, Porter, Weber, Mayo
Seminar: Pest model

4th week:
Lecture: Functions of management, Leadership theories, Planning, Organizing, Directing, Controlling, Innovation and Representation, Trait theory, Behavioural theories, The Contingencialist Leadership Models, Hersey and Blanchard

Seminar: Situational tasks in group work, Tests measuring leadership styles

5th week:
Lecture: Managing people perception, learning and personality, motivation and organizational learning
Seminar: group work, situational tasks, discussion with different dispute methods

6th week:
Lecture: Leadership styles Autocratic, Bureaucratic, Laissez-faire, Democratic, Transformational leadership
Seminar: Tests measuring leadership styles, discussion of the results

7th week:
Lecture: Leadership qualities. Most important leadership skills and qualities, Generic leadership traits, What you have to know, What you need to do, How to turn the core leadership functions into skills
Seminar: Tests measuring leadership qualities, discussion of the results

8th week:
Lecture: Time management, Energy management. Taming Time, A Few Myths About Managing Your Time, Lining Up Your Ducks: Prioritize!, Knowing Your Time Management Style, How You Relate to Time
Seminar: Techniques to manage the time and energy

9th week:
Lecture: The basics of strategic management , Problem-solving strategic analysis, strategy formulation, strategy implementation, what is a problem? How can it be solved?
Seminar: Why-why analysis, 80/20 theory, fishbone diagram

10th week:
Lecture: Work Performance determining work performance, analyze the problems, find solutions
Seminar: Test measuring Work Performance,, discussion of the results

11th week:
Lecture: Emotional Intelligence determining emotional intelligence, highlighting the EM'S role and its effect in the leadership
Seminar: Tests measuring the Emotional Intelligence, discussion of the results

12th week:
Lecture: Managing relationships communications, interpersonal relationships, building groups into teams communications, interpersonal relationships, building groups into teams
Seminar: Tests measuring, discussion of the results

13th week:
Lecture: Coaching, stress caused by leadership defining what a coach is, identifying, the tasks of coaching and authoritarian leadership, signs of stress, recognizing symptoms
Seminar: Case studies, stress tests

14th week:
Lecture: The basic of Quality Management. ISO 9001:2008, TOM, EFQM
Seminar: Case studies.

15th week:
Lecture: End-term test

Requirements

Topics: In the Management for Engineers course students gain in sight into the key areas of leadership. During the course students become familiar with the new management trends, such as coaching authoritarian leadership, time- and energy management and with the importance of emotional intelligence in effective leadership. In the framework of practical classes the students' leadership skills, emotional intelligence and their soft skills are measured and analyzed.
A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice classes is compulsory. Students must attend the practices 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. Attendance at practice classes will be recorded by the practice leader. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate his/her participation as an absence because of the lack of active participation in class. During the semester there is an end-term test in the 15th week. Students have to sit for the test.
B, for a grade: The course ends in a mid-semester grade (AW5) based on the average of the grades of the participation and the average of the test results, the mid-semester grade is calculated as an average of them: - the average grade of practice - the average grade of the test The minimum requirement for the mid-term and end-term tests is 60%. Based on the score of the tests separately, the grade for the tests is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5) If the score of any test is below 60, once students can take a retake test of the whole semester material.

Required reading materials

McKeown, A. – Wright, R. : Professional English in Use
Cambridge University Press, 2011.
Schwart, T – Loehr, J. : The Power of Full Engagement: Managing Energy, Not Time, Is the Key to High Performance and Personal Renewal
Free Press, 2005.
McKeown, A. – Wright, R. : Leader Effectiveness Training
Cambridge University Press, 2011.
Mancini, M. : Time management
McGraw-Hill Companies, 2003.
Taylor, J. : Decision Management System
IBM Press, 2012.

Department of Civil Engineering

Subject: **BRIDGES & STRUCTURES**
Year, Semester: 4th year/1st semester
Lecture: **2**
Practical: **2**

1st week:
Lecture: Programme The history of bridges The classification of bridges
Practical: Standards.

2nd week:
Lecture: Requirements and preliminary works.
Practical: Foundations, substructures and equipment; dilatations.

3rd week:
Lecture: The structures of steel bridges. Steel girder bridges.
Practical: The building techniques of steel bridges.

4th week:
Lecture: Steel frames, arches and suspension bridges.
Practical: Orthotropic plates.

5th week:
Lecture: The structures of concrete bridges.
Practical: The building techniques of concrete bridges.

6th week:
Lecture: Concrete girder bridges; concrete frames and arch bridges.
Practical: Concrete slab bridges.

7th week:
Lecture: Prestressing techniques. Precast pretensioned girder bridges.
Practical: Concrete box girders.

8th week:
Lecture: Structures of cable-stayed bridges.
Practical: Building techniques of cable-stayed bridges

9th week:
Lecture: Composite bridges.
Practical: Timber bridges.

10th week:
Lecture: Test loading, monitoring and maintenance.
Practical: Strengthening techniques.

11th week:
Lecture: Reservoirs, bunkers, water-towers.

12th week:
Lecture: Cases and curiosities

Requirements

A, for a signature: Attendance and participation at lectures and practice classes is compulsory. Students must attend them 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. Attendance will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. During the semester there is one end-term test. To pass it students have to achieve a minimum (50%) level.
B, for a grade: The course ends in an exam (ESE). Based on the result of the end-term test (30%) and the written exam (70%): Score Grade 0-50 fail (1) 50-62 pass (2) 63-74 satisfactory (3) 75-85 good (4) 85-100 excellent (5) If the score of the test is below 50, students have one chance to write a retake exam.

Required reading materials

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

Subject: **COMPOSITE STRUCTURES**
Year, Semester: 4th year/1st semester
Lecture: **2**

1st week:
Lecture: General presentation on composite structures in the world.

2nd week:
Lecture: Calculating the cross sectional data of steel I-beam with a reinforced concrete head-plate.

3rd week:
Lecture: Calculating elastic stress distribution in the cross section of steel I-beam with a reinforced concrete head-plate.

4th week:
Lecture: Calculating the elastic stress distribution in the cross section of steel I-beam with a reinforced concrete head-plate, taking creep in account.

5th week:
Lecture: Calculating the effective width of a head-plate.

6th week:
Lecture: TEST 1. Issuing a design task.

Self Control Test

7th week:
Lecture: Calculating plastic bending resistance of steel I-beam a with reinforced concrete head-plate.

8th week:
Lecture: Calculating plastic bending resistance of steel I-beam with a reinforced concrete head-plate. (further cases)

9th week:
Lecture: Calculating shear resistance of steel I-beam with a reinforced concrete head-plate.

10th week:
Lecture: Lateral torsional buckling of steel I-beam with a reinforced concrete head-plate.

11th week:
Lecture: TEST 2
Self Control Test

12th week:
Lecture: Servicing limit states of steel I-beam with a reinforced concrete head-plate.

13th week:
Lecture: Composite columns

14th week:
Lecture: Composite plates with a trapezoidal steel plate.

15th week:
Lecture: TEST 3. Submitting a design task.

Requirements

Topics: Materials of steel-concrete composite building structures. Elastic calculation of composite beams. Plastic calculation of composite beams. Design of composite columns. Design of slabs with a trapezoidal sheet.
A, for a signature: Participation at lectures is compulsory. Students must attend the lectures 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. Attendance will be recorded. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each lecture. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't 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 the design task as scheduled minimum at a sufficient level. During the semester there are three tests. Students have to reach the minimum level of points on each test. If the score of any test is below 10 from 20, the student once can take a retake test on all the topics.
B, for a grade: The course ends in a mid-term grade (AW5), based on the points of the task and the tests. Based on the points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

EUROCODE 4: Design of composite steel and concrete structures. Part 1-1: General rules and rules for buildings
2010.
JOHNSON R.P.: Composite structures of steel and concrete Vol1
Crosby Lockwood Stamples, 1975.
LAWSON R.M.: Design of composite slabs and beams with steel decking
SCI Publications, 1989.
LAWSON R.M., RACKHAM J.W.: Design of haunched composite beams in buildings
Steel Construction Institute, 1989.

HAENSEL J.: Effects of creep and shrinkage in composite construction
University of Bochum , 1975.
NEIL S., JOHNSON R., LAWSON R.M., MULLET D.L.: Design of composite trusses
Steel Construction Institute, 1992.

Subject: **DESIGN OF BUILDINGS II**
Year, Semester: 4th year/1st semester
Lecture: **1**
Practical: **2**

1st week:
Lecture: Preparation, application for the courses, description of subject requirements, course schedule and literature lists, registration week

2nd week:
Lecture: History of Hungarian agricultural architecture, government regulations, the provisions of relevant OTÉK Opportunities for farm-site construction
Practical: Research - description of 3 processed agricultural structures - scheme, definition of static models and enveloping options.

3rd week:
Lecture: Presentation of livestock farms and prescriptions, animal health considerations and manure management.
Practical: Consultation.

4th week:
Lecture: Horse farming, stables, farming buildings, sheep farming
Practical: Consultation.

5th week:
Lecture: Cattles, pig farming buildings
Practical: Consultation.

6th week:
Lecture: Storage buildings in agriculture
Practical: Consultation.

