University of Debrecen

Faculty of Engineering

Engineering Management MSc Program

2017

TARTALOM

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

HISTORY OF THE UNIVERSITY

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

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

In 2005 the Bologna System was introduced, which aids the compatibility of the qualifications received at the University of Debrecen with universities all over Europe.

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

The Faculty of Engineering offers 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. The Faculty of Engineering launched the engineering trainings in English in 2011. In order to optimize the quality of training, the Faculty continuously strives to expand the number of industrial and educational partners at home and abroad.

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

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

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

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

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

ADMINISTRATION UNITS FOR INTERNATIONAL PROGRAMMES

COORDINATING CENTER FOR INTERNATIONAL EDUCATION

98, Nagyerdei Boulevard, Debrecen 4032

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Program Director (Non-Medical Programmes)	László Kozma
Administrative Assistant	Ms. Ágnes Czibere
Administrative Assistant	Ms. Ibolya Kun
Administrative Assistant	Ádám Losonczi
Administrative Assistant	Ms. Ágnes Szurmai

The Coordination Center for International Education supports the international degree programmes of University of Debrecen. It helps new students with information on admission and entrance exam. It serves promoting tasks and deals with several cases for students like enrolment, study contracts, modifying student status or major, activating student status, modifying students' personal data, requiring student cards and their updating, modifications, providing certificates for the Immigration Office and registration to residential permit, certificates about student status, certificates on credit recognition, making health insurance contract and Health Insurance Card, requirement for visa.

STUDENT ADMINISTRATION CENTER

1, Egyetem Square, Debrecen H-4032 (basement of Kossuth Lajos Dormitory II)

This administration unit provides students in such cases like receiving new students, checking students' FIR data, registration of tuition fees and other fees, transferring Stipendium Scholarship, handing out and certifying diploma information.

INTERNATIONAL OFFICE AT THE FACULTY OF ENGINEERING

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International Relations Officer room 206	Ms. Ágnes György agnes@eng.unideb.hu

The International Office has been functioning since 2014 in order to ensure that the international degree programmes achieves smoothly. The office has the tasks like arranging students' study cases, providing certificates for students, accepting and considering requests, administration of late-coming students, solving problems of course registration, administration of Erasmus students, giving information about the Internship and the administration of transferred students

DEAN'S OFFICE

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Department of Basic Technical Studies
Department of Building Services and Building Engineering
Department of Chemical and Environmental Engineering
Department of Civil Engineering
Department of Electrical Engineering and Mechatronics
Department of Engineering Management and Enterprise
Department of Mechanical Engineering

DEPARTMENT OF ARCHITECTURE

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ACADEMIC CALENDAR

General structure of an academic year:

Study period	1st week	registration*	1 week
	2nd – 7th week	teaching block 1	6 weeks
	8th week	1st drawing week	1 week
	9th – 14th week	teaching block 2	6 weeks
	15th week	2nd drawing week	1 week
Exam period	directly after the study period	exams	7 weeks

*Registration is in the first week of September in the fall semester usually, and in the first week of February in the spring semester.

ACADEMIC CALENDAR OF THE FACULTY OF ENGINEERING 2017/2018

Opening ceremony of the academic year	10th September 2017
1st semester registration week	From 4th September till 8th September 2017
Repeat period of exam courses announced for the 1st semester of the academic year 2017/2018	From 4th September till 8th September 2017
1st semester study period of MSc and BSc programme	From 11th September till 15th December 2017 (14 weeks). In case of finalist courses: from 11th September till 10th November 2017 (9 weeks).
1st semester study period of BSc dual programme	From 11th September till 8th December 2017 (13 weeks).
Reporting period (Drawing week) of MSc, BSc and BSc dual programme	From 23rd October till 27th October 2017 (4 working days without scheduled lessons, consultation schedule announced previously).

Reporting period (Drawing week, term for elaborating tasks apart from the finalist courses) of BSc programme	From 11th December till 15th December 2017 (5 working days without scheduled lessons, consultation schedule announced previously).
1st semester exam period	From 18th December 2017 till 2th February 2018 (7 weeks). From 13th November till 15th December 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 state exam.
State exams (according to the decision of the departments)	At least one occasion in January 2018. The departments shall advertise the date of the state exam until 15th September 2017.
2nd semester registration week	From 5th February till 9th February 2017
2nd semester study period of MSc and BSc programme	From 12th February till 18th May 2018 (14 weeks). In case of finalist courses: from 12th February till 13th April 2018 (9 weeks).
2nd semester study period of BSc dual programme	From 20th February till 19th May 2018 (13 weeks).
Reporting period (Drawing week) of MSc, BSc and BSc dual programme	From 26th March till 30th March 2018 (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 programme	From 14th May till 18th May 2018 (5 working days without scheduled lessons, consultation schedule announced previously).
2nd semester exam period	From 21st May till 6th July 2018 (7 weeks). From 16th April till 18th May 2018 (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 state exam.
State exams (according to the decision of the departments)	At least one occasion in June 2018. The departments shall advertise the date of the state exam until 15th February 2018.

