BULLETIN

UNIVERSITY OF DEBRECEN

ACADEMIC YEAR 2016/2017

Engineering Management MSc

FACULTY OF ENGINEERING

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 higher education in Debrecen dates back to the 16th century. The Calvinist Reformed College, established in 1538, played a central role in education, teaching in the native language and spreading Hungarian culture in the region as well as in the whole country. The College was a sound base for the Hungarian Royal University, founded in 1912. Apart from the three academic faculties (arts, law, theology) a new faculty, the faculty of medicine was established, and the University soon became one of the regional citadels of Hungarian higher education. Today 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.

Date of Foundation:1912 Hungarian Royal University of Sciences 2000 University of Debrecen

Legal predecessors: Debrecen University of Agricultural Sciences. Debrecen Medical University. Wargha István College of Education, Hajdúböszörmény. Kossuth Lajos University of Arts and Sciences.

Legal status of the University of Debrecen: state university

Founder of the University of Debrecen: Hungarian State Parliament

Supervisory body of the University of Debrecen: Ministry of Education

Accreditation dates and statute numbers:

Debrecen University of Agricultural Sciences: 17th December 1996, MAB/1996/10/II/1.
Debrecen Medical University: 5th July 1996, OAB/1996/6/II/6
Wargha István College of Education, Hajdúböszörmény: 5th July 1996, OAB/1996/6/II/2
Kossuth Lajos University of Arts and Sciences: 5th July1996, OAB/1996/6/II.5.
University of Debrecen: 3rd October 2012, MAB/2012/8/VI/2.

Number of Faculties at the University of Debrecen: 14

- Faculty of Law
- Faculty of Medicine
- Faculty of Humanities
- Faculty of Health
- Faculty of Dentistry
- Faculty of Economics and Business (before 1 August 2014 the predecessors of the Faculty were the Faculty of Applied Economics and Rural Development and the Faculty of Economics and Business Administration)
- Faculty of Child and Adult Education
- Faculty of Pharmacy
- Faculty of Informatics
- Faculty of Agricultural and Food Sciences and Environmental Management (before 1 March 2010 the name of the Faculty was the Faculty of Agriculture)
- Faculty of Engineering
- Faculty of Public Health
- Faculty of Sciences and Technology
- Faculty of Music

Number of accredited programmes at the University of Debrecen:

73 degree programmes with the pre-Bologna 5-year-system university education, 41 supplementary degree programmes offering transfer-degree continuation of studies towards the university degree (MSc), 50 degree programmes with the pre-Bologna 3-year-system college education, 67 BSc and

78 MSc programmes according to the Bologna system, 5 unified one-cycle linear training programmes, 35 specializations offering post-secondary vocational certificates and 159 vocational programmes.

Number of students at the University of Debrecen: 28812

According to time of studies: 22888 full-time students, 5899 part-time students having corresponding classes and 25 part-time students having evening classes or distance education according to education level: 944 students at post-secondary vocational level, 17406 students at BSc, 3112 students at MSc, 21 students at college level, 190 students at university level (MSc), 5320 students at one-cycle linear training, 954 students at vocational programmes, 865 students at PhD, 3741 foreign students.

Full time teachers of the University of Debrecen: 1421

194 full college/university professors and 1055 lecturers with a PhD.

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
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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:	+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
Phone: +36 (52) 415-155/ 78704
Web: http://epitesz.eng.unideb.hu/

Professor, Head of Department		Antal Puhl DLA
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
Phone: +36-52-415-155 / 77730
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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.	Adrien Árvainé Molnár
	Ms.	Éva Csernusné Ádámkó
		Csaba Gábor Kézi
	Ms.	Erika Perge
		Attila Vámosi
Secretary	Ms.	Sándorné Anton

DEPARTMENT OF BUILDING SERVICES AND BUILDING ENGINEERING

Ótemető street 2-4., Debrecen, 4028
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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 Ph.D.
Secretary		Lola Csibi

DEPARTMENT OF MECHANICAL ENGINEERING

2-4 Ótemető street , Debrecen, 4028
Phone: +36-52-415-155 / 77776
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College professor, head of department	Ms.	Istvánné Ráthy Dr. Ph.D.
College Professor, Deputy Head of Department		Lajos Dr. Fazekas 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 Ph.D.
		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

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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.

DEPARTMENT OF CIVIL ENGINEERING

2-4 Ótemető street, Debrecen, 4028
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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 Ph.D., C.Sc.
Secretary	Ms.	Mónika Tóthné Csákó

DEPARTMENT OF ELECTRICAL ENGINEERING AND MECHATRONICS

2-4 Ótemető street, Debrecen, 4028
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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 Ph.D.
Secretary	Ms.	Nóra Tóth
PhD Student	Ms.	Emese Bánóczy-Sarvajcz
		István Pógár

DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

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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

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Assistant	Ms.	Ibolya Kun
Administrator	Ms.	Ágnes Czibere

English Program Office

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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
	Ms.	Erika Thomas

CHAPTER 5
ACADEMIC CALENDAR OF THE FACULTY

Faculty calendar of the academic year 2016/2017
Faculty of Engineering, University of Debrecen

Opening ceremony of the academic year	11th September 2016
1st semester registration week	From 12th September till 16th September 2016
Repeat period of exam courses announced for the 1st semester of the academic year 2015/2016	From 12th September till 16th September 2016
1st semester study period of MSc and BSc program	From 19th September till 23rd December 2016 (14 weeks). In case of finalist courses: from 19th September till 18th November 2016 (9 weeks).
1st semester study period of BSc dual program	From 19th September till 16th December 2016 (13 weeks).
Reporting period (Drawing week) of Msc, BSc and BSc dual program	From 31st October till 4th November 2016 (3 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 12th December till 16th December 2016 (5 working days without scheduled lessons, consultation schedule announced previously).
1st semester exam period	From 27th December 2016 till 10th February 2017 (7 weeks). From 21st November till 23rd December 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 January 2017. The departments shall advertise the date of the final exam until 15th September 2017.
2nd semester registration week	From 13th February till 17th February 2017
2nd semester study period of MSc and BSc program	From 20th February till 26th May 2017 (14 weeks). In case of finalist courses: from 20th February till 28th April 2016 (10 weeks).
2nd semester study period of BSc dual program	From 20th February till 19th May 2017 (13 weeks).
Reporting period (Drawing week) of Msc, BSc and BSc dual program	From 27th March till 31st March 2017 (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 15th May till 19th May 2017 (5 working days without scheduled lessons, consultation schedule announced previously).
2nd semester exam period	From 29th May till 14th July 2017 (7 weeks). From 24th April till 26th May 2017 (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 between 5th and 23rd June 2017. The departments shall advertise the date of the final exam until 15th February 2017.

CHAPTER 6
ACADEMIC PROGRAM FOR ENGINEERING MANAGEMENT MSC

Department of Basic Technical Studies

Subject: **ACHIEVEMENTS AND APPLICATIONS OF MODERN PHYSICS**
Coordinator: **Gusztáv Áron Sziki**
Year, Semester: 1st year/1st semester
Lecture: **2**

1st week:
Lecture: Oscillations, Composition of oscillations, harmonic oscillations, the Law of Superposition, decomposition and characterization of oscillations: the Law of Fourier, spectrum, spectral analysis.

2nd week:
Lecture: Friction in oscillating systems, damped oscillations, forced oscillations, natural frequency, resonance.

3rd week:
Lecture: Waves, harmonic waves, energy current-density, intensity, Lamber-Beer Law of attenuation.

4th week:
Lecture: Three-dimensional waves, intensity-distance relationship, sound waves, light waves, electromagnetic waves, Weber-Fechner Law of sensation, electromagnetic spectrum.

5th week:
Lecture: Microwaves, technical applications of microwaves, effects of microwaves on continuum.

6th week:
Lecture: Experimental foundations of quantum mechanics, principles of quantum theory, Planck's Hypothesis, photons, Bohr model of atoms, excitation and relaxation, de Broglie Hypothesis.

7th week:
Lecture: Spontaneous and induced optical emission, lasers and their technical applications.

8th week:
Lecture: Midterm test I.
Self Control Test.

9th week:
Lecture: General classification of radiation types. Radioactivity. Characterization of the types of radioactive radiation. Penetration range and linear ionization density.

10th week:
Lecture: Natural radioactivity, Forms of nuclear decay, Fajans-Soddy displacement law, Natural decay series.

11th week:
Lecture: The law of radioactive decay, decay constant and half-life, activity, measurement of radioactivity, Geiger-Muller tube, scintillation detectors, typical parameters of detectors.

12th week:
Lecture: Effects of ionizing radiation on the living tissue, dis-symmetry, a dose and a dose rate, a quality factor.

13th week:
Lecture: Technical applications of ionizing radiation: industrial radiography, mineral analysis, gauging, flow tracing, sterilization.

14th week:
Lecture: Artificial radioactivity, forms of nuclear energy production, nuclear fission and fusion.

15th week:
Lecture: Midterm test II.
Self Control Test.