7th week:
Lecture: Wine processing, wineries, farm buildings
Practical: Deadline of the 1st project

8th week:
Lecture: Fire protection, basic concepts, classification of buildings, structure halls, fire distances, fire loads
Practical: Research - description of 3 processed agricultural structures - scheme, definition of static models and enveloping options

9th week:
Lecture: Industrial parks and it's benefits. Classification of Dressing rooms.
Practical: Consultation

10th week:
Lecture: Preparation week for the semi-annual project, consultations only in announced time. A week for the semi-annual tests.
Practical: Design of dressing rooms.

11th week:
Lecture: History of reinforced concrete, reinforced concrete long-span structures, the benefits of prefabrication
Practical: Deadline for the 2nd project. A small Test.
Self Control Test

12th week:
Lecture: Steel structures, hall structures.
Practical: Opportunity to resit the test.

13th week:
Lecture: Industrial coatings, classical and light enveloping, wall and roof structures.
Practical: Consultation.

14th week:
Lecture: Details of structures, industrial gates.

15th week:
Lecture: Preparation and correction week for the semi-annual project, consultations only in announced time. The end-term test this week.

Requirements

A, for a signature: Attendance at lectures is recommended, but not compulsory. Participation at practice is compulsory. Students must attend the practices 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 can't make up a practice class with another group. Attendance at practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, being 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 behavior or conduct doesn't 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. Special conditions for signing and examination: Minimum: a half year performance means 38 points. Satisfactory: performance of the two mid-semester projects.
B, for a grade (AW5): Mid-semester : Exam (ESE): 2 x 25 50 points Study: 2 x 25 50 points 100 points The condition of the signature, and the exam-release is the performance on the exam, which have to be more than 50%, means min. 52 points. End of 2nd Semester Examination (ESE) Written 50 points A total of 150 points

Required reading materials

Malcolm Millais: Building structures
Philip Garrison: Basic Structures for Engineers and Architects
Jürgen Adam, Kathariana Hausmann, Frank Jüttern: Industrial Buildings

Subject: **ENGINEERING TIMBER STRUCTURES**
Year, Semester: 4th year/1st semester
Lecture: **2**

1st week:
Lecture: Timber as a structural material: strength and elastic properties.

2nd week:
Lecture: Design of members subjected to flexure.

3rd week:
Lecture: Design of members and walls subjected to axial or combined axial and flexural actions.

4th week:
Lecture: Design of glued laminated members.

5th week:
Lecture: Design of composite timber and wood-based sections.

6th week:
Lecture: Design of built-up columns.

7th week:
Lecture: Design of stability bracing, floor and wall diaphragms.

8th week:
Lecture: Design of metal dowel-typed connections.

9th week:
Lecture: Design of joints with connectors.

10th week: **Lecture:** Moment capacity of connections formed with metal dowel fasteners or connectors.	**13th week:** **Lecture:** consultation
11th week: **Lecture:** Special timber structures: arches, frames, nailed shells and lattice structures.	**14th week:** **Lecture:** consultation
12th week: **Lecture:** Comparative analysis of existing timber structures.	**15th week:** **Lecture:** consultation

Requirements

Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active student's participation should be required. Students have to submit all the two tests and the five design tasks as scheduled minimum at a sufficient level.
During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 15th week – and there are three design tasks. In order to get the signature, minimum point of tests and design tasks has to be taken (min. 50 points of 80 points). In order to take an exam grade – minimum (2) pass grade – minimum point of the tests and the design tasks as well as exam points have to be taken (Summa minimum 61 points from 100 points). The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: Test I: Maximum: 30 points Minimum: 18 points Test II: Maximum: 30 points Minimum: 18 points Summa: 60 points 36 points Three design tasks: Design Task 1: Maximum: 15 points Minimum: 9 points Design Task 2: Maximum: 10 points Minimum: 7 points Design Task 3: Maximum: 15 points Minimum: 9 points Summa: 40 points 25 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in a mid-semester grade (AW5). Based on the summa points of the tests and the summa points of the design tasks, the mid-semester grade is defined according to the following calculation: Score Grade 0 – 60 points: fail (no sign) 61 – 70 points: pass (2) 71 – 80 points: satisfactory (3) 81 – 90 points: good (4) 91 – 100 points: excellent (5)

Required reading materials

Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .
MSZ EN 1995-1-1: Design of timber structures Part 1-1: General. Common rules and rules for buildings
2010.
MSZ EN 1995-1-2: Design of timber structures. Part 1-2: General. Structural fire design
2005.

Eurocode EN 1990:2002/A1:2005 : Basis of structural design
Jack Porteous & Abdy Kermani: Structural Timber Design to Eurocode 5
Blackwell Publishing , 2009. ISBN: 978-14051-4638-8

Subject: **GEOTECHNICS IV**
Year, Semester: 4th year/1st semester
Lecture: **2**

1st week:
Lecture: Failure investigations in Geo technical Engineering. Surveying and recording the damages, cracks. Planning of instrumentation, and analyzing their data.

2nd week:
Lecture: Recommendations and design for the restoration. Technologies used for reenforcing the foundation of a damaged building.

3rd week:
Lecture: In-ground retaining structures. Brief history of embedded retaining wall design. Embedded walls. Effects of soil/wall friction and adhesion.

4th week:
Lecture: Clay soils. Time-scale over which undrained conditions apply. Effect of high in situ lateral stress.

5th week:
Lecture: Calculation of bending moments and prop loads. Geostructural mechanism to estimate wall-movements. The effect of wall stiffness.

6th week:
Lecture: Analysis and design of shallow underground structures. Design and construction of underground engineering structures in urban area.

7th week:
Lecture: Midterm Test
Self Control Test

8th week:
Lecture: Introduction to tunnels. Tunnel construction. Bored tunnels in soft ground - method of construction.

9th week:
Lecture: Type of shield for tunneling. Stress changes near tunnels. Stability of tunnel headings for undrained and drained loading.

10th week:
Lecture: Stress analysis of a tunnel of circular cross-section. Collapse of tunnels in clay (short term total stress analysis). Collapse of tunnels - effective stress analysis

11th week:
Lecture: Ground movements due to tunneling. Load factor to limit ground movements.

12th week:
Lecture: Influence of water on tunnels. Environmental aspects of underground structures.

13th week:
Lecture: Design and construction of bored tunnels and pipes under existing road and railway lines. Supporting walls and presses.

14th week:
Lecture: End of Semester Test
Self Control Test

15th week:
Lecture: Make-up tests (End of Semester).
Self Control Test

Requirements

Topics: This is an introductory class to the design and the construction of the underground engineering structures, including embedded retaining wall, underground garage, and tunnels. Failure investigations in Geo technical Engineering and special foundations used for reenforcing damaged structures are also covered briefly. By the end of this course, the student should have: An overall knowledge and understanding of the design and the construction aspects of in-ground retaining structures. Text: Lecture notes will be available.
Attendance: Participation in lectures is critical to successful completion of this course. More than 5 unexcused absences result in no completion of the course. Completion of the course: D or higher grades for both tests. There is one make up test for each. Grading of tests: Score Grade 0-60 (F) fail (1) 61-70 (D) pass (2) 71-80 (C) satisfactory (3) 81-90 (B) good (4) 91-100 (A) excellent (5) Grading of the course: Mid term Test 25% End of semester Test 25% Exam 50% Verbal exam is taken at the end of the semester in the exam period. Students have to sign up for the scheduled exam minimum two days in advance in the Neptune.

Required reading materials

Utsav Chandra Kalita : Soil Mechanics & Foundation Engineering
PHI Learning Pvt. , 2011.
Károly Széchy : The art of tunneling
Akadémiai Kiadó, 1996.
Sahashi K. Gulhati, Sahashi K Gulhati Manoj Datta : Geotechnical Engineering
McGraw-Hill Education, 2005.

Subject: **REINFORCED CONCRETE BUILDINGS**
Year, Semester: 4th year/1st semester
Lecture: **2**
Practical: **1**

1st week:
Lecture: Classification of reinforced concrete high buildings. Special loads of high rise reinforced concrete buildings. Bracing systems of high rise buildings.

2nd week:
Lecture: Determination of loads and stresses of the bracing systems of high rise reinforced concrete buildings. Examples.

3rd week:
Practical: Examples for static analysis of different bracing systems of high rise buildings. Outgiving and discussion of the 1st Design Task.

4th week:
Lecture: Special aspects of precast concrete and precast reinforced concrete. Safety factors, concrete strength, effects of the industrial area. Examples.

5th week:
Lecture: Prestressing technologies. Prestressing force loss of prestressing, effective prestressing forces.

6th week:
Lecture: Design of pressed members. Magnel lines. Ultimate moment capacity according to Mörsch. Effects of prestressing on shear. Outgiving and discussion of the 2nd Design Task.

7th week:
Lecture: Postensioning technologies. Special problems of the postensioned structures. Design aspects and problems of the statically determined and undetermined structures.

8th week:
Lecture: 1st Test. Handing in of the 1st Design Task. Handing in of the 2nd Design Task

9th week:
Lecture: Reinforced concrete footings I. Design of footings. Examples. Outgiving and discussion of the 3rd Design Task.

10th week:
Lecture: Reinforced concrete footings II. Design of footings. Examples. Outgiving and discussion of the 4th Design Task.

11th week:
Lecture: Reinforced concrete footings III. Design of footings. Examples. Outgiving and discussion of the 5th Design Task.