THE ENGINEERING MANAGEMENT MASTER'S PROGRAM

INFORMATION ABOUT THE PROGRAM

Name of master's program:	Engineering Management Master's Program
Specializations available:	• Construction Industry Specialization • Industrial Process Engineering Specialization • Material Handling and Logistics
Field, branch:	Engineering; Engineering management
Level:	MSc (master)
Qualification:	Engineering Manager
Mode of attendance:	Full-time
Faculty:	Faculty of Engineering
Program coordinator:	Dr Edit Szűcs, College Professor
Program length:	4 semesters
Credits total:	120 (Thesis: 30, Optional subjects: 6)

Professional competencies to be acquired

Knowledge:

- He/she understands the general and specific principles, rules, relations and procedures pertaining to natural sciences, engineering sciences, agricultural science, organisational science necessary to work in the field of engineering.
- He/she knows the functional operation, requirements of engineering devices, production systems.
- He/she knows the conditions, methods of creating and improving economical maintenance.
- He/she knows the operational principles of organisations as purposeful systems.
- He/she knows the engineering-, agriculture- and management-like activities and their relations.
- He/she knows the theory and methodology necessary to found production and service organisations and to control and improve their operation.

- He/she knows the engineering, economic and legal regulations relating to quality management, environmental protection, consumer protection, product responsibility, health and safety at work.
- He/she possesses the widely-used problem-solving techniques necessary for research and scientific work.
- He/she knows the main quantitative analytical methods and the basics of operation research, programming in mathematics, probability theory and statistics in mathematics.

Ability:

- He/she is capable of the practical application of the acquired knowledge and using problem-solving techniques.
- He/she is able to review production and service processes from engineering, economic, human and other social perspectives and communicate with representatives from different professional fields.
- He/she is able to prepare and realise business plans, complete pre-decision-making tasks and make decisions, work out and implement innovation strategies.
- He/she is capable of the application of integrated knowledge from the following areas: engineering devices, technological processes, materials and technologies, electronics, informatics.
- He/she is able to complete the tasks of engineering value analysis, quality assurance of production systems and technologies, improve the quality and efficiency indicators of economy.
- He/she is able to harmonize the design and implementation of innovation processes.
- He/she is able to harmonize tasks which need multidisciplinary engineering skills and control their realisation.
- He/she is capable of creativity, flexibility, has good communication, argumentative, cooperative and problem-solving skills.
- He/she is able to apply statistical and econometric devices to deepen research activity.

Attitude:

- He/she is open and sensitive to professional and technological development and innovation and their proactive application.
- He/she undertakes the professional and ethical value system relating to his/her professional field.
- He/she endeavours to design and complete the tasks at a professionally high level individually or in teamwork.

- Continuous readiness to learn, profound and in-depth education, highly developed analytic and synthetic skills, environmental sensitivity characterize him/her.
- Ethical strength, critical and self-critical sense characterise him/her.
- He/she is capable of cooperation, teamwork and completing leadership tasks individually followed by the necessary amount of practice.
- He/she shows respect for other people's professional opinion, results.
- System-based thinking, approach characterize him/her.

Autonomy and responsibility:

- He/she is capable of solving engineering-economic-like tasks individually.
- He/she is careful before individually making decisions in consultation with representatives from diverse fields (primarily that of engineering, economics, law). He/she takes responsibility for his/her decisions.
- Initiative, responsibility and decision-making ability characterize him/her.
- When making decisions he/she takes into account health and safety at work; engineering, economic and legal regulations; professional-ethical aspects.
- He/she evaluates his/her inferiors' work, facilitates professional development through his/her critical remarks, educates them to take responsibility and show ethical behaviour in their professional field.
- He/she is able to individually keep track of technical, technological, economic, financial, legal, social changes, problem-solving techniques, global social and economic processes in relation to his/her professional field.

Specializations

Students select specialization prior to enrolling on the program. Minimum number of applicants per specialization: 10.

Certain subject groups are common for all Engineering Management MSc students (science knowledge, economics and humanities, field-specific subjects). The subject group "Differentiated Field-specific Subjects" contains specialized topics and fields.