Requirements

Topics:
Oscillations and waves, sound waves, light waves, electromagnetic waves, microwaves, experimental foundations and principles of quantum theory, optical emission, lasers and their technical applications, radioactivity, classification of radiations, characterization of the types of radioactive radiation, natural radioactivity, forms of nuclear decay, law of radioactive decay, decay constant and half-life, activity, measurement of radioactivity, effects of ionizing radiation on a living tissue, technical applications of ionizing radiation, artificial radioactivity, forms of nuclear energy production.
A, for a signature: Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor. Students have to write two midterm tests during the semester. The first (40 points max) in the 8th, the second (40 points max) in the 15th week.
At the end of the semester everybody will get a seminar grade on the basis below: fail (1) 0-39, close fail (2) 40-50, improvement needed (3) 51-60, very good (4) 61-70, excellent (5) 71-80. If somebody fails then he/she has to write both tests in the 1st week of the exam period again. If the result is 40 points (50%) or better, then he can take an exam. If somebody has to repeat his midterm tests then his seminar grade can't be better than (2). There will be homework from week to week. Only students who have handed in all their homework at the time of the midterm test will be allowed to write it. The problems in the midterm tests will be selected from the homework assignments.
B, for a grade: Everybody is going to get an exam grade for their exam. The final grade will be the average of the seminar and the exam grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4).

Required reading materials

Halper, A. M.: 3000 solved problems in physics
McGraw-Hill , 2011. ISBN: 978-0071763462
Gettys, W. E.: Physics, classical and modern
McGraw-Hill , 1989. ISBN: 978-0071004534
Krane, K. S.: Modern physics
Wiley, 1996. ISBN: 0471828726

Subject: **QUANTITATIVE METHODS**
Coordinator: **Imre Kocsis**
Year, Semester: 1st year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Graph theory, using graphs.
Seminar: Problems related to graph theory.

2nd week:
Lecture: The basic tasks of linear programming, applications.
Seminar: Problems related to linear programming.

3rd week:
Lecture: Queue and inventory models.
Seminar: Problems related to queue and inventory models.

4th week:
Lecture: Basics of probability calculus (probability space, conditional probability, independence of events, random variables, distributions sights, the law of large numbers).
Seminar: Problems related to probability calculus.

5th week:
Lecture: Sampling methods, descriptive statistics; estimates (the estimated properties, point estimates, interval estimates).
Seminar: Problems related to descriptive statistics and estimates.

6th week:
Lecture: Non-parametric tests (fit testing, homogeneity, independence test).
Seminar: Problems related to non-parametric tests.

7th week:
Lecture:

Parametric tests (Tests for the expected value and the standard deviation).

Seminar:
Problems related to parametric tests.

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

9th week:
Lecture: ANOVA, Measurement Systems Analysis (R&R).
Seminar: Problems related to ANOVA and Measurement Systems Analysis (R&R).

10th week:
Lecture: Correlation and regression analysis.
Seminar: Problems related to correlation and regression analysis.

11th week:
Lecture: Statistics in quality management (Statistical Process Control, Six Sigma).
Seminar: Problems related to quality management.

12th week:
Lecture: Simulation, Monte Carlo methods.
Seminar: Problems related to simulation.

13th week:
Lecture: Decision theory, decision model, decision matrix, decision-making process.
Seminar: Problems related to decision theory.

14th week:
Lecture: Goodness and reliability of business processes.
Seminar: Problems related to reliability.

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

Requirements

Topics:
Graph theory, using graphs; The basic tasks of linear programming, applications; Queue models and inventory models, Basics of probability calculus (probability space, conditional probability, independence of events, random variables, distributions sights, the law of large numbers); Sampling methods, descriptive statistics; Estimates (the estimated properties, point estimates, interval estimates); Non-parametric tests (fit testing, homogeneity, independence test); Parametric tests (Tests for the expected value and the standard deviation); Correlation and regression analysis; Time series analysis; Statistics in quality management (Statistical Process Control, Six Sigma);

Simulation, Monte Carlo methods; Decision theory, decision model, decision matrix, decision-making process; Goodness and reliability of business processes

A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.

B, for a grade (ESE): The grade is based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Rice, J. A. : Mathematical statistics and Data Analysis
Belmont. Thomson's., 2007.
Wolfram, S. : The mathematica book
Champaing. Wolfram Media., 2003.
STATISTICS Methods and Applications
URL: http://www.statsoft.com/textbook
Murphy, P.: Introduction to Quantitative Methods
URL: http://www.ucd.ie/statdept/classpages/introductiontoquantitativemet.htm
Investopedia, CFA Level 1 - Chapter 2: Quantitative Methods
URL: http://www.investopedia.com/study-guide/cfa-exam/level-1/quantitative-methods/
Cornuejols, G. - Trick, M: Quantitative Methods for the Management Sciences
URL: http://mat.gsia.cmu.edu/classes/QUANT/

Department of Electrical Engineering and Mechatronics

Subject: **ENGINEERING TECHNOLOGICAL KNOWLEDGE I**
Coordinator: **János Tóth**
Year, Semester: 1st year/1st semester
Lecture: **4**

1st week:
Lecture: Theory of systems, basic concepts of systems engineering.

2nd week:
Lecture: System modelling and deductive-inductive methods.

3rd week:
Lecture: Design, operation and management of a mathematical model.

4th week:
Lecture: An input-output model in the function of time, and the frequency range of an operator.

5th week:
Lecture: Comparison of linear and continuous sampling systems.

6th week:
Lecture: The necessity of characterizing transformation basics, descriptive methods of sampling systems.

7th week:
Lecture: System descriptions, continuous, respectively sampled signals.

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

9th week:
Lecture: Analyses of continuum and discrete-time systems in time domain.

10th week:
Lecture: System equation, equation of a state.

11th week:
Lecture: Analyses of continuum and discrete-time systems, frequency and a complex frequency range, excitation-response stability.

12th week:
Lecture: Transfer characteristics, transfer functions, pole-zero determination.

13th week:
Lecture: Analog digital control algorithms, definition of a digital control algorithm synthesis, digital PID controller parameters.

14th week:
Lecture: A stability analysis. Selecting regulators, optimal settings, quality improvement.

15th week:
Lecture: Mid-term test II.
Self-control Test.

Requirements

Topics:
The aim of this course is to develop students' systematic approach and process-oriented thinking which allow them to select related technical fields with complex technical equipment design, operation and development. The course is aimed at the integration of systems thinking mainly to the introduction of the use of modern tools and typical control engineering design tasks.
A, for a signature: Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the course will not be signed and the student has to repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests. There will be homework week by week. Only those students who have handed in all their homework at the time of the midterm test will be allowed to write it. The problems in the midterm tests will be selected from the homework assignments.
B, for a grade (ESE): The grades of the mid-term test and the study define the exam grade (50-50 %). The course ends with an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 50% separately. The grade for each test is given according to the following: 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, a student once can write a retake test of the whole semester material.

Required reading materials

Marlin, T. E. : Process control
McGraw-Hill, 2000.

Dorf, M. C. : Modern control systems
Upper Saddle River, N.J. Pearson Prentice Hall, 2011.

Department of Engineering Management and Enterprise

Subject: **ADVANCED CORPORATE FINANCE**
Coordinator: **Judit T. Kiss**
Year, Semester: 1st year/1st semester
Lecture: **1**
Seminar: **3**

1st week:
Lecture: Corporate finance investment and financing decisions. The financial goal of corporation.
Seminar: Calculation Problems – Cash flow analysis.

2nd week:
Lecture: Review of the future value and present value calculation. The present value of an investment opportunity, Net Present Value. The opportunity cost of capital.
Seminar: Calculation exercises: Valuing Cash Flows in Several Periods. Future value and present value. Continuous compounding. The risk and present value.

3rd week:
Lecture: A net present value and other investment criteria.
Seminar: Calculation Problems – Internal rate of return, problem of limited resources.

4th week:
Lecture: Making investment decisions I.
Seminar: Calculation Problems - choosing a discount rate, choosing among projects.

5th week:
Lecture: Making investment decisions II.
Seminar: Calculation Problems – timing decision, equivalent annual cost.

6th week:
Lecture: Investment decisions – economic rent – purchasing decisions, annuity.
Seminar: Calculation problems.

7th week:
Lecture: Complex investment problems.
Seminar: Complex investment problems – Computer exercises.

8th week:
Lecture: Midterm test I.
Seminar: Midterm test I.
Self Control Test.

9th week:
Lecture: Project analysis I.
Seminar: A sensitivity analysis, real options and decision trees.

10th week:
Lecture: Project analysis II.
Seminar: Monte Carlo simulation, risk and return, cost of capital, a portfolio analysis.

11th week:
Lecture: Options I. (Call options, put options). Exercise price.
Seminar: Calculation Problems.

12th week:
Lecture: Options II. – Option algebra.
Seminar: Option strategies (bull, bear call/put spread, call/put butterfly, Call/put straddle options).