12th week:
Lecture: Types, properties, applications and design aspects of different kind of fibre reinforced concrete.

13th week:
Lecture: Fire resistance of reinforced concrete structures, design for fire.

14th week:
Lecture: Industrial visit.

Requirements

Topics: Reinforced concrete buildings. Monolithic and prefabricated systems: structural elements of RC frames and RC halls. Bracing systems of tall buildings. Reinforced concrete constructions: forming of dilatations, forming of structural joints, structural elements for thermal, voice and water isolations as well as vibrations, connection of prefabricated RC members. Special design problems of construction of prefabricated elements: connections of monolithic and prefabricated elements, details of joints. Design considerations for the main formwork types. Effects of fire on RC structures, structural fire design.
Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active student's participation should be required during lectures as well as practice classes. Students have to submit all the two tests and the five design tasks as scheduled minimum at a sufficient level.
During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 15th week – and there are five design tasks. In order to get the signature, minimum point of tests and design tasks has to be taken (min. 50 points of 80 points). In order to take an exam grade – minimum (2) pass grade – minimum point of the tests and the design tasks as well as exam points have to be taken (Summa minimum 61 points from 100 points). The minimum and the maximum points related to the tests and design tasks can be obtained are the following: Two tests: Test I: Maximum: 15 points Minimum: 8 points Test II: Maximum: 15 points Minimum: 8 points Summa: 30 points 16 points Five design tasks: Design Task 1: Maximum: 8 points Minimum: 5 points Design Task 2: Maximum: 15 points Minimum: 11 points Design Task 3: Maximum: 9 points Minimum: 6 points Design Task 4: Maximum: 9 points Minimum: 6 points Design Task 5: Maximum: 9 points Minimum: 6 points Summa: 50 points 34 points Points required for a signature: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points from the Tests and from the Design Tasks, a signature can be obtained) Exam: Maximum: 20 points Minimum: 11

points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade (AW5). Based on the summa points of the tests, the summa point of the design tasks and the summa point of the exam, the exam grade is defined according to the following calculation: 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)

Required reading materials

fib Bulletin 51 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 1. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 52 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 2. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 53 Structural Concrete : Textbook on behavior, design and performance
2nd - Volume 3. Federation International du Béton , 2009. ISBN: 1562-3610, 978-2-883
fib Bulletin 54 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 4. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 54 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 4. Federation International du Béton , 2010. ISBN: 1562-3610, 978-2-883
fib Bulletin 62 Structural Concrete : Textbook on behavior, design and performance
2nd – Volume 5. Federation International du Béton , 2012. ISBN: 1562-3610, 978-2-883
Eurocode: Basis of structural design
EN 1990:2002/A1:2005 .
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .
MSZ: Design of concrete structures Part 1-1.: General rules and rules for buildings
EN 1992-1-1: 2010 .
MSZ: Design of concrete structures Part 1-2: General rules. Structural fire design
EN 1992-1-2: 2010 .
MSZ: Concrete Part 1: Specification, performance production, conformity, and rules of application of MSZ
4798-1:2004. EN 206-1 in Hungary,
Robert Park & Thomas Paulay: Reinforced Concrete Structures
Wiley-India Edition , 2010. ISBN: 978-81-265-2362-5

Subject: **STEEL BUILDINGS**
Year, Semester: 4th year/1st semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Preparation, description of subject requirements, course schedule description, description of the course literature list, registration week.

2nd week:
Lecture: Type and classification of steel buildings. Practice: Outgiving and discussion of the design task.

Seminar: Outgiving and discussion of the design task.

3rd week:
Lecture: Bracing systems of steel frames. Fixed column foots.
Seminar: Detailing of steel structures.

4th week:
Lecture: Classifications and types of steel struts

used in steel buildings I.
Seminar: Loads and forces of the bracing system.

5th week:
Lecture: Classifications and types of steel struts used in steel buildings II.
Seminar: Detailing of the struts and their joints.

6th week:
Lecture: Design and special problems of steel crane girders.
Seminar: Examples for design of crane girders.

7th week:
Lecture: Design and special problems of quilt girders.
Seminar: Design example for a quilt girder.

8th week:
Lecture: TEST1
Self Control Test

9th week:
Lecture: Classification and types of the thin-wall steel structures.
Seminar: Calculation and details of thin-wall structures.

10th week:
Lecture: Special problems of cross section class IV.
Seminar: Design of CSC IV.

11th week:
Lecture: Some special problems of steel-concrete composite structures.
Seminar: Design examples for simple composite girders.

12th week:
Lecture: Fatigue of steel structures. Problems of the brittle fracture. Fire resistance of steel structures.
Seminar: Simplified design examples for checking fire resistance.

13th week:
Lecture: Case studies for steel structures, steel buildings.

14th week:
Lecture: TEST2
Self Control Test

15th week:
Lecture: Consultation.
Seminar: Consultation. Handing in of the Design Task

Requirements

Topics: Classification and types of steel buildings. Bracing systems of steel buildings. Special steel struts in steel buildings. Detailing of steel frames and struts. Design of steel crane girders. Design of steel quilt structures. Classification, types and design problems of thin-wall structural elements. Cross section class IV. Some problems of the steel-composite structures used in steel buildings. Fatigue, brittle fracture and fire resistance of steel structures. Case studies.
Attendance at lectures is strongly recommended, but not compulsory. Participation at practice classes is compulsory. Students must 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 can't make up a practice with another group. Attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is equivalent with 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, being discussed with the tutor. Students are required to bring a calculator and the printed materials of the lectures to each lecture and practice class. Active participation is evaluated by the teacher in every class. Active student's participation should be required. Students have to submit all the two tests and one design task as scheduled minimum at a sufficient level.
During the semester there are two tests – the 1st test in the 8th week and the 2nd test in the 14th week – and there is a design task. In order to get the signature, the minimum points of the tests and

the design task have to be taken (min. 50 points of 80 points). In order to take an exam grade (ESE) – minimum (2) pass grade – minimum points of tests and the design task as well as exam points have to be taken (Summa minimum 61 points of 100 points). The minimum and the maximum points related to the tests and the design task can be obtained are the following: Two tests: Test I: Maximum: 20 points Minimum: 12 points Test II: Maximum: 20 points Minimum: 12 points Summa: 40 points 24 points Design task: Maximum: 40 points Minimum: 26 points Points required for sign: Maximum: 80 points Minimum: 50 points (In case of having min. 50 points for the Tests and for the Design Task, signature can be obtained) Exam: Maximum: 20 points Minimum: 11 points Summa points: Maximum: 100 points Minimum: 61 points The course ends in an exam grade (ESE). Based on the summa points of the tests, the summa points of the design task and the summa point of the exam, the exam grade is defined according to the following calculation: 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)

Required reading materials

Eurocode EN 1990:2002/A1:2005 : Basis of structural design
Eurocode 1: Actions on structures - Part 1-1: General actions - Densities, self-weight, imposed loads for buildings
EN 1991-1-1:2002 .
Eurocode 3: Design of steel structures - Part 1-8: Design of joints
EN 1993-1-8:2005.
MSZ: Design of steel structures Part 1-1.:General rules and rules for buildings
EN 1993-1-1: 2009 .
Design of Steel Portal Frames for Europe
University of Edinburgh, 2011.

Subject: **STRENGTHENING OF STRUCTURES**
Year, Semester: 4th year/1st semester
Lecture: **2**

1st week:
Lecture: Features of the building diagnostic tests.

2nd week:
Lecture: Expected lifetime of structures. Effects of reconstruction.

3rd week:
Lecture: Rules and methods of load tests.

4th week:
Lecture: Strengthening of reinforced concrete structures with post-tensioning.

5th week:
Lecture: Strengthening reinforced concrete structures with carbon fiber-reinforced belts.

6th week:
Lecture: Damages of masonry structures. Ways of strengthening.

7th week:
Lecture: Damages of arches and vaulted ceilings. Ways of strengthening.

8th week:
Lecture: Damages of buildings due to the foundation. Methods of strengthening foundations.

9th week:
Lecture: TEST1
Self Control Test

10th week:
Lecture: Fixing local injuries of steel structures.

11th week:
Lecture: Strengthening of steel frame structures.

12th week:
Lecture: Strengthening of steel structures by modifying the bracing system.

13th week:
Lecture: Damages of wooden structures and ways of strengthening.

14th week:
Lecture: Damages of prefabricated structures. Ways of strengthening.

15th week:
Lecture: TEST2
Self Control Test

Requirements

A, for a signature: Participation at lectures is compulsory. Students must attend the lectures 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. Attendance will be recorded. Being late is equivalent with an absence. In case of further absences, a medical certificate needs to be presented. Students are required to bring a calculator to each lecture. Active participation is evaluated by the teacher in every class. If a student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class. During the semester there are two tests. Students have to reach the minimum level of points on each test. If the score of any test is below 30 of 50, the student once can take a retake test covering the whole semester material.
B, for a grade: The course ends in a mid-term grade (AW5), based on the points of the tests. Based on the points earned during the semester, the grade is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5)

Required reading materials

KORIS K. , BÓDI I.: Strengthening of structures URL: http://www.hsz.bme.hu/hsz/oktatas/feltoltesek/BMEEOHSASA4/strengthening_of_structures.pdf
MAZZOLANI F.M.: Refurbishment by steelwork URL: http://www.arcelormittal.com/sections/fileadmin/redaction/pdf/Brochures/refurbishement_en.pdf
MAZZOLANI F.M., IVÁNYI M.: Refurbishment of buildings and bridges
Springer, 2002. ISBN: 978-3-211-83690-3
CROSWELL R. M., WEBSTER M. D.: Guidelines for the Structural Provisions for the Repair, Alteration, Addition and Change of Use of Existing Buildings
Boston Association Of Structural Engineers, 2002.
MAZZOLANI F.M., Refurbishment by steelwork: Repair, restoration and strengthening of structures URL: http://www.nicee.org/iaee/E_Chapter9.pdf
TALJSTEN B., CFRP.: strengthening - concrete structures strengthened with near surface mounted CFRP laminates
URL: http://quakewrap.com/frp%20papers/CFRP-Strengthening-Concrete-Structures-Strengthened-With-Near-Surface-Mounted-CFRP-Laminates.pdf

Subject: **STRUCTURAL ENGINEERING FINAL EXAM**
Year, Semester: 4th year/2nd semester

CHAPTER 8
INTERNSHIP

Civil Engineering BSc, Operational and Maintenance Specialization

Students majoring in the Civil Engineering BSc have to carry out a 4 weeks internship involved in the model curriculum. The internship course must be signed up for previously via the NEPTUN study registration system in the spring semester (4th semester). Its execution is the criteria requirement of getting the leaving certificate (absolutorium).

I. Objective of the internship, competences • Students get acquainted with professional work in conformity with their major at the company or institution and join in the daily working process. They have to resolve tasks independently assigned by their supervisor and gain experiences may be utilized 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, talk shop applying correct technical terms. Professional competences: applying the professional skill gained during the training and acquiring new knowledge.

II. Places suitable for internship

All the organizations, institutions and companies, 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.

III. Documents necessary for commencing and completing the internship

Students need to hand in as many copies of all the necessary documents as many signers are on them. The deadline of receiving the Invitation Letter is 30th May 2016 to the secretariat (Mrs. Mónika Csákó Tóthné). A student need an Internship Cooperation (Company abroad) in several copies or “Megállapodás” (Company in Hungary). There must be 4 signers on it: one of the company, a faculty signer, a supervisor of the faculty, a major responsible person. The deadline is 30th May 2016 to the secretariat (Mrs. Mónika Csákó Tóthné). A Student Agreement must have got 3 signers: company, faculty, student. The deadline is 30th May 2016 to secretariat (Mrs. Mónika Csákó Tóthné). There must be one signer on the Evaluation Sheet and Certificate by the company. The deadline is 9th September 2016 to the secretariat (Mrs. Mónika Csákó Tóthné). Initiative of the internship at the company and providing for the documents from the company is the student’s duty. If the student doesn’t specify the receiving company or doesn’t provide for the Invitation Letter or the initiative of the Agreement and the Student Agreement (or its signature) in time, the major responsible will refuse the Internship Certificate.

IV. Execution of the Internship and its certification

1. The duration of the internship is 6 weeks.

2. Besides completing the internship, students have to compile a 15-20 pages essay about the work done. The topic of the essay must be negotiated with the supervisor and attached to the activity actually done by the student. It is expedient to choose a topic which may be appropriate either for participating in the National Scientific Students' Associations Conference ("OTDK") or a thesis.

3. The execution of the internship must be certified by the “Evaluation Sheet and Certificate” form can be downloaded from the website of the Department of Civil Engineering. The deadline of submitting the Essay and the “Evaluation Sheet and Certificate”: 9th September 2016, office 212.

Summary of the tasks and deadlines regarding the internship

• the student sign up for the Internship course via the NEPTUN in the spring semester,

• contact the company and provide for the Invitation Letter (1 copy) must be submitted to the secretariat, for the Internship Cooperation (2 original copies, company is abroad) or “Internship Cooperation with Company in Hungary” (4 original copies, company is in Hungary) and for the Student Agreement (3 original copies) respectively signed by the company till 30th May 2016. Please remember that it is the student’s responsibility to meet the deadline given! Having the

documents signed by the Dean of the Faculty and sending copies to the company by post is the duty of the secretariat.

• executing the 4 weeks internship in the summertime,

• providing for the Evaluation Sheet and Certificate form at the end of the internship and submitting it together with the essay to Mrs. Mónika Csákó Tóthné responsible for the internship program at the department till 9th September 2016.

V. Exemption

A partial exemption may be required by the student who has completed an internship in the secondary school and it is certified by the secondary school certificate. The request for partial exemption can be submitted till 30th May 2016. After this deadline requests are denied. The copy of the secondary school certificate and the written request addressed to Dr. Imre Kovács major responsible must be submitted to Dr. Imre Kovács (office 301). In case of any problem arising from the internship please contact Mr. Imre Kovács head of the Department of Civil Engineering (office 212, dr.kovacs.imre@gmail.com) or Mrs. Mónika Csákó Tóthné secretary (office 212, csmoni@eng.unideb.hu).

All the necessary formal documents can be downloaded from the website of the Faculty of Engineering. www.eng.unideb.hu (English Page/Internship)

CHAPTER 9
THESIS

1. „Thesis” course
The „Thesis” course may be signed up for in the beginning of the semester via the NEPTUN system after negotiating it with the internal tutor (supervisor). During the semester students have to give an account of the actual state of the thesis to the internal tutor at least three times, which is certified on the Consultation Sheet. The Consultation Sheet is made out and managed by the supervisor. The thesis can be submitted at the end of the semester after approving it by the supervisor on the Consultation Sheet. The grade gained for it is not identical with the grade of the evaluation of the Thesis, it is merely a grade of the „Thesis” course. The precondition of approving the course must be negotiated with the supervisor however in general 80% readiness of the thesis is the minimum requirement. The Consultation Sheet signed by the supervisor must be bound into the thesis!
2. After negotiating with the supervisor for the company providing for the thesis topic, the external tutor has to have the Form of Thesis Topic Announcement signed certifying that his/her company provides Thesis Topic for the student. Thesis Topic Announcement Form signed by the external tutor and the company must be delivered to the Department. In addition to this, the filled form without signature in MS Word file should be sent to secretary's e-mail address as soon as it is finalized but not later than the deadline. On the basis of this, the Thesis Sheet is constructed by the Department and it must be bound into the thesis. The data necessary for constructing the Thesis Sheet must be handed in at the department (in that case as well, if the company didn’t sign the Thesis Topic Announcement Form in time): - name of the student, - title of the thesis, - tasks must be elaborated in some sentences, (commonly the same as the chapters of the thesis), - name of the internal tutor (supervisor), - name of the external tutor, name of the company, - two chose subjects for the final exam (qv. final exam guide).
3. Plagiarism is strictly forbidden! Student has to sign the Plagiarism Statement must be bound into the thesis between the Thesis Sheet and the Consultation Sheet. The Plagiarism Statement must be filled electronic as well.
4. Formal Thesis Requirements (minimum number of pages, font style and size, prescriptions regarding the content, etc.) may be downloaded from the above mentioned website as well.
To be handed in:
- 2 bound copies (1 for the Department, 1 for the external examiner) The following must be bound (in this sequence):
- Thesis Sheet (with serial number and the signature of the head of department) – can be required from the secretariat after the end of November (it is not the sheet signed by the company!), - Plagiarism Statement – must be filled electronic and sign by the student, - Consultation Sheet (issued and signed by the supervisor), - occasional Confidential Agreement,
- photo 4x4 cm. To be handed in with the thesis, but not bound:
- max. 1 page abstract* in English containing the name of the student, the title of the thesis, and the brief summary of the topic, with readable signature,
- max. 1 page abstract* in Hungarian containing the name of the student, the title of the thesis, and the brief summary of the topic, with readable signature, - thesis in electronic version (tagged: name, major, title of thesis, date of final exam) on CD or DVD in MS Word or PDF format. * It is not identical with the “Summary” chapter of the thesis though obviously similar to its content. It contains the objective, the topics and tasks elaborated by the student, and the conclusion in some sentences regarding the topic respectively! One copy of the thesis remains at the department which will be presented in the final exam. Another copy is given for the external examiner which after referee will get back to the student.
You can find all the formal documents you need to download on the website of the Faculty here: http://www.eng.unideb.hu (English Page/Thesis)

Objective

These guidelines describe the formal principles that must be observed when writing thesis at the Faculty of Engineering. Adhering to these principles ensures comparability between different theses. Furthermore, this guidance provides you assistance to the successful elaboration and submission of the thesis. General principles Students majored in engineering have to write thesis for completing the academic studies. The successful elaboration and submission of the thesis is the condition of admission for the finals. The aim of writing thesis is to systematize the theoretical and the professional knowledge of the candidates and to prove the skill in the field of constructing and seizing procedures. The thesis is a resolution of a real technical problem as an engineering task. The candidate proves by writing thesis that he/she is capable of working on engineering task independently. This is why the thesis must be elaborated and compiled with the greatest carefulness considering the specific requirements for format and structure.