13th week:
Lecture: Performance measurement and financial decisions.
Seminar: Balanced scorecard and financial perspective, key factors of performance and

financial indicators, the role of the economic and social environment in financial decisions. **14th week:** **Lecture:** Market value added - The value of common stocks, economic value added. **Seminar:** Calculation Problems (Stocks, financial indicators).	**15th week:** **Lecture:** Midterm test II. **Seminar:** Midterm test II. **Self Control Test.**

Requirements

Topics:
The course focuses on the theory and application of the following: Cash flow analysis. The value of bonds. Investment decision making processes. Project Analysis. Capital investment process; Sensitivity analysis, Monte Carlo Simulation. Examination of real options and decision trees. Option algebra. Investments and economic rents. Performance measurement and financial decisions, Evaluation of Performance (Balanced Scorecard and Financial perspective, other method) Key factors of performance and financial indicators, Economics and market value added.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an examination. The minimum requirement of the mid-term test, the end-term test and the teamwork is 50% separately. Based on the score of the tests separately, the grade for the tests and the examination is given according to the following table: The grade is given according to the following: score/grade: 0-49 fail (1), 50-62 pass (2), 63-75 satisfactory (3), 76-89 good (4), 90-100 excellent (5). If the score of any test is below 50, the student once can take a retake test of the whole semester material. An offered grade: It may be offered for the students if the average of the mid-term test, the end-term test and the teamwork is at least good (4). An offered grade is the average of them.

Required reading materials

Brealey, R. A. - Myers, S. C. – Allen, F : Principles of Corporate Finances
McGraw-Hill/Irwin, 2011. ISBN: 0077356381, 97800773
Ogden, J. – Jen, F. C. – O'Connor, P. F. : Advanced corporate finance
Prentice Hall, 2002. ISBN: 10 0130915688
Scott Besley - Eugene F. Brigham : Principles of Finance
Cengage Learning, 2011. ISBN: 1111527369, 97811115

Subject: **DEVELOPMENT OF AN ORGANIZATION**
Coordinator: **Andrea Emese Matkó**
Year, Semester: 1st year/1st semester
Lecture: **2**
Seminar: **1**

1st week:
Lecture: Organizational structures I. Matrix, functional.
Seminar: Case studies.

2nd week:
Lecture: Organizational structures II. Divisionals, lines.
Seminar: Case studies.

3rd week:
Lecture: Organizational development I. Concept of organizational development, organizational development features, objectives of organization development.
Seminar: Practical aspects of organizational development.

4th week:
Lecture: Organizational development II. Organizational development processes.
Seminar: Practical aspects of organizational development.

5th week:
Lecture: Competitiveness Relationship between competitiveness and organizational developments.
Seminar: Case studies.

6th week:
Lecture: Development of a specific organization I.
A situation analysis.
Seminar: SWOT, PEST, BCG.

7th week:
Lecture: Development of a specific organization II.
Determination of Organizational Structures, job Descriptions, information flow.
Seminar: Drawing an organization charts and information flow maps.

8th week:
Lecture: Development of a specific organization III.
Identification of problems, exploring the causes of problems.
Seminar: Ishikawa and Pareto analyses.

9th week:
Lecture: Development of a specific organization IV.
Appointment of intervention points.
Seminar: What do you need to improve?

10th week:
Lecture: Development of a specific organization V.
The designation of specific (quantitative and qualitative) development goals.
Seminar: Ordering tools and methods of intervention points.

11th week:
Lecture: Development of a specific organization VI.
Appointment of persons involved in an organizational development.
Seminar: Assigning tasks.

12th week:
Lecture: Development of a specific organization VII.
Establishing a timetable.
Seminar: The Gantt chart.

13th week:
Lecture: Development of a specific organization VIII.
Ordering quantitative and qualitative indicators of planned interventions.
Seminar: The SMART method.

14th week:
Lecture: Development of a specific organization IX.

Planning corrective actions. **Seminar:** The PDCA cycle. **15th week:** **Lecture:** End-term test	**Self Control Test**

Requirements

Topics:
The aim of this course is describing organizational changes and the management of organizational development processes, tools and models through processing case studies.
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. During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.
B, for a grade: The course ends in a mid-semester grade based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Schein, E. : Organizational Culture and Leadership
2nd edition. Jossey-Bass Publishers, 1992.
Tosi-John, H. L. – Rizzo, R. – Stephen J. C. : Managing Organizational Behavior
Blackwell Publishers Ltd, 1994.

Subject: **EUROPEAN UNION LAW**
Coordinator: **Andrea Emese Matkó**
Year, Semester: 1st year/1st semester
Lecture: **2**

1st week: **Lecture:** Evolution, history and development of the European integration The integration issue after the second world war, establishment of the European Coal and Steel Community, The Rome treaty and the establishment of the European Economic Community. **2nd week:** **Lecture:** History of the European Union part II The first fifteen years of the EEC, the Merger	treaty, and the institutional development, the enlargements of the EC, the Single European Act, and from Communities to the European Union. **3rd week:** **Lecture:** History of the European Union part III The Maasticht Treaty; 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.

4th week:
Lecture: Introduction to the institutional structure of the European Union
Characters of the institutional structure. The Council of the European Union, the presidency of the Council and the voting system.

5th week:
Lecture: Introduction to the institutional structure of the European Union part II
The Commission of the EU, members, the adminstrative stucture of the Commission. The Court of Justice and its' tasks and procedures, The European Ombudsman.

6th week:
Lecture: Introduction to the institutional structure of the European Union part III
The Parliament of the European Union, the election and the political composition of the Parliament, The Committee of the Regions and the composition of the Economic and Social Committee.

7th week:
Lecture: The European Union based on three pillars
The concept of the three pillars, division of the three pillars and changes after the Lisbon Treaty Cooperation processes in the second and third pillars.

8th week:
Lecture: The single market and the four freedoms the free movement of goods, the free movement of persons and capital and the freedom to provide services (the history of the liberalisation and the four freedoms in practice).

9th week:
Lecture: Laws of the European Union
The Community law, sources of the Community law (primary and secondary legal sources, and other sources), Features of the Community legal system. Decision making of the Community pillar.

10th week:
Lecture: Common policies and Community activities part I
Common Commercial Policy and the EU relations with the world economy, the Competition Policy, and the Agricultural policy. Common policies and Community activities in parties.

11th week:
Lecture: The competences between the European Union and the member states, principles of conferral and subsidiarity.

12th week:
Lecture: Regional Policy, Employment and Social Policy, Environmental Policy, and the Common Transport Policy.

13th week:
Lecture: The European Union and Hungary
How becoming of new member states affected Hungary. Implementation and changes on the law system.

14th week:
Lecture: The future of the European Union
The problems the European Union facing, and their possible solutions and opinions.

15th week:
Lecture: Questions and answers about the European Union.

Requirements

Topics:
This course is devoted to an in-depth study of EU institutional law, within the broader perspective of EU law as Hungary is being part of the European Union since 2004. The participation in the integration brought significant changes in the law system of the country. It is important for students to know the basic development of the European integration. During the course students will learn about history and development of the European integration: the integration issue after the second

world war, the establishment of European Community, and all the major treaties that shaped the European Union. The four main topics of the course are: the 'horizontal' division of competences between the EU institutions, the 'vertical' division of competences between the EU and the Member States (e.g. principles of conferral and subsidiarity), the enforcement of EU law as well as the position of a citizen in the European legal order. It is also important for students to understand the characteristics of the Hungarian municipality structure in light of the EU and also to show students the law of the European Union: the Community law, the sources of the European Law (primary and secondary legal sources, and other sources) and the main features of the legal system of the EU.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Fairhurst, J. : Law of the European Union
The tenth edition. Pearson, 2014.
Guth, J. – Connot, T. : EU Law Questions and answers
Pearson, 2013.
D. Chalmers, Gareth Davies: Law of the European Union
Text and Materials, Cambridge, 2014.
Márton Varjú, Ernő Várnay: The Law of the European Union in Hungary
HVG-ORAC, 2015.

Department of Mechanical Engineering

Subject: **MECHANICS FOR MANAGERS II**
Coordinator: **Tamás Mankovits**
Year, Semester: 1st year/1st semester
Lecture: **1**
Practical: **2**

1st week: **Lecture:** Constitutive models I. Material models of Mechanics. **Practical:** Rigid and brittle materials, elastic and plastic properties.	**2nd week:** **Lecture:** Constitutive models II. Material models of Mechanics. **Practical:** Rigid-plastic materials, Elasto-plastic materials.

3rd week:
Lecture: Constitutive models III.
Material models of Mechanics.
Practical: Idealized material models.

4th week:
Lecture: Loadings I.
Simple loadings: Tension and compression.
Practical: Practical examples for tension and compression problems of trusses.

5th week:
Lecture: Loadings II.
Simple loadings: Bending.
Practical: Practical examples for bending problems of beams.

6th week:
Lecture: Loadings III.
Simple loadings: Torsion.
Practical: Practical examples for torsion problems of beams.

7th week:
Lecture: Loadings IV.
Combined loadings.
Practical: Sizing for combined loadings.

8th week:
Lecture: Equivalent stress I.
Mohr's circle on equivalent stress.
Practical: Practical examples for Mohr's circle.

9th week:
Lecture: Equivalent stress II.
Huber–Mises–Hencky typed equivalent stress.
Practical: Practical examples.

10th week:
Lecture: Mid-term test.
Self Control Test.

11th week:
Lecture: Basic principles of elasticity I. Stress and strains.
Practical: Stress and strain calculations.

12th week:
Lecture: Basic principles of elasticity II.
Equation system of the linear elasticity.
Boundary conditions.
Practical: Numerical examples.

13th week:
Lecture: Introduction to the finite element method I.
Linear spring elements. The equation system of the finite element method.
Practical: Numerical examples.

14th week:
Lecture: Finite Elements Method II
Typical finite elements.
Practical: Numerical examples.

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

Requirements

Topics:
Materials and Concepts (a displacement field, a strain tensor field, a stress tensor field). Deformation energy. Simple loads (pulling, bending, twisting) complex loads. Design theories (Mohr, Huber-Mises-Hencky). The elasticity equation system boundary conditions. The principle of minimum-total potential energy. Lagrange's variational principle. Bernoulli's theory rod. The displacement field based on a finite element method. The shift, deformation and stress approximation. Kinematic boundary conditions, taking into account a kinematic load. The general structure of finite element software systems. Strength of two-dimensional tasks (axisymmetric tasks). An isoparametric element model. Numerical integration. The aim of the subject is expanding the mechanical basics knowledge acquired through mechanics managers I. subject with strength of materials, elasticity and numerical mechanics knowledge. Individual student job: During the semester the students will receive a personal computing task, which are traditional methods in solid mechanics and a finite element method must be solved too. Requirements: We check continued

mastery of the curriculum during the semester by writing two tests and evaluating its performance. We checked in terms of life and the need for knowledge acquisition with an interim job and evaluating its performance. The exam consists of the materials of the presented lectures. The grade of the interim jobs and the grade of oral examination defining the final grade.
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. During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.
B, for a grade: The course ends in a mid-semester grade based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Mankovits, T. : Numerical Analysis of Engineering Structures (Linear Elasticity and the Finite Element Method) University of Debrecen, 2014.
Sadd, M.H. : Elasticity – Theory, Applications, and Numerics
Butterworth-Heinemann, Burlington, USA, 2005.
Zienkiewicz, O.C., Taylor, R.L. : The Finite Element Method – The Basis
5th edition. Butterworth-Heinemann, London, 2000.
Bathe, K.J. : Finite Element Procedures Prentice-Hall, 1996.

Department of Civil Engineering

Subject: **ECOLOGY FOR PLANNERS**
Coordinator: **Beáta Pataki**
Year, Semester: 1st year/2nd semester
Lecture: **2**

1st week:
Lecture: Introduction of an ecological approach in a planning process. New ideas and tools.

2nd week:
Lecture: Introduction to ecosystem services and approaches. The Millennium Ecosystem Assessment

3rd week:
Lecture: A Driving-Pressure-Status-Impact-Response (DPSIR) model, parts of a decision support system.

4th week:
Lecture: Settlement as ecosystem. The role and importance of ecosystems in urban areas. Interactions between natural and man-made environment.

5th week:
Lecture: Sustainable building, urban and regional development and planning – ecological approaches applied in engineering. Smart cities. (water, waste and energy issues)

6th week:
Lecture: Effects of green spaces and open water

surface (climate, moisture, temperature, ecosystem, aesthetics) in urban areas.

7th week:
Lecture: Introduction into Ecohydrology (part 1). Ecological aspects in water management and rural planning. Engineering measures in wetlands (goals, types and impacts).

8th week:
Lecture: Midterm test I.

9th week:
Lecture: Introduction to the ecohydrology (part 2). Issues of the protection of aquatic environment. Analyses of physical, chemical, and biological indicators of water quality. Water balance equation.

10th week:
Lecture: System-thinking as a tool for practical realization of the protection of aquatic environment. The watershed and aquatic ecosystem as a complex system. Natural and antrophogenic effects and impacts.

11th week:
Lecture: Causes, consequences, and solutions of pollution in surface fresh waters. Pollution sources. Water quality management systems as a tool for designing measures for maintenance or improvement of the status of environment.

12th week:
Lecture: The fundamental tools of water quality protection and management of aquatic environment: management strategies: waste water treatment. (Point pollution sources)

13th week:
Lecture: Management of diffuse pollution sources. Techniques to be applied for rivers and lakes: discharge and river management, lake-management. Ecohydrological aspects.

14th week:
Lecture: The theory of engineering calculations on the field of water quality management, transport and transformation processes.

15th week:
Lecture: Midterm test II.
Self Control Test

Requirements

Topics:
Ecology, ecosystem services, a DPSIR model, sustainable buildings, sustainable urban developments, sustainable rural planning, green spaces, wetlands, ecohydrology, protection of aquatic environment, pollution sources, system-thinking approaches, engineering calculations and measures to be applied.
A, for a signature: Participation and attendance is also part of your final grade. You are expected to attend classes regularly. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Vaccari, D. A. : Environmental biology for engineers and scientists
Hoboken. N.J. Wiley-Interscience, 2006.
Perlman, D. L. – Milder J. : Practical Ecology for Planners, Developers, and Citizens
Island Press, 2004. ISBN: 10 1559637161

Department of Electrical Engineering and Mechatronics

Subject: **ENGINEERING TECHNOLOGICAL KNOWLEDGE II**
Coordinator: **Géza Husi**
Year, Semester: 1st year/2nd semester
Lecture: **4**

1st week:
Lecture: Introduction, Probability — Basic concepts.

2nd week:
Lecture: Markov chains and processes, The M/M/1 queues.

3rd week:
Lecture: Markov chains and processes, The M/M/1 queues.

4th week:
Lecture: Two-machine lines, "Deterministic" lines.

5th week:
Lecture: Exponential and continuous lines, long lines.

6th week:
Lecture: Long lines (cont.).

7th week:
Lecture: A "deterministic" line — Long line optimization.

8th week:
Lecture: Midterm test I.
Self Control Test.

9th week:
Lecture: Assembly/disassembly systems.

10th week:
Lecture: A/D loops.

11th week:
Lecture: Efficient Buffer Design Algorithms for Production Line Profit Maximization.

12th week:
Lecture: Quality/quantity models.

13th week:
Lecture: Scheduling of Setup Changes.

14th week:
Lecture: Real-time control of manufacturing systems.

15th week:
Lecture: Midterm test II.
Self Control Test.

Requirements

Topics:
The mission of the course is to introduce modern techniques in the field of manufacturing systems. The aim of the course is to provide knowledge of manufacturing system design, concurrent engineering (CE), design, redesign, quality, effectiveness evaluation areas. Students are going to master production and manufacturing systems, design fundamentals, factory planning processes, learn about the parts manufacturing and design, implementation and commissioning issues mounting systems. Some important issues in design and operation of manufacturing systems are

going to be designed. Important measures of system performance are going to be explained. Another aim is to show the importance of random, potentially disruptive events, to give some intuition about the behavior of these systems, to explain the importance of capacity, and how it can vary randomly over time. Teaching enough mathematics (especially probability) is also part of the course to describe behavior of manufacturing systems. During the semester it is going to be shown how in-process inventory is sometimes a necessary evil — that is, and its benefits as well as costs. Some practical tools for systems design are going to be presented. It's going to be part of the classes to describe issues in real-time scheduling, and to show why deterministic scheduling is often not adequate. Some simple scheduling rules are going to be presented and recent related research are goint to be described too.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Stanley Gershwin: 2.852 Manufacturing Systems Analysis
Spring, 2010.
Tempelmeier, Horst, and Heinrich Kuhn: Flexible Manufacturing Systems: Decision Support for Design and Operation
Wiley-Interscience, 1993. ISBN: 9780471307211
Papadopoulos, H. T., C. Heavey, and J. Browne: Queueing Theory in Manufacturing Systems Analysis and Design.
Chapman and Hall, 1993. ISBN: 9780412387203
Askin, Ronald G., and Charles R. Standridge: Modeling and Analysis of Manufacturing Systems
Wiley, 1993. ISBN: 9780471514183
Buzacott, John A., and J. George Shanthikumar: Stochastic Models of Manufacturing Systems
Prentice Hall, 1993. ISBN: 9780138475673
Altiok, Tayfur: Performance Analysis of Manufacturing Systems
Springer, 1997. ISBN: 9780387947730
Hopp, Wallace J., and Mark Spearman: Factory Physics: Foundations of Manufacturing Management
2nd ed. . McGraw-Hill/Irwin, 2000. ISBN: 9780256247954
Goldratt, Eliyahu M., and Jeff Cox: The Goal: A Process of Ongoing Improvement.
3rd ed. . North River Press, 2004. ISBN: 9780884271789
Li, Jingshan, and Semyon M. Meerkov: Production Systems Engineering
Springer, 2009. ISBN: 9780387755786
Drake, Alvin W.: Fundamentals of Applied Probability Theory
McGraw-Hill, 1967. ISBN: 9780070178151
Feller, William: An Introduction to Probability Theory and its Applications (Volumes I and II)

Wiley, 1968. ISBN: 9780471257080
Ross, S. M. : Introduction to Probability and Statistics for Engineers and Scientists
Wiley-Interscience, 1987. ISBN: 9780471817529

Department of Engineering Management and Enterprise

Subject: **ADVANCED QUALITY MANAGEMENT**
Coordinator: **Edit Szűcs**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: ISO 9001:2008 I. ISO 9000 standards, PDCA, Documentation systems, General Requirements, Quality Management Manuals.
Seminar: Analyzing examples for ISO 9001:2008.