The topics of the thesis are provided by the companies, firms, research institutes from their running tasks to be elaborated. Consequently, the appropriate solution of the engineering task is useful for the companies as well. Full and part time students can obtain thesis topic unaided from companies. The essay and experiment report made for the National Scientific Students' Association Conference ("OTDK") may be developed for degree thesis as well. For the elaboration of the thesis 3 weeks are ensured – stated in the model curriculum – after finishing the scheduled lessons in the term (before the examination period). Of course, there is opportunity to study the specialized literature and negotiate it with the supervisor earlier since the thesis topic has been issued previously. The candidate is supported by the internal tutor (supervisor) and the external tutor (supervisor) however the task must be solved individually. The internal supervisor assigned the details must be elaborated which could not be defined at the announcement of the thesis topic. The profoundness of the elaboration and the proportion of the parts are specified by the supervisors primarily and by the internal one. The thesis is pronounced by the supervisors to be appropriate for submission if it is completed and meets the formal, content and look requirements.

Format, layout, structure and the length of the thesis:

Structure of the thesis: (bounded with black fabric cover with gilt letters on it)

- Cover page
- Original thesis sheet (must be bound!)
- Table of contents (with the page number 3, after that it is consecutively numbered)
- List of abbreviations and symbols (if applicable)
- Text (introduction, main part, conclusion)
- Bibliography
- Appendix (if applicable)
- Drawings
- Abstract (Max. 1 page abstract in Hungarian and in English containing the name of the student, the title of the thesis and the brief summary of the topic. The abstracts are not bound into the thesis!)

The structure of a paper should allow the reader to quickly gain an overview of its contents. It is thus important that the selected headings reflect the content in a concise way. The central theme should be clearly visible from the structure as presented in the table of contents.

Layout of the thesis:

The paper format is DIN A4, portrait orientation.

The thesis must be printed single-sided and bound in hardcover.

The page margin is 30 mm on left side to allow printing and binding.

The page margin is 20 mm on the right side.

The page margin is 25 mm on the top/bottom.

The recommended standard font and font size are the following:

Times New Roman CE 13, full justification

Arial CE 12, full justification
Line spacing is 1.5.
The content is structured in consecutively numbered chapters. Chapter sections and subsections should also be assigned a numerical index. E.g.: 1.Introduction 1.1. Problem definition 1.1.1. The method of inspection, measurement 1.1.1.1. Results, implication The chapter structure should not have more than 4 hierarchical levels. Headings of the first hierarchy 14 points, bold; heading 2: 12 points, bold; heading 3: 12 points, bold and italic; heading 4: 12 points, italic. One section requires a minimum of two sub-sections or none at all.
Page numbers should be indicated on every page on the bottom / outside. Length of the thesis: The main body of the text of the thesis must be between 30-50 A4 pages in length. It contains about 1500 characters (including space characters) per page. The table of contents, the reference list and appendixes are not to be included in the count. Additional tables, calculations and graphs that are too voluminous for or not explicitly mentioned in the running text have to be placed in the appendix. Language of the thesis: The thesis in the English program must be written in English. Both UK and US spelling are possible. Look of the thesis The look of the thesis has to be nice with uniform appearance in some respect. This is why the following formal specifications have to be kept. The pages are not framed like a sizing record or a shop drawing. Text and figures built in the text
The text has to be started with a table of contents. The table of contents (on a separated page) is followed by the list of the abbreviations and symbols. You should start the main text with an introduction that briefly and clearly outlines the topic of your work and the survey of the specialized literature. The candidate has to prove his/her proficiency in the topic. The text should be concise clear and contain correct technical terms.
The figures and pictures have to be inserted into the Microsoft Word document. Tables and figures should be numbered and have a caption. Please be aware that also figures need to be referenced. In particular, please pay attention to copyright issues and the often-required permission to reprint figures.
The stressing and sizing procedures must be explained in the text in that way so that it can be followed by a non-professional person as well.
Before the main text begins, you should also include a list of abbreviations, a list of graphs and tables, and a list of formulas and symbols (in this order) that are used in your paper. They should also be listed in your table of contents. The list of abbreviations contains all the abbreviations that are used in the thesis except for those in common use like "e.g.", "etc.", "i.e.", which can be found in a standard dictionary. All abbreviated terms must be written out when they are first mentioned in the text.
Calculated and measured data should be compiled in a table placed either in the text or in the appendix with numbering and referring. Tables, graphs and formulas
Tables, graphs and formulas should be numbered continuously per section to make them uniquely identifiable. Example: Table 2.3 is the third table in chapter 2.
Tables and graphs are to be given a caption to characterize their content and should be explanatory by themselves. Example: Graph 3.4: Example of a table header (Source: Statistisches Bundesamt: Statistisches Jahrbuch 2008 für die Bundesrepublik Deutschland, Wiesbaden, September 2008, p. 58).
Additional tables and graphs that are too voluminous or are not explicitly mentioned in the running text must be placed in the appendix.
The formulas are numbered per section and the numbering must be stated on the right in parenthesis and right-justified.
Numbers
Numbers from zero to twelve should be written out.
To depict decimals use a point in English; thousands are separated by a comma in English (i.e.

English: 1,234,567.89).
Units of measurement that do not follow a number are to be written out: “15 kg”, but “Kilogram is a unit of measurement.”
References
References must be displayed in the list of references. Clear references are of importance throughout the thesis and must be numbered eg. [4]. The numbering of the references is made from 1 to “n” in the order of appearances. Referring to own papers or assignments must also be in a proper way. The same applies to references from the Internet. The electronic references must be referred to in such a way that a reader can relocate your reference. The plagiarism is strictly forbidden.
The reference list must contain:
Last name and initials of the author's first name
Full title of the book, periodical or article
Publisher and place of publishing
Year of publishing For Example: [4] Pattantyus Á.G.: Gépész és villamosmérnökök kézikönyve Budapest, Műszaki Könyvkiadó, 1961. [5] K.V.Jegorov: Osznovü teorij avtomaticseszkogo regulirovanyija Izdatyel'sztvo Energija, Moszkva, 1967. [8] Lajtai I.: Szerszámgép-kiszolgáló robotok megfogószerkezetei Automatizálás, 1983. 3.sz. p. 37-41.
Drawings
Drawings are made either by computer program or by hand and ink in on max. A/1 drawing sheet. All the drawings must be numbered. The drawing number consists of two parts. The first part corresponds with the serial number of the thesis (placed at the right top corner of the cover page). The other one numbered from 1000 is the number of the drawing according to the rules of drawing numbering (assembly drawing, part assembly drawing, shop drawing). The drawings must be fold into A/4 size and put into the bag formed in the internal side of the cover at the back. It is expedient to inform the bookbinder about the amount of drawings must be stored in it. Handing in, evaluation The thesis fulfilling the formal requirements has to be handed in to the internal supervisor in two copies on schedule. The hand in-date is indicated on the thesis sheet. The submission is approved by the signature of the supervisor. The print out has to be accompanied by an electronic version on a CD or DVD (word, pdf or image format). The thesis is evaluated by the two supervisors. The final mark is given by the Finals Committee. One 4 cm x 4 cm photo of the candidate must be bound on the internal side of the cover at the back.
Elaborating/submitting the Thesis
1. „Thesis” course
The „Thesis” course may be signed up for in the beginning of the semester via the NEPTUN system after negotiating it with the internal tutor (supervisor). During the semester students have to give an account of the actual state of the thesis to the internal tutor at least three times, which is certified on the Consultation Sheet. The Consultation Sheet is made out and managed by the supervisor. The thesis can be submitted at the end of the semester after approving it by the supervisor on the Consultation Sheet. The grade gained for it is not identical with the grade of the evaluation of the Thesis, it is merely a grade of the „Thesis” course. The precondition of approving the course must be negotiated with the supervisor however in general 80% readiness of the thesis is the minimum requirement. The Consultation Sheet signed by the supervisor must be bound into the thesis!
2. After negotiating with the supervisor for the company providing for the thesis topic, the external tutor has to have the Form of Thesis Topic Announcement signed certifying that his/her company provides Thesis Topic for the student. Thesis Topic Announcement Form signed by the external tutor and the company must be delivered to the Department. In addition to this, the filled form without signature in MS Word file should be sent to csmoni@eng.unideb.hu address as soon as it is finalized but not later than the deadline. On the basis of this, the Thesis Sheet is constructed by the Department and it must be bound into the thesis. The data is necessary for constructing the Thesis.

Sheet must be handed in at the department (in that case as well, if the company didn't sign the Thesis Topic Announcement Form in time) with the following data:
name of the student,
title of the thesis,
tasks must be elaborated in some sentences, (commonly the same as the chapters of the thesis),
name of the internal tutor (supervisor),
name of the external tutor, name of the company,
two chosen subjects for the state exam (qv. state exam guide).
3. Plagiarism Plagiarism is strictly forbidden! Student has to sign the Plagiarism Statement must be bound into the thesis between the Thesis Sheet and the Consultation Sheet. The Plagiarism Statement must be filled electronic as well. 4. Formal Thesis Requirements (minimum number of pages, font style and size, prescriptions regarding the content, etc.) may be downloaded from the above mentioned website as well.
To be handed in:
2 bound copies (1 for the Department, 1 for the external examiner) The following must be bound (in this sequence):
Thesis Sheet (with serial number and the signature of the head of department) - can be required from the secretariat after 30th November (it is not the sheet signed by the company!),
Plagiarism Statement - must be filled electronic and sign by the student,
Consultation Sheet (issued and signed by the supervisor),
occasional Confidential Agreement,
photo 4x4 cm.
To be handed in with the thesis, but not bound:
max. 1 page abstract* in English containing the name of the student, the title of the thesis, and the brief summary of the topic, with readable signature,
max. 1 page abstract* in Hungarian containing the name of the student, the title of the thesis, and the brief summary of the topic, with readable signature,
thesis in electronic version (tagged: name, major, title of thesis, date of state exam) on CD or DVD in MS Word or PDF format.
* It is not identical with the "Summary" chapter of the thesis though obviously similar to its content. It contains the objective, the topics and tasks elaborated by the student, and the conclusion in some sentences regarding the topic respectively! One copy of the thesis remains at the department which will be presented in the state exam. Another copy is given for the external examiner which after referee will be got back to the student.