2nd week:
Lecture: ISO 9001:2008 II. Responsibilities of management, Customer Focus, Quality Policy.
Seminar: Analyzing examples for ISO 9001:2008.

3rd week:
Lecture: KIR MSZ EN ISO 14001:2005, elements and structures.
Seminar: Analyzing examples for MSZ EN ISO 14001:2005.

4th week:
Lecture: MEBIR MSZ 28001:2008, occupational health and safety, elements and structures.
Seminar: Analyzing examples for MSZ 28001:2008.

5th week:
Lecture: Medical Technology, Food Safety ISO 13485:2003, MSZ EN ISO 22000, Elements and Structures.
Seminar: Analyzing examples for ISO 13485:2003 and MSZ EN ISO 22000.

6th week:
Lecture: IBIR, CC MSZ ISO/ICE 15408, ISO/ICE 27001:2005, information safety, elements and structure.
Seminar: Analyzing examples for MSZ ISO/ICE 15408 and ISO/ICE 27001:2005.

7th week:
Lecture: Seven new methods I: Affinity diagrams, charting the relationship between each others, Wood charts, a graph matrix.
Seminar: Analyzing examples for the methods.

8th week:
Lecture: Seven new methods II: Matrix data analysis, decision-making process card program analyst.
Seminar: Analyzing examples for the methods.

9th week:
Lecture: Seven new methods III: Arrow diagrams, Gantt diagram.
Seminar: Analyzing examples for the methods.

10th week:
Lecture: Quality Improvement Methods I: Brainstorming, action plans, block diagrams, SWOT, FMEA, QFD, why-why.
Seminar: Analyzing examples for the methods.

11th week:
Lecture: Quality Improvement Methods II: Poka-Yoke, NGT, multivoting, a Log-frame matrix.
Seminar: Analyzing examples for the methods.

12th week:
Lecture: Statistical software MINITAB.
Seminar: Analyzing examples for MINITAB.

13th week:
Lecture: TQM Definition of TQM, model of TQM, Principles of TQM.
Seminar: Case studies.

14th week:
Lecture: Relationship between quality and LEAN Quality and lean in manufacturing, Methodologies, effects, tools.
Seminar: Case studies.

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

Requirements

Topics:
The subject contains the advanced concepts of quality management. The aim of the course is that students become familiar with the elements, installation, operation and tools of an integrated management system. During the subject students can be familiar with seven new methods and quality improvement methods.
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 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. During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.
B, for a grade: The course ends in a mid-semester grade based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Kim-Soon Ng : Quality Management and Practices
InTech, Chapters published, 2012. ISBN: 978-953-51-0550-3
David L. Goetsch, Stanley Davis: Quality management: introduction to total quality management for production
Pearson Prentice Hall, 2013. ISBN: 0-13-287097-5, 978-0
B. G. Dale: Managing Quality
Wiley-Blackwell, 2007. ISBN: 978-1-4051-4279-3

Subject: **BASES OF NATURAL SCIENCES IN NANOTECHNOLOGY**
Coordinator: **István Budai**
Year, Semester: 1st year/2nd semester
Lecture: **2**

1st week:
Lecture: Introduction to the course, Historical perspective of micro and nano-manufacturing technology, Advantages and applications of nanotechnology.

2nd week:
Lecture: Materials overview, atomic structures, bonding, polymers, electrical characteristics, the periodic table, crystal structures and defects, physical chemistry of solid surfaces.

3rd week:
Lecture: Introduction composite materials and their application. Si-based materials, Ge-based materials.

4th week:
Lecture: Overview of nano-fabrication methods: Top-down and bottom-up approaches, lithography, deposition, CVD, PVD, etching, and material modification methods, processes and equipments.

5th week:
Lecture: Characterization tools, optical microscopy, profilometry, ellipsometry, spectrophotometer, scanning an electron microscope, AFM, FFM.

6th week:
Lecture: Zero dimensional nano-structures (Nano Particles) - Fabrication procedures.

7th week:
Lecture: Sol-gel processing, applications, properties and applications of nano-praticles.

8th week:
Lecture: Midterm test I.
Self Control Test.

9th week:
Lecture: One dimensional nano-structures - Nanowires and nanorods, fabrication methods, Properties and applications of nanowires.

10th week:
Lecture: Two dimensional nano-structures.

11th week:
Lecture: Top down fabrication procedures, Lithography, Pattern transfer methods, Wet Etching and Dry etching.

12th week:
Lecture: Nano material characterization methods.

13th week:
Lecture: Application of nanomaterials, carbon nano-tubes, Quantum dots, etc., Organic compounds and bio-applications of nano-materials.

14th week:
Lecture: Midterm test II.
Self-control Test.

Requirements

Topics:
The importance of chemistry and physics nanotechnology in two aspects may take: structure for the operation of chemical nanotechnology devices, respectively, development of physical methods and onset of nanotechnology tools and processes chemical, physical, physical-chemical interactions. The aim of this course is to describe the importance of nanotechnology in practice and the roles of chemistry and physics in development of nanotechnology.
A, for a signature: Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor. The minimum requirement of the mid-term and the end-term test is 60 % separately. At the end of the semester everybody will get a mid-semester grade on the basis of the table below: 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 point, the student once can take a retake test of the whole semester material. If somebody fails then he/she has to write both tests in the 1st week of the exam period again. If the result is 50 % or better the retake test is success. If somebody has to repeat his midterm tests then his grade can't be better than (2).
B, for a grade: The grade will be the average of the two test's grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4). Use of English: In accordance with Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Cheating: University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

Required reading materials

Charles P. P. - Jr. Frank J. O. : Introduction to Nanotechnology
John Wiley & Sons, 2003. ISBN: 0471079359
Geckerel, K. E. – Rosenberg, E. : Functional Nanomaterials
ASP, 2006. ISBN: 1-58883-067-5
Gabor L. Hornyak, H.F. Tibbals, Joydeep Dutta, and John J. Moore : Introduction to Nanoscience and Nanotechnology
CRC Press, 2009. ISBN: 1420047795

Subject: **LEADERSHIP COMPETENCIES DEVELOPMENT**
Coordinator: **Edit Szűcs**
Year, Semester: 1st year/2nd semester
Lecture: **2**
Seminar: **2**

1st week: **Lecture:** Leadership Defining leadership, the role or personality to be a leader, soft skills.	**Seminar:** Group work, situational task, discussion with dispute method.

2nd week:
Lecture: Functions of leadership
Planning, organizing, directing, controlling, innovation, representation and decision making.
Seminar: Situational tasks in groups.

3rd week:
Lecture: Leadership styles
Autocratic, bureaucratic, maliaise-faire, democratic, transformational leadership.
Seminar: Tests measuring leadership styles, discussion of the results.

4th week:
Lecture: General leadership competencies
Most important leadership skills and qualities, generic leadership traits, what you have to know, what you need to know, what you need to do, how to return the core leadership functions into skills.
Seminar: Tests measuring leadership qualities, discussion of the results.

5th week:
Lecture: Time management
Wrong time management, time thieves, procrastination, planning, Eisenhower's principle, delegation.
Seminar: Methods and techniques managing your time.

6th week:
Lecture: Conflict management
Grouping of conflicts, emergence of conflicts, conflict management types.
Seminar: Steps of problem-solving strategy, test for defining the own conflict management style, situational tasks.

7th week:
Lecture: Motivation
Motivation in leadership, Abraham Maslow's hierarchy, the Herzberg model.
Seminar: Motivational leadership self-tests, situational tasks, how can you motivate your colleagues as a leader.

8th week:
Lecture: Team management
Working in a team, a leading team, differences between a team and a group.
Seminar: Competencies for team leading in practice.

9th week:
Lecture: Problem-solving
What is a problem? How can it be solved?
Seminar: Problem solving methods.

10th week:
Lecture: Emotional intelligence
Determining emotional intelligence, highlighting the EM's role and its effect in leadership.
Seminar: Tests measuring emotional intelligence, discussion of the results.

11th week:
Lecture: Making decisions
Decisiveness, decision-making styles.
Seminar: Optimum decisions for organizational goals.

12th week:
Lecture: Communication
Communication activities, most important communication skills as a leader.
Seminar: Supporting communication.

13th week:
Lecture: Managerial efficiency
Planning and organization processes, control of activities.
Seminar: Case studies, team work.

14th week:
Lecture: Stress management
Stability under stress, self-confidence, sturdiness, serenity.
Seminar: Situational tasks in groups.

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

Requirements

Topics:
Preparing students for participating in management tasks and competencies.
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. During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.
B, for a grade: The course ends in a mid-semester grade based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Nelson, B. : The management bible
Hoboken, Wiley, 2005.
Pegg: Positive leadership.Amsterdam
Pfeiffer, 1991.

Subject: **PRODUCTION AND SERVICE MANAGEMENT**
Coordinator: **István Budai**
Year, Semester: 1st year/2nd semester
Lecture: **4**

1st week:
Lecture: Basic concepts of operating management, types of functions, input-output approaches.