CHAPTER 10
MODEL CURRICULUM

Compulsory courses												
1. year												
		1st semester					2nd semester					
Subjects	**Neptun code**	L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	**Prerequisites of taking the subject**
CAD modelling I	**MFCAD31S04-EN**								4	ESE	4	Descriptive Geometry
Construction Materials I	**MFEPA31S03-EN**						2	1		ESE	3	Engineering Physics: MFMFI31S03-EN, Technical Chemistry: MFKEM31S03-EN
Engineering Physics	**MFMFI31G02-EN**	2			ESE	2						None
European Studies	**MFEUI31X02-EN**				ESE	0						None
Geoinformatics I	**MFGIN31S04-EN**	2		2	AW5	4						None
Geoinformatics II	**MFGIN32S04-EN**						2		2	ESE	4	Geoinformatics I.: MFGIN31S04-EN
Hydraulics I	**MFHID31S04-EN**						2		2	ESE	4	Engineering Physics: MFMFI31S03-EN
Informatics for Engineers I	**MFINF31X03-EN**		2		ESE	3						None
Informatics for Engineers II	**MFINF32X03-EN**							2		AW5	3	Informatics for Engineers I. MFINF31X03-EN

Compulsory courses												
1. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
International Communities and Organizations	**MFICO31X02-EN**	2			AW5	2						None
Introduction to Ethics	**MFTAI31X02-EN**						2			ESE	2	None
Mathematics I	**MFMAT31S05-EN**	2	3		ESE	5						None
Mathematics II	**MFMAT32S05-EN**						2	3	5	ESE	5	Mathematics I. MFMAT31S05-EN
Mechanics I	**MFMEC31S05-EN**						2		2	ESE	5	Mathematics I.: MFMAT31S05-EN, Engineering Physics: MFMFI31S03-EN
Technical Chemistry	**MFKEM31X03 -EN**	2	1		ESE	3						None
Technical Drawing I	**MFMAB31G03-EN**	1	2		AW5	3						None
Technical Drawing II	**MFMAB31G03-EN**	1	2		ESE	3						None
Urban & Regional Development	**MFTEL31S03-EN**	2			AW5	3						None

Compulsory courses												
2. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Basics of Environmental Engineering	**MFKOR31S03-EN**						2	1		ESE	3	Hydrology and hydrogeology I.: MFHIO31S04-EN, Technical Chemistry: MFKEM31S03-EN
Building Construction I	**MFMAG31S04-EN**	2		2	ESE	4						Technical Drawing II.: MFMAB31S03-EN
Construction Materials II	**MFEPA32S03-EN**	2	1		ESE	3						Construction Materials I: MFEPA31S03-EN
Economics for Engineers	**MFKGZ31X04-EN**	3			ESE	4						None
Geographical Information System (GIS) I	**MFTIN31S03-EN**	1		2	AW5	3						Geoinformatics II.: MFGIN32S04-EN
Geology	**MFGEO31S03-EN**	2			ESE	3						None
Geotechnics I	**MFGTH31S04-EN**						2	2		ESE	4	Mechanics II MFMEC32S05, Geology: MFGEO31S03-EN

Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Hydrology and hydrogeology I	**MFHIO31S04-EN**	2	2		ESE	4						None
ExamMathematics Final	**MFMAT30X00-EN**				FE	0						MFMAT33S03-EN
Mathematics III	**MFMAT33S03-EN**	2	2		ESE	3						Mathematics II. MFMAT32S05-EN
Mechanics II	**MFMEC32S05-EN**	2		2	ESE	5						Mechanics I. (Statics): MFMEC31S05-EN
Mechanics III	**MFMEC33S05-EN**						2		2	ESE	5	Mechanic I: MFMEC31S05-EN
Microeconomics	**MFVGF31X04-EN**						1	2		ESE	4	Economics for Engineers MFKGZ31X04-EN
Public Works I	**MFKOZ31S04-EN**						2		2	ESE	4	Hydraulics I: MFHID31S04-EN

Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Reinforced Concrete Structures I	**MFVBS31S03-EN**						2		1	AW5	3	Construction Materials II.: MFEPA32S03-EN, Theory of Design: MFMEL31S04-EN
Steel Structures I	**MFACS32S03-EN**						2	1		AW5	3	Construction Materials II
Theory of Design	**MFMEL31S04-EN**	2		2	AW5	4						Mechanics I.: MFMEC31S05-EN
Transportation Engineering I	**MFKLE31S03-EN**						2	1		ESE	3	Geoinformatics I. MFGTH31S04
Transportation Engineering II	**MFKLE32S03-EN**						2	1		ESE	3	None

Compulsory courses												
3. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Basics of Quality Management	**MFMIN31X04-EN**	1	1		AW5	4						None
Building Construction II	**MFMAG32SS4-EN**	2		2	ESE	4						Building Construction I: MFMAG31S04-EN
Construction Management I	**MFKIV31S03-EN**	1	2		AW5	3						Management for Engineers: MFMFE31X03-EN
Construction Management II	**MFKIV32SS3-EN**						1	2		AW5	3	Construction Management I.: MFKIV31S03-EN
Design of Buildings I	**MFETE31SS3-EN**	1		2	AW5	3						Building Construction I.: MFMAG31S04-EN
FEM modelling I	**MFVEM31SS4-EN**							4		AW5	4	Steel structures II: MFACS32SS3-EN, Reinforced Concrete Structures II: MFVBS32SS3-EN, Theory of Girders I: MFTST31SS3-EN

Compulsory courses												
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Geotechnics II	**MFGTH32S04-EN**	2	2		ESE	4						Geotechnics I.: MFGTH31S04-EN
Geotechnics III	**MFGTH33S04-EN**						2	2		ESE	4	Geotechnics I: MFGTH31S04-EN
Management for Engineers	**MFMAM31X04-EN**						1	3		AW5	4	None
Mechanics Final Exam	**MFMEC30S00-EN**				FE	0						MFMEC33S05-EN
Reinforced Concrete Structures II	**MFVBS32SS3-EN**	2		1	ESE	3						Reinforced Concrete Structures I.: MFVBS31S03-EN
Reinforced Concrete Structures III	**MFVBS33SS3-EN**						2		1	ESE	3	Reinforced Concrete Structures II: MFVBS32SS3-EN
State administration and Law	**MFJOG31X02-EN**	2			ESE	2						None
Steel Structures II	**MFACS32SS3-EN**	2	1		ESE	3						Steel Structures I.: MFACS31S03-EN

Compulsory courses												
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Steel Structures III	**MFACS33SS3-EN**						2	1		ESE	3	Steel Structures II: MFACS32SS3-EN
Theory of Girders I	**MFTST31SS3-EN**	1	2		ESE	3						Mechanics III. (Dynamics): MFMEC33S05-EN
Theory of Girders II	**MFTST32SS3-EN**						1	2		ESE	3	Theory of Girders I.: MFTST31SS3-EN
Timber & Masonry Structures	**MFFFS31S03-EN**						2	1		AW5	3	Theory of Design: MFMEL31S04-EN
Water management and hydraulic structures	**MFVIZ31S04-EN**	2	2		AW5	4						Public Works I.: MFKOZ31S04-EN, Hydrology and hydrogeology I.: MFHIO31S04-EN

Compulsory courses												
4. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Bridges & Structures	**MFMUT31S04-EN**	2		2	ESE	4						Geotechnics III.: MFGTH33S04-EN
Composite Structures	**MFMOS31SM3-EN**	2			AW5	3						Steel structures II: MFACS32SS3-EN, Reinforced Concrete Structures II.: MFVBS32SS3-EN
Design of Buildings II	**MFETE32SM3-EN**	1		2	ESE	3						Design of Buildings I.: MFETE31SS3-EN
Engineering Timber Structures	**MFMFS31SM3-EN**	2			AW5	3						Timber & Masonry Structures MFFFS31S03-EN
Geotechnics IV	**MFGTH34SS3-EN**	2			ESE	3						Geotechnics II (Earthworks): MFGTH32S04-EN and Geotechnics III. (Foundation Engineering)

Compulsory courses												
4. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Reinforced Concrete Buildings	**MFMVB31SM3-EN**	2		1	AW5	3						Reinforced Concrete Structures III.: MFVBS33SS3-EN
Steel buildings	**MFMAC31SM3-EN**	2	1		ESE	3						Steel Structures III.: MFACS33SS3-EN
Strengthening of Structures	**MFSZM31SM3-EN**	2			AW5	3						Steel structures III: MFACS33SS3-EN, Reinforced Concrete Structures III: MFVBS33SS3-EN
Structural Engineering Final Exam	**MFKSS31SS0-EN**									FE	0	None

BSc in Civil Engineering Compulsory courses												
1. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
CAD modelling I	**MFCAD31S04-EN**								4	ESE	4	Descriptive Geometry
Construction Materials I	**MFEPA31S03-EN**						2	1		ESE	3	Engineering Physics: MFMFI31S03-EN, Technical Chemistry: MFKEM31S03-EN
Engineering Physics	**MFMFI31G02-EN**	2			ESE	2						None
European Studies	**MFEUI31X02-EN**				ESE	0						None
Geoinformatics I	**MFGIN31S04-EN**	2		2	AW5	4						None
Geoinformatics II	**MFGIN32S04-EN**						2		2	ESE	4	Geoinformatics I.: MFGIN31S04-EN
Hydraulics I	**MFHID31S04-EN**						2		2	ESE	4	Engineering Physics: MFMFI31S03-EN
Informatics for Engineers I	**MFINF31X03-EN**		2		ESE	3						None
Informatics for Engineers II	**MFINF32X03-EN**							2		AW5	3	Informatics for Engineers I. MFINF31X03-EN

BSc in Civil Engineering Compulsory courses												
1. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
International Communities and Organizations	**MFICO31X02-EN**	2			AW5	2						None
Introduction to Ethics	**MFTAI31X02-EN**						2			ESE	2	None
Mathematics I	**MFMAT31S05-EN**	2	3		ESE	5						None
Mathematics II	**MFMAT32S05-EN**						2	3	5	ESE	5	Mathematics I. MFMAT31S05-EN
Mechanics I	**MFMEC31S05-EN**						2		2	ESE	5	Mathematics I.: MFMAT31S05-EN, Engineering Physics: MFMFI31S03-EN
Technical Chemistry	**MFKEM31X03 -EN**	2	1		ESE	3						None
Technical Drawing I	**MFMAB31G03-EN**	1	2		AW5	3						None
Technical Drawing II	**MFMAB31G03-EN**	1	2		ESE	3						None
Urban & Regional Development	**MFTEL31S03-EN**	2			AW5	3						None

BSc in Civil Engineering Compulsory courses												
2. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Basics of Environmental Engineering	**MFKOR31S03-EN**						2	1		ESE	3	Hydrology and hydrogeology I.: MFHIO31S04-EN, Technical Chemistry: MFKEM31S03-EN
Building Construction I	**MFMAG31S04-EN**	2		2	ESE	4						Technical Drawing II.: MFMAB31S03-EN
Construction Materials II	**MFEPA32S03-EN**	2	1		ESE	3						Construction Materials I: MFEPA31S03-EN
Economics for Engineers	**MFKGZ31X04-EN**	3			ESE	4						None
Geographical Information System (GIS) I	**MFTIN31S03-EN**	1		2	AW5	3						Geoinformatics II.: MFGIN32S04-EN
Geology	**MFGEO31S03-EN**	2			ESE	3						None
Geotechnics I	**MFGTH31S04-EN**						2	2		ESE	4	Mechanics II MFMEC32S05, Geology: MFGEO31S03-EN

BSc in Civil Engineering Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Hydrology and hydrogeology I	**MFHIO31S04-EN**	2	2		ESE	4						None
ExamMathematics Final	**MFMAT30X00-EN**				FE	0						MFMAT33S03-EN
Mathematics III	**MFMAT33S03-EN**	2	2		ESE	3						Mathematics II. MFMAT32S05-EN
Mechanics II	**MFMEC32S05-EN**	2		2	ESE	5						Mechanics I. (Statics): MFMEC31S05-EN
Mechanics III	**MFMEC33S05-EN**						2		2	ESE	5	Mechanic I: MFMEC31S05-EN
Microeconomics	**MFVGF31X04-EN**						1	2		ESE	4	Economics for Engineers MFKGZ31X04-EN
Public Works I	**MFKOZ31S04-EN**						2		2	ESE	4	Hydraulics I: MFHID31S04-EN

BSc in Civil Engineering Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Reinforced Concrete Structures I	**MFVBS31S03-EN**						2		1	AW5	3	Construction Materials II.: MFEPA32S03-EN, Theory of Design: MFMEL31S04-EN
Steel Structures I	**MFACS32S03-EN**						2	1		AW5	3	Construction Materials II
Theory of Design	**MFMEL31S04-EN**	2		2	AW5	4						Mechanics I.: MFMEC31S05-EN
Transportation Engineering I	**MFKLE31S03-EN**						2	1		ESE	3	Geoinformatics I. MFGTH31S04
Transportation Engineering II	**MFKLE32S03-EN**						2	1		ESE	3	None

BSc in Civil Engineering Compulsory courses												
3. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Basics of Quality Management	**MFMIN31X04-EN**	1	1		AW5	4						None
Building Construction II	**MFMAG32SS4-EN**	2		2	ESE	4						Building Construction I: MFMAG31S04-EN
Construction Management I	**MFKIV31S03-EN**	1	2		AW5	3						Management for Engineers: MFMFE31X03-EN
Construction Management II	**MFKIV32SS3-EN**						1	2		AW5	3	Construction Management I.: MFKIV31S03-EN
Design of Buildings I	**MFETE31SS3-EN**	1		2	AW5	3						Building Construction I.: MFMAG31S04-EN
FEM modelling I	**MFVEM31SS4-EN**							4		AW5	4	Steel structures II: MFACS32SS3-EN, Reinforced Concrete Structures II: MFVBS32SS3-EN, Theory of Girders I: MFTST31SS3-EN

BSc in Civil Engineering Compulsory courses												
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Geotechnics II	**MFGTH32S04-EN**	2	2		ESE	4						Geotechnics I.: MFGTH31S04-EN
Geotechnics III	**MFGTH33S04-EN**						2	2		ESE	4	Geotechnics I: MFGTH31S04-EN
Management for Engineers	**MFMAM31X04-EN**						1	3		AW5	4	None
Mechanics Final Exam	**MFMEC30S00-EN**				FE	0						MFMEC33S05-EN
Reinforced Concrete Structures II	**MFVBS32SS3-EN**	2		1	ESE	3						Reinforced Concrete Structures I.: MFVBS31S03-EN
Reinforced Concrete Structures III	**MFVBS33SS3-EN**						2		1	ESE	3	Reinforced Concrete Structures II: MFVBS32SS3-EN
State administration and Law	**MFJOG31X02-EN**	2			ESE	2						None
Steel Structures II	**MFACS32SS3-EN**	2	1		ESE	3						Steel Structures I.: MFACS31S03-EN

BSc in Civil Engineering Compulsory courses												
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Steel Structures III	**MFACS33SS3-EN**						2	1		ESE	3	Steel Structures II: MFACS32SS3-EN
Theory of Girders I	**MFTST31SS3-EN**	1	2		ESE	3						Mechanics III. (Dynamics): MFMEC33S05-EN
Theory of Girders II	**MFTST32SS3-EN**						1	2		ESE	3	Theory of Girders I.: MFTST31SS3-EN
Timber & Masonry Structures	**MFFFS31S03-EN**						2	1		AW5	3	Theory of Design: MFMEL31S04-EN
Water management and hydraulic structures	**MFVIZ31S04-EN**	2	2		AW5	4						Public Works I.: MFKOZ31S04-EN, Hydrology and hydrogeology I.: MFHIO31S04-EN

BSc in Civil Engineering Compulsory courses												
4. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Bridges & Structures	**MFMUT31S04-EN**	2		2	ESE	4						Geotechnics III.: MFGTH33S04-EN
Composite Structures	**MFMOS31SM3-EN**	2			AW5	3						Steel structures II: MFACS32SS3-EN, Reinforced Concrete Structures II.: MFVBS32SS3-EN
Design of Buildings II	**MFETE32SM3-EN**	1		2	ESE	3						Design of Buildings I.: MFETE31SS3-EN
Engineering Timber Structures	**MFMFS31SM3-EN**	2			AW5	3						Timber & Masonry Structures MFFFS31S03-EN
Geotechnics IV	**MFGTH34SS3-EN**	2			ESE	3						Geotechnics II (Earthworks): MFGTH32S04-EN and Geotechnics III. (Foundation Engineering)

BSc in Civil Engineering Compulsory courses												
4. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Reinforced Concrete Buildings	**MFMVB31SM3-EN**	2		1	AW5	3						Reinforced Concrete Structures III.: MFVBS33SS3-EN
Steel buildings	**MFMAC31SM3-EN**	2	1		ESE	3						Steel Structures III.: MFACS33SS3-EN
Strengthening of Structures	**MFSZM31SM3-EN**	2			AW5	3						Steel structures III: MFACS33SS3-EN, Reinforced Concrete Structures III: MFVBS33SS3-EN
Structural Engineering Final Exam	**MFKSS31SS0-EN**									FE	0	None

BSc in Mechanical Engineering Compulsory courses												
1. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
CAD modelling I	**MFCAD31S04-EN**								4	AW5	4	Descriptive Geometry I.: MFABR31X04-EN
Construction Materials I	**MFEPA31S03-EN**						2	1		AW5	3	Engineering Physics: MFMFI31S03-EN, Technical Chemistry: MFKEM31S03-EN
Engineering Ethics	**MFTAI31X02-EN**						2			ESE	2	None
Engineering Physics	**MFMFI31G02-EN**	2			ESE	2						None
Environmental Protection	**MFKOR31X02-EN**							2		ESE	2	Technical Chemistry MFKEM31X03-EN
Informatics for Engineers I	**MFINF31X03-EN**			2	AW5	3						None
Informatics for Engineers II	**MFINF32X03-EN**								2	AW5	3	Informatics for Engineers I. MFINF31X03-EN
Instrumental Technique	**MFMUS31R04-EN**								2	ESE	4	None
Manufacturing Processes I	**MFGYT31G04-EN**						2		1	ESE	4	Materials Science I. MFANI31G04-EN