2nd week:
Lecture: The second strategy, goals, hates and wheelwright model, creating an operational strategy.

3rd week:
Lecture: The relationship between production and service, common features, differences.

4th week:
Lecture: Process design: process models, environmental planning.

5th week:
Lecture: Product and Service Design: ingredients, basic process of screening, assessment methods, a design unit.

6th week:
Lecture: Supplying chain management in operating the basic concepts, decisions, do or buy decision criteria, including location criteria change.

7th week:
Lecture: Process technologies: typing, general characteristics, selection criteria.

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

9th week:
Lecture: The production (supply) timing, direction, control management strategies. Statistical process control, continuous improvement.

10th week:
Lecture: Inventory management, inventory management models. Formed on the basis of economic considerations and production features sets. ABC inventory analysis.

11th week:
Lecture: Coverage determinations MRP overview, MRP input - output data, to determine the capacity need.

12th week:
Lecture: Queueing models queuing strategies. The measurement of production and service performance (throughput). Development of planned and random queuing system.

13th week:
Lecture: LEAN principles and goals of Lean Manufacturing system design. The design steps.

14th week:
Lecture: End-term test.
Self Control Test.

Requirements

Topics:
Acquaint the students with the preparation of products and services theoretical and practical reality. Individual student job: Students write mid-term test during the semester, and make a case study. The grade of mid-term tests and the grade of oral examination defining the final grade (50-50 %).

Required reading materials

Stevenson, W. : Operations Management
10th. McGraw-Hill/Irwin, 2008. ISBN: 9780073377841
Szűcs, E. : Management of Complex Production Systems
University of Debrecen , 2012.

Department of Engineering Management and Enterprise

Subject: **ECONOMETRICS**
Coordinator: **Judit T. Kiss**
Year, Semester: 2nd year/1st semester
Lecture: **1**
Seminar: **3**

1st week:
Lecture: The nature of econometrics and the structure of economic data Introduction (Types of data, Data sources, The structure of economic data, steps of empirical analysis, econometric model, Mean, Mode, Median, Measures of dispersion).
Seminar: Calculating Problems – Computer exercises.

2nd week:
Lecture: Relationship among variables - Correlation Analysis (Types of correlation, Scatter diagrams, a correlation graph, Pearson's coefficient of correlation, rank correlation).
Seminar: Correlation (negative and positive correlation – examples, linear and non-linear correlation, Properties of Pearsonian Correlation

Coefficient, Calculations for Coefficients of Correlation, Calculations for Coefficients of Rank Correlation).

3rd week:
Lecture: Linear Regression – Simple regression models I. Deriving the Ordinary Least Squares Estimates.
Seminar: Calculating Problems – Computer exercises (Dependent – independent variable, error term, fitted values and residuals, Algebraic Properties of OLS Statistics).

4th week:
Lecture: Linear Regression – Simple regression models II. - Goodness of Fit.
Seminar: Calculating Problems - total sum of squares (SST), explained sum of squares (SSE), and the residual sum of squares (SSR), R-squared of the regression.

5th week:
Lecture: The Expected of the OLS estimators The Variances of the OLS Estimators - Unbiasedness of OLS.
Seminar: Calculating Problems – Computer exercises.

6th week:
Lecture: Estimating an Error variance; (Variances of the OLS Estimators, Heteroskedasticity, homoskedasticity).
Seminar: Sampling Variances of OLS Estimators.

7th week:
Lecture: Hypotheses Testing: a "t" Test, Confidence intervals, The F test.
Seminar: Calculating Problems – Computer exercises (Confidence intervals, F and t statistics).

8th week:
Lecture: Midterm test I.
Seminar: Midterm test I.
Self Control Test.

9th week:
Lecture: Time series data analysis (The nature of time series data, Time series regression models, index numbers).
Seminar: Computer exercises – Complex model problems (estimation of time series regression model).

10th week:
Lecture: Nonlinear regression model I. - Linearization.
Seminar: Linearized regression - Logarithmic Functional Forms; Quadratic function, The double logarithmic functions.

11th week:
Lecture: Non-linear regression model II.
Seminar: Functional forms – an exponential, hyperbolic, polynomial model.

12th week:
Lecture: Multiple regression analysis I. - estimation.
Seminar: A Model with Two Independent Variables (Obtaining the OLS Estimates, Interpreting the OLS Regression Equation - interpreting of the coefficients).

13th week:
Lecture: Multiple regression analysis II. - estimation.
Seminar: The Model with "k" Independent Variables – computer exercises.

14th week:
Lecture: Creating of a Complex model.
Seminar: Computer exercises – Problems of a Complex model.

15th week:
Lecture: Midterm test II.
Seminar: Midterm test II.
Self Control Test.

Requirements

Topics:
The objective of this course is to prepare students for basic empirical work in economics. The aims

of this course are to make students familiar with the basic concepts of econometric analyzes. In particular, the course will be focused on data analyzes, regression analyzes, testing, and forecasting. By the end of the course, students should be able to understand the scope and limitations of classical econometric techniques, to read, write and properly interpret articles and reports of an applied econometric nature using these techniques.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests. B, for a grade (ESE): The course ends in a mid-semester grade based on the test results. The minimum requirement of the mid-term and the end-term test is 50% separately. The grade for each test is given according to the following: score/grade 0-49 fail (1), 50-62 pass (2), 63-75 satisfactory (3), 76-89 good (4), 90-100 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

Wooldridge, J. : Introductory Econometrics: A Modern Approach
Fifth Edition.2013. ISBN: 1111531048, 97811115
Ramanathan, R.: Introductory econometrics with applications
Fifth Edition. Harcourt College Publishers, 2002. ISBN: 0-03-034342-9
Brooks, C. : Introductory Econometrics for Finance
Second Edition. Cambridge University Press, 2008. ISBN: 1139472305, 97811394

Subject: **MANAGERIAL ACCOUNTING**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Accounting for management.
Seminar: Solving exercises related to the lecture.

2nd week:
Lecture: Sources of data, presenting information.
Seminar: Solving exercises related to the lecture.

3rd week:
Lecture: Cost classification.
Seminar: Solving exercises related to the lecture.

4th week:
Lecture: Accounting for materials.
Seminar: Solving exercises related to the lecture.

5th week:
Lecture: Accounting for labour.
Seminar: Solving exercises related to the lecture.

6th week:
Lecture: Accounting for overheads.
Seminar: Solving exercises related to the lecture.

7th week:
Lecture: Absorption and marginal costing.
Seminar: Solving exercises related to the lecture.

8th week:
Lecture: Exam.
Self Control Test.

9th week:
Lecture: Job, batch and process costing.
Seminar: Solving exercises related to the lecture.

10th week:
Lecture: Service and operation costing.
Seminar: Solving exercises related to the lecture.

11th week:
Lecture: Budgeting.
Seminar: Solving exercises related to the lecture.

12th week:
Lecture: Capital budgeting.
Seminar: Solving exercises related to the lecture.

13th week:
Lecture: Standard costing.
Seminar: Solving exercises related to the lecture.

14th week:
Lecture: Performance measurement techniques.
Seminar: Solving exercises related to the lecture.

15th week:
Lecture: Exam.
Self Control Test.

Requirements

Topics:
This course introduces students into the fundamentals of managerial accounting – the internal use of accounting information to manage firms, including planning, analysis, and decision-making. The course's main objective is to equip students with knowledge and ability to prepare, understand, evaluate, and execute financial and non-financial reports used in business organizations. Managers face to several business decisions every day that require the use of financial and non-financial information about products, processes, employees, suppliers, customers, competitors, and resources. These decisions range from evaluating profitability of investment projects to managing product-line portfolios and pricing, from supply chain and customer management to evaluating and motivating employees. For this reason, utilizing relevant information (both financial and non-financial) to make efficient decisions is essential to business organizations and an important skill for a career in corporate management, business consulting, financial services. Unlike financial accounting, this course focuses on information generated by internal accounting information systems. Students will be required to be familiar with preparing management reports, since the emphasis in this course is on interpretation, evaluation, and decision-making.
For a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests. For a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following:

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

Kaplan Publishing: ACCA Paper F2 and FIA Diploma in Accounting and Business, Management Accounting (MA/FMA) Complete Text
Kaplan Publishing UK, 2015. ISBN: 978-1-78415-441-7
Warren, C. - Reeve, J. – Duchac, J : Financial & Managerial Accounting
13th Edition. Cengage Learning, ISBN: 130548049X, 97813054
Maher, M. – Stickney, C. – Weil, R. : Managerial Accounting: An Introduction to Concepts. Methods and Uses.
11th Edition. Cengage Learning, 2011. ISBN: 1111571260, 97811115

Subject: **MODULE PROJECT PRACTICE**
Coordinator: **Andrea Emese Matkó**
Year, Semester: 2nd year/1st semester
Seminar: **4**

1st week:
Seminar: Recognizing the problem Assessment of a situation, clarification of expectations.

2nd week:
Seminar: Exploring the causes of problems Ishikawa, Pareto analysis.

3rd week:
Seminar: Preparation of feasibility studies Solutions, costs, formulation of the objectives.

4th week:
Seminar: Formulation of quantitative and qualitative indicators SMART method.