BSc in Mechanical Engineering Compulsory courses												
1. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Materials Science I	**MFANI31G04-EN**	2	2		ESE	4						None
Materials Science II	**MFANI32G04-EN**						2	2		AW5	4	Materials Science I. MFANI31G04-EN
Mathematics I	**MFMAT31S05-EN**	2	3		ESE	5						None
Mathematics II	**MFMAT32S05-EN**						2	3		ESE	5	Mathematics I. MFMAT31S05-EN
Operation and Theory of Machines	**MFAGT31G03-EN**	2		1	ESE	3						None
Technical Chemistry	**MFKEM31X03 -EN**	2	1		ESE	3						None
Technical Drawing I	**MFMAB31G03-EN**	1		2	AW5	3						None
Technical Drawing II	**MFMAB32G03-EN**						2		1	AW5	3	Technical Drawing I MFMAB31G03-EN
Technical Mechanics I	**MFMMC31G04-EN**	2		2	ESE	4						None
Technical Mechanics II	**MFMMC32G04-EN**						2		2	ESE	4	Technical Mechanics I. MFMMC31G04-EN, Mathematics I. MFMAT31S05-EN

BSc in Mechanical Engineering Compulsory courses												
1. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Thermodynamics and Fluid Mechanics I	**MFHOA31G05-EN**						2	2		ESE	5	Mathematics I. MFMAT31S05-EN, Engineering Physics MFMFI31G02-EN

BSc in Mechanical Engineering Compulsory courses												
2. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
3D Computer Aided Design	**MF3DP31G03-EN**								2	AW5	3	Machine Elements I. MFGEP31G05-EN, CAD and CAE I. MFCAD31G03-EN
Automotive Constructions	**MFITE31G03-EN**	2			AW5	3						None
CAD and CAE I	**MFCAD31G03-EN**	1		1	AW5	3						Informatics for Engineers II. MFINF32X03-EN
Calculations with Matlab	**MFECM31X03-EN**							2		AW5	3	Mathematics I, Mathematics II
Economics for Engineers	**MFKGZ31X04-EN**	3			ESE	4						None
Electronics and Electrotechnics II	**MFELT32G02-EN**						2		1	ESE	2	Electrotechnics and Electronics I. MFELT31G03-EN

BSc in Mechanical Engineering Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Electrotechnics and Electronics I	**MFELT31G03-EN**	2		1	ESE	3						Mathematics II. MFMAT32S05-EN, Engineering Physics MFMFI31G02-EN
Electrotechnics and electronics I	**MFELT31G03-EN**	2		1	ESE	3						Mathematics II. MFMAT32S05-EN, Engineering Physics MFMFI31G02-EN
Engineering Experimentation	**MFEEX31X02-EN**			2	AW5	2						None
Hydraulic and Pneumatic Machines	**MFHPG31G04-EN**						2		2	ESE	4	Thermodynamics and Fluid Mechanics II. MFHOA32G05-EN
Logistics I	**MFLOG31G02-EN**	2			ESE	2						None
Machine Elements I	**MFGEP31G05-EN**	3	2		ESE	5						Technical Mechanics II. MFMMC32G04-EN, Technical Drawing II MFMAB32G03-EN

BSc in Mechanical Engineering Compulsory courses												
2. year (continued)												
		1st semester					2nd semester					
Subjects	**Neptun code**	L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	**Prerequisites of taking the subject**
Machine Elements II	**MFGEP32G05-EN**						2	2		ESE	5	Machine Elements I. MFGEP31G05-EN
Manufacturing Processes II	**MFGYT32G04-EN**	2		1	AW5	4						Manufacturing Processes I. MFGYT31G04-EN
Manufacturing Processes III	**MFGYT33G03-EN**						1		2	AW5	3	Manufacturing Processes II. MFGYT32G04-EN
Mathematics final exam	**MFMAT30X00-EN**				FE	0						MFMAT33S03-EN
Mathematics III	**MFMAT33S03-EN**	2	2		ESE	3						Mathematics II. MFMAT32S05-EN
Measurement and Automatics I	**MFMET31R03-EN**						2		1	ESE	3	Electrotechnics and Electronics I MFELT31G03-EN
Mechatronics I	**MFMHT31R04-EN**						1		2	AW5	4	Basics of mechatronics: MFMEA31R04-EN
Microeconomics	**MFVGF31X04-EN**						1	2		ESE	4	Economics for Engineers MFKGZ31X04-EN

BSc in Mechanical Engineering Compulsory courses												
2. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Steel Constructions	**MFACS31G03-EN**						2	1		ESE	3	Technical Mechanics III. MFMMC33G03-EN, Technology of Structural Materials MFSAT31G02-EN
Technical Mechanics Final Exam	**MFMMC30G00-EN**									FE	0	Technical Mechanics III MFMMC33G02-EN
Technical Mechanics III	**MFMMC33G03-EN**	1		1	ESE	3						Technical Mechanics II. MFMMC32G04-EN, MATHEMATICS II. MFMAT32S05-EN
Technical Mechanics IV	**MFMMC34G02-EN**						1		1	AW5	2	Technical Mechanics III. MFMMC33G03-EN
Technology of Structural Materials	**MFSAT31G02-EN**	1		1	ESE	2						Materials Science II. MFANI32G04-EN
Thermal and Fluid Machines I	**MFHOG31G03-EN**						2		1	ESE	3	Thermodynamics and Fluid Mechanics I. MFHOA31G05-EN

BSc in Mechanical Engineering Compulsory courses												
2. year (continued)												
Subjects	**Neptun code**	**1st semester**					**2nd semester**					**Prerequisites of taking the subject**
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Thermodynamics and Fluid Mechanics II	**MFHOA32G05-EN**	2	2		ESE	5						Thermodynamics and Fluid mechanics I. MFHOA31G05-EN

BSc in Mechanical Engineering Compulsory courses												
3. year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Basics of Quality Management	**MFMIN31X04-EN**	1	1		AW5	4						None
Diagnostics	**MFDIA31G03-EN**	2		1	ESE	3						Machine Elements II. MFGEP32G05-EN
Drive Train Optimization	**MFHAT31G04-EN**						2		2	ESE	4	Machine Elements II. MFGEP32G05-EN, Manufacturing Processes III. MFGYT33G03-EN
Finite Element Method	**MFVEG31G04-EN**	2	1		AW5	4						3D Computer Aided Design: MF3DP31G03-EN,
Fracture Mechanics	**MFTMA31G03-EN**						2		1	ESE	3	Technical Mechanics IV. MFMMC34G02-EN,
Industrial Safety	**MFBIZ31X02-EN**						2			ESE	2	None
Machine Repairing I	**MFGPJ31G03-EN**	2		2	AW5	3						Technology of Structural Materials MFSAT31G02-EN
Machine Repairing II	**MFGPJ32G03-EN**						2		1	AW5	3	Machine Repairing I. MFGPJ31G03-EN

BSc in Mechanical Engineering Compulsory courses												
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Maintenance Engineering I	**MFUZM31G03-EN**	2		1	ESE	3						Manufacturing Planning MFGYA31G04-EN, Internship MFTGY30G00-EN
Maintenance Engineering II	**MFUZM32G04-EN**						2		1	ESE	4	Maintenance Engineering I. MFUZM31G03-EN
Management for Engineers	**MFMAM31X04-EN**						1	3		AW5	4	None
Manufacturing Planning	**MFGYA31G34-EN**	2	2		AW5	4						Manufacturing Processes III. MFGYT33G03-EN
Material Handling	**MFARO31G03-EN**	2	1		AW5	3						MFGEP32G05-EN Logistics I.

BSc in Mechanical Engineering Compulsory courses												Prerequisites of taking the subject
3. year (continued)												
Subjects	Neptun code	1st semester					2nd semester					
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Measurement and Automatics II	**MFMET32R04-EN**	2		2	AW5	4						Electrotechnics and Electronics II. MFELT32G02-EN, Measurement and Automatics I. MFMET31R03-EN
Programmable Logic Controllers	**MFPRL31G04-EN**			4	AW5	4						Electrotechnics and Electronics I. MFELT31G03-EN
Project work	**MFPRO31G32-EN**							2		AW5	2	MFGEP32G05, MFGYT33G032
Robotics	**MFARO32R33-EN**						2		1	AW5	3	Logistics I. MFLOG31G02-EN
State administration and Law	**MFJOG31X02-EN**	2			ESE	2						None
Thermal and Fluid Machines II	**MFHOG32G03-EN**	2		1	ESE	3						None

BSc in Mechanical Engineering Freely Chosen Courses								
Department	**Subject**	**Neptun code**	**Crd. point**	**Semester**	**Nr. of hours**	**Exam**	**Prerequisites of taking the subject**	**Coordinator**
Department of Electrical Engineering and Mechatronics	**Advanced Robot Applications**	**MFARA31X03-EN**	3	2	4	AW5	Material Handling I.	Péter Tamás Szemes Ph.D.