5th week:
Seminar: The Gantt-diagram. Establishing schedule, MS Project.

6th week:
Seminar: Project planning I
Defining the main and sub-activities.

7th week:
Seminar: Project planning II
Determination of an implementation structure.

8th week:
Seminar: Project planning III
Planning human, technical and financial.

9th week:
Seminar: Project planning IV
Appointment of responsible people.

10th week:
Seminar: Project planning V
Risk analyses.

11th week:
Seminar: Project planning VI
Creating a communication plan.

12th week:
Seminar: The implementation of the project Management activities, group situations.

13th week:
Seminar: Completion of the project I
Evaluation of results.

14th week:
Seminar: Completion of the project II
Corrective actions, PDCA.

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

Requirements

Topics:
During the semester the students need to plan and manage a complete project.
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. During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 15th week. Students must sit for the tests.
B, for a grade: The course ends in a mid-semester grade based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Kerzner, H.R. : Project Management: A Systems Approach to Planning, Scheduling, and Controlling
Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 2013. ISBN: 978-0470278703
Lock, D. : Project Management
Gower, 2013. ISBN: 978-1409452690
Larson, E. – Gray C. : Project Management: The Managerial Process with MS Project
McGraw-Hill Education, 2013. ISBN: 978-1259186400

Subject: **PROJECT MANAGEMENT**
Coordinator: **István Budai**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Concepts and Definitions.
Seminar: Examples, case studies.

2nd week:
Lecture: Organizational Structures.
Seminar: Examples, case studies.

3rd week:
Lecture: Organizing and Staffing a Project Office and a Team.
Seminar: Examples, case studies.

4th week:
Lecture: Management Functions.
Seminar: Examples, case studies.

5th week:
Lecture: Management Of Your Time And Stress.

Seminar: Examples, case studies.

6th week:
Lecture: Conflicts, The Variables for Success
Seminar: Examples, case studies

7th week:
Lecture: Working With Executives.
Seminar: Examples, case studies.

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

9th week:
Lecture: Planning, Network Scheduling Techniques.
Seminar: Examples, case studies.

10th week:
Lecture: Project Graphics, Pricing and Estimating.
Seminar: Examples, case studies.

11th week:
Lecture: Cost Control, a Trade Off Analysis in a Project Environment.
Seminar: Examples, case studies.

12th week:
Lecture: Risk Management.
Seminar: Examples, case studies.

13th week:
Lecture: Learning Curves.
Seminar: Examples, case studies.

14th week:
Lecture: Contract Management.
Seminar: Examples, case studies.

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

Requirements

Topics:
This course focuses on building up foundation knowledge which is necessary to manage projects efficiently in professional organizations. This knowledge principally relates to the internationally recognized Project Management Body of Knowledge (PMBOK) and its application to temporary endeavors undertaken to create a unique product, service or result. Through real world case studies you are introduced to principles, concepts and processes of project management and their application in both business and public sectors. Individual student job: Students write two mid-term tests during the semester.
The minimum requirement of the mid-term and the end-term test is 60% separately. The first (50 points max) in the 8th, the second (50 points max) in the 14th week. At the end of the semester everybody will get a seminar grade. Everybody will get an exam grade for their exam. The final grade will be the average of the seminar and the exam grade.

Required reading materials

Kerzner, H.R. : Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 2013. ISBN: 978-0470278703
Heagney, J. : Fundamentals of Project Management
AMACOM, 2011. ISBN: 978-0814417485
Lock, D. : Project Management
Gower, 2013. ISBN: 978-1409452690

Subject: **RISK AND RELIABILITY**
Coordinator: **István Budai**
Year, Semester: 2nd year/1st semester
Lecture: **2**
Seminar: **2**

1st week:
Lecture: Basic Concepts
Basic concepts and definitions: Risk vs. Reliability, Hazards, Failures, Uncertainty sources.
Seminar: Selection of research project topic.

2nd week:
Lecture: Reliability Engineering I
Traditional design; Safety Factors; Probabilistic Design.
Seminar: Measuring safety factors and a reliability block diagram.

3rd week:
Lecture: Reliability Engineering I
Reliability engineering; Reliability measures; Reliability block diagrams.
Seminar: Reliability block diagrams.

4th week:
Lecture:

Failure Definitions and Failure Databases
Failure: definitions and modelling (HW vs SW failures; component vs system-level failures).

Seminar:
Selecting systems, listing failures & providing examples of a failure or reliability.

5th week:
Lecture: Risk Analysis Methods
Failure modes and effects analysis (FMEA), Criticality analysis (CA).
Seminar: Generating FMECA for selected systems.

6th week:
Lecture: Risk Analysis Methods I
Fault Tree Analysis (FTA), Event Tree Analysis (ETA).
Seminar: Generating FTA for selected systems and comparing to FMECA results.

7th week:
Lecture: Risk Analysis Methods II
Probabilistic Risk Assessment (PRA).
Seminar: Generating FTA for selected systems and comparing to FMECA results.

8th week:
Lecture: Midterm test I.
Self Control Test.

9th week:
Lecture: Risk Based Design (RBD)
Risk considerations in early design stages.
Seminar: Analyzes of design states.

10th week:
Lecture: RBD Research Methods
Failure analysis during functional design (FFDM) Design repository.
Seminar: Usage of design repository for selected systems.

11th week:
Lecture: RBD Research Methods
Functional failure identification and propagation (FFIP).
Seminar: Generating FFIP for selected systems.

12th week:
Lecture: RBD Research Methods
Cost-benefit analysis (CBA).
Seminar: A cost-benefit analysis (CBA).

13th week:
Lecture: Hazard identification and analyzes
Hazard identification methods, Processing hazards checklists, Hazards surveys and analyzes of hazard and operability in industry.
Seminar: Course summary.

14th week:
Lecture: Midterm test I.
Self Control Test.

Requirements

Topics:
Fundamentals of risk, uncertainty, and reliability. Methods to analyze and quantify the risk of failures, and the reliability of complex systems, including fault tree analysis, reliability block diagrams, probabilistic risk assessment. Introduction to research methods for risk and reliability analysis during the early design stages.
A, for a signature: Participation at lectures is compulsory. Students must attend lectures and may not miss more than three of them during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Attendance at lectures will be recorded by the lecturer. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed lectures must be made up for at a later date, being discussed with the tutor. The minimum requirement of the mid-term and the end-term test is 60% separately. The first (50 points max) in the 8th, the second (50 points max) in the 14th week. At the end of the semester everybody will get a seminar grade on the basis of the table below: The grade for each test is given according to the following: 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 point, the student once can take a retake test of the whole semester material. If somebody fails then he/she has to write both tests in the 1st week of the exam period again. If the result is 50 points (50%) or better, then he can take an exam. If somebody has to repeat his midterm tests then his seminar grade can't be better than (2).
B, for a grade: For their exam everybody will get an exam grade . The final grade will be the average of the seminar and the exam grade. If it is for example (3.5) then the lecturer decides if it is (3) or (4). Use of English: In accordance with Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Cheating: University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

Required reading materials

Mohammad Modarres : Risk Analysis in Engineering: Techniques, Tools and Trends
Taylor & Francis, 2006.
Terje Aven: Quantitative risk assessment: the scientific platform Cambridge, UK; New York
Cambridge University Press, 2011.

Department of Basic Technical Studies

Subject: **CONTROL OF INTEGRATED INFORMATION SYSTEMS**
Coordinator: **Imre Kocsis**
Year, Semester: 2nd year/2nd semester
Lecture: **2**
Practical: **2**

1st week: **Lecture:** Introduction to Business Processes history of ERP, functional organizational structures, key business processes,	SAP ERP system structures. **Practical:** SAP GUI installation and setting up.

2nd week:
Lecture: Introduction to Enterprise systems I
Architecture of an enterprise system, data in an enterprise system, get started with SAP I.
Practical: login intoSAP system, menu and transactions, favourite transactions, setup.

3rd week:
Lecture: Introduction to Enterprise systems II
Material types, material groups, user roles, Business intelligence, get started with SAP II.
Practical: Reports and selections, buttons and icons.

4th week:
Lecture: Introduction of accounting
Financial accounting and management accounting, Organizational data, Account structures and processes, cost centres, reporting.
Practical: Relevant transaction review.

5th week:
Lecture: A procurement process I
Master and organization data, structures.
Practical: Executor procurement key transactions.

6th week:
Lecture: A procurement process II
Key steps in a process, material movements, reporting.
Practical: Executing procurement key transactions.

7th week:
Lecture: A fulfillment process I
Organization levels and master data, sales and distribution processes, Customer master data.
Practical: Executing key steps, transactions in a fulfillment process.

8th week:
Lecture: Midterm test I.
Self Control Test.

9th week:
Lecture: A fulfillment process II
Main process steps, shipping points and plant structures and data, scheduling and shipping, billing, payment, reporting.
Practical: Executing key steps, transactions in fulfillment processes.

10th week:
Lecture: A production process
A make to stock and a make to order types, Bill of materials, routing, work centre master data element and structure, main process steps and material movements
Practical: Use BOM and routing, work centre transactions.

11th week:
Lecture: Inventory and warehouse management processes
Organization levels and master data, goods movement, key steps in warehouse management, IM and WM processes, material movements
Practical: Inventory reports.

12th week:
Lecture: Material planning process and process integration I
Key concept of material planning, basic steps in a material planning process, data, documents, procurement and MRP types.
Practical: Master data, BOM, Routing setup control.

13th week:
Lecture: Material planning processes and process integration II
Basic steps in sales and operation planning, demand management, Material requirement planning, MRP list, reports. Process integration summary.
Practical: Checking the results of planning reports.

14th week:
Lecture: Integrated Information and Computing Systems for Natural, Spatial, and Social Sciences
Collaboration, frameworks, controlling, storage, new architectures, micro IS, mobile communication, etc.
Practical: Q &A (based on the last practice open questions).

15th week:
Lecture: Midterm test II.

Self Control Test.

Requirements

Topics:
During the course students can be familiar with the development of integrated enterprise information systems and their roles in organizations, selection and implementation of enterprise information systems and functions of information systems in operation. Practical operation of the SAP enterprise system.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests. Written and practical test. The written exam is linked to the lectures and it is 2/3 part in the grade, the practical test is linked to the practices and it is 1/3 par in the grade.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests and practice. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

Magal, S. R. : Integrated business processes with ERP systems
Hoboken N. J. Wiley, 2012.
Rückemann, C. P. : Integrated Information and Computing Systems for Natural, Spatial, and Social Sciences
IGI Global, 2012. ISBN: 1466621907

Department of Mechanical Engineering

Subject: **MODUL I**
Coordinator: **Lajos Dr. Fazekas**
Year, Semester: 2nd year/2nd semester
Lecture: **2**

1st week:
Lecture: Process management.

2nd week:
Lecture: Construction of process management.

3rd week:
Lecture: Process modelling (EPC).

4th week:
Lecture: Process modelling (BPMN 2.0).

5th week:
Lecture: Process modelling (VSM).

6th week:
Lecture: A decision making model.

7th week: **Lecture:** Multi-Criteria analysis (AHP method). **8th week:** **Lecture:** Mid-term Test. **Self Control Test** **9th week:** **Lecture:** Multi-Criteria analysis (Promethe method). **10th week:** **Lecture:** Multi-Criteria analysis (KIPA method). **11th week:** **Lecture:** Process simulation with excel.	**12th week:** **Lecture:** Process simulation with witness. **13th week:** **Lecture:** Problem solving with lineal programming. **14th week:** **Lecture:** Problem solving with lineal programming. **15th week:** **Lecture:** Final Test. **Self Control Test.**

Requirements

Topics:
The course focuses on the management thinking, and develops manager approach. The most significant aim is to use problem solving techniques with full of confidence. In a manufacturing/shipping etc. company used these techniques problem solving is very useful. For this reason, the course contains a complex, modern software pack; for example decision supporting tools for process modelling and process simulation, and programs for examining the efficiency of systems.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

J. Heizer, B. Render: Principles Of Operations Management
Global Edition. Pearson Education, 2013. ISBN: 0136119417
I. Saul: Linear Programming: Methods and Applications
Fifth Edition.2010. ISBN: Fifth Edition
D. Medison: Process Mapping, Process Improvement and Process Management
2005. ISBN: 1932828044

Subject: **MODUL II**
Coordinator: **Dr. Lajos Fazekas**
Year, Semester: 2nd year/2nd semester
Lecture: **2**

1st week:
Lecture: Planning material requirement.

2nd week:
Lecture: Planning enterprise resource.

3rd week:
Lecture: Value Streams.

4th week:
Lecture: Components of pull systems.

5th week:
Lecture: JIDOKA.

6th week:
Lecture: Continuous improvement.

7th week:
Lecture: LEAN principles.

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

9th week:
Lecture: LEAN tools.

10th week:
Lecture: Failure Modes and Effects Analyses.

11th week:
Lecture: Process and machine ability.

12th week:
Lecture: Statistical process control.

13th week:
Lecture: Six sigma.

14th week:
Lecture: Optimum search methods.

15th week:
Lecture: Final test.
Self Control Test.

Requirements

Topics:
During the lectures of this course students may get to know advanced production processes and stimulative productivity procedures furthermore they may get to know the product and process development. These techniques may help the optimum running of the business processes and result low running cost process.
A, for a signature: Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occasions 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. During the semester there are two tests: the mid-term test on the 8th week and the end-term test on the 15th week. Students must sit for the tests.
B, for a grade (ESE): The course ends in an exam based on the average grade of the two tests. The minimum requirement of the mid-term and the end-term test is 60% separately. The grade for each test is given according to the following: 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

D. Medison: Process Mapping, Process Improvement and Process Management
2005. ISBN: 1932828044
J. Womack, D. Jones: Lean Thinking
2003. ISBN: 0743249275
W. J. Stevenson: Operations management
10th ed. . McGraw-Hill/Irwin , 2009. ISBN: 9780073377841

CHAPTER 7
INTERNSHIP

An Internship Guide to Engineering Management MSc

Students specializing in Engineering Management MSc have to carry out a 4-week long internship involved in the model curriculum. The internship course must be signed up for previously via the NEPTUN study registration system in the 3rd semester. Its execution is the significant requirement of getting a leaving certificate (absolutorium).

I. Objective of the internship, competences

Students get acquainted with professional work in conformity with their specialist at a 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: to precise working on schedule either individually or in team, to take part in talking shops applying correct technical terms. Professional competences: applying professional skills 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.

III. Documents necessary for commencing and completing the internship

The numbers of document copies is equivalent with the number of signers. The document types which must be signed are here: Invitation Letter, Internship Cooperation, "Megállapodás" (Company in Hungary), Student Agreement (Company abroad). 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 specialist responsible will refuse the Internship Certificate.

IV. Execution of the Internship and its certification

1. The duration of the internship is 4 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 Faculty of Engineering. The deadline of submitting the Essay and the "Evaluation Sheet and Certificate" is always given on the website of the Faculty.

- a student has to sign up for the Internship course via the NEPTUN in the spring semester,
- Contacting the company and providing 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 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 the responsible person for the internship program at the Faculty till the deadline.

CHAPTER 8
THESIS

Objective
These guidelines describe the formal principles that must be observed when writing a 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 a 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, see appendix 1)
- Cover page (see appendix 2) - 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 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: Statistics Federal Authority: Annual Statistics 2008 for the United Kingdom, London, 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] Taylor J.: The gear analysis handbook New York, VCI Publishing Company, 2000. 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 a supervisor…
After negotiating with a supervisor for the company providing for the thesis topic, an 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 the secretartiat, to Ms. Magdolna Sándorné Anton (magdi@eng.unideb.hu address) as soon as it is finalized but not later than 14th November every year. 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 chosen subjects for the final exam (qv. final 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. The deadline of Submission is actually given on the Faculty website (www.eng.unideb.hu)

the followings must 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 every year (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.

CHAPTER 9
MODEL CURRICULUM

Compulsory courses												
1st year												
		1st semester					2nd semester					
Subjects	Neptun code	L	S	P	mExa	Crd.	L	S	P	mExa	Crd.	Prerequisites of taking the subject
Achievements and applications of modern physics	**MFMFE51M03-EN**	2			ESE	3						None
Advanced Corporate Finance	**MFHVP51M05-EN**	1	3		ESE	5						None
Advanced Quality Management	**MFHMM51M05 -EN**						2	2		ESE	5	None
Bases of natural sciences in nanotechnology	**MFNAN51M03-EN**						2			AW5	3	None
Development of an organization	**MFSZF51M05-EN**	2	1		ESE	3						None
Ecology for Planners	**MFOKO51M03-EN**						2			ESE	2	None
Engineering technological knowledge I	**MFMTI51M05-EN**	4			ESE	5						None

Compulsory courses												
1st year (continued)												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Engineering technological knowledge II	**MFMTI52M05-EN**						4			ESE	5	None
European Union Law	**MFGMJ51M03-EN**	2			AW5	2						None
Leadership competencies development	**MFVKF51M05-EN**						2	2		ESE	5	None
Mechanics for Managers II	**MFSZM51M03-EN**	1		2	AW5	3						None
Production and service management	**MFTSM51M05-EN**						4			ESE	5	None
Quantitative Methods	**MFKVA51M05-EN**	2	2		AW5	5						None

Compulsory courses												
2nd year												
Subjects	Neptun code	1st semester					2nd semester					Prerequisites of taking the subject
		L	S	P	Exam	Crd.	L	S	P	Exam	Crd.	
Control of Integrated information systems	**MFIIR51M05-EN**						2		2	AW5	5	None
Econometrics	**MFOKN51M03-EN**	1	3		AW5	5						None
Managerial accounting	**MFVEV51M05-EN**	2	2		AW5	5						None
Modul I	**MFMOD51M03-EN**						2			AW5	3	None
Modul II	**MFMOD52M03-EN**						2			ESE	3	None
Module project practice	**MFSZF51M05-EN**		4		AW5	5						None
Project management	**MFPRV51M05-EN**	2	2		ESE	5						None
Risk and Reliability	**MFKMB51M05-EN**	2	2		ESE	5						None