MODEL CURRICULUM OF ENGINEERING MANAGEMENT MSC CONSTRUCTION INDUSTRY SPECIALIZATION

Subject grd	Subject	Code	1st semester				2nd semester				3rd semester				4th semester			
			L	P	E	CR	L	P	E	CR	L	P	E	CR	L	P	E	CR
Science knowledge	Quantitative Methods	MK5KVANA04MX17-EN	2	2	m	4												
	Mechanics II.	MK5MEC2G04MX17-EN	1	2	m	4												
	Introduction to Nanotechnology	MK5NANOM04MX17-EN	1	2	m	4												
	Ecological Planning	MK5OKOTE04MX17-EN					0	2	k	4								
	Econometrics	MK5OKONM04MX17-EN					1	2	m	4								
Economics and Humanities	Development of Organization and Human Resc	MK5SZEMM04MX17-EN	2	2	k	4												
	Negotiation and Conflict Management	MK5TKOMM04MX17-EN									1	2	m	4				
	Leadership Competencies Development	MK5KOMPM04MX17-EN													2	2	m	4
	Advanced Corporate Finance	MK5HVLPM04MX17-EN	1	3	k	4												
	International and Management Accounting	MK5NVSZM04MX17-EN									2	2	m	4				
Professional core material	Digital System Design	MK5ALKMM04MX17-EN					1	2	m	4								
	Opearation Management	MK5HTEV204MX17-EN					2	2	k	4								
	Advanced Quality Management	MK5HMINM04MX17-EN					2	2	m	4								
	Project Leadership	MK5PROVM04MX17-EN									2	2	m	4				
	Risk and Reliability	MK5KOCKM04MX17-EN									2	2	k	4				
	Control of Integrated Information System	MK5INFRM04MX17-EN													1	3	k	4
Differentiated professional skills	Energy Conscious Architecture	MK5ENTEM04M317-EN	1	3	m	4												
	Building energetics II.	MK5ÉPE2M04M317-EN					2	2	k	4								
	Reconstruction	MK5REKOM04M317-EN									2	2	m	4				
	Construction management III.	MK5EPS3M04M317-EN													2	2	m	4
	Complex Project	MK5KOMPM04M317-EN									0	4	m	4				
	MSc Thesis I.	MK5DIP1M09MX17-EN									0	3	m	9				
	MSc Thesis II.	MK5DIP2M21MX17-EN													0	7	m	21
Optional subjects	Optional subject I.		0	0		3												
	Optional subject II.						0	0		3								
	Industrial Internship	MK5SZGYM00MX17-EN									**4 weeks**							
		Hours per week		22				20				26				19		
		Total	8	14		27	8	12		27	9	17		33	5	14		33
		Exam:				2				3				1				1
		Mid-semester grade:				4				3				6				3

Abbreviations:
L= Lecture
P= Practice
E= Evaluation
C= Credits
e = exam
m = mid-semester grade
FE= final exam
s= signature

MODEL CURRICULUM OF ENGINEERING MANAGEMENT MSC INDUSTRIAL PROCESS ENGINEERING SPECIALIZATION

Subject grc	Subject	Code	1st semester				2nd semester				3rd semester				4th semester			
			L	P	E	CR	L	P	E	CR	L	P	E	CR	L	P	E	CR
Science knowledge	Quantitative Methods	MK5KVANA04MX17-EN	2	2	m	4												
	Mechanics II.	MK5MEC2G04MX17-EN	1	2	m	4												
	Introduction to Nanotechnology	MK5NANOM04MX17-EN	1	2	m	4												
	Ecological Planning	MK5OKOTE04MX17-EN					0	2	k	4								
	Econometrics	MK5OKONM04MX17-EN					1	2	m	4								
Economics and Humanities	Development of Organization and Human Resc	MK5SZEMM04MX17-EN	2	2	k	4												
	Negotiation and Conflict Management	MK5TKOMM04MX17-EN									1	2	m	4				
	Leadership Competencies Development	MK5KOMPM04MX17-EN													2	2	m	4
	Advanced Corporate Finance	MK5HVLPM04MX17-EN	1	3	k	4												
	International and Management Accounting	MK5NVSZM04MX17-EN									2	2	m	4				
Professional core material	Digital System Design	MK5ALKMM04MX17-EN					1	2	m	4								
	Opearation Management	MK5HTEV204MX17-EN					2	2	k	4								
	Advanced Quality Management	MK5HMINM04MX17-EN					2	2	m	4								
	Project Leadership	MK5PROVM04MX17-EN									2	2	m	4				
	Risk and Reliability	MK5KOCKM04MX17-EN									2	2	k	4				
	Control of Integrated Information System	MK5INFRM04MX17-EN													1	3	k	4
Differentiated professional skills	Production Technologies	MK5TERMM04M217-EN	1	3	m	4												
	Cellular Manufacturing	MK5GYCELM04M217-EN					2	2	k	4								
	Fuzzy Logics	MK5MESTM04M217-EN									2	2	m	4				
	System Engineering	MK5RENDM04M217-EN													2	2	m	4
	Complex Project	MK5KOMPM04M217-EN									0	4	m	4				
	MSc Thesis I.	MK5DIP1M09MX17-EN									0	3	m	9				
	MSc Thesis II.	MK5DIP2M21MX17-EN													0	7	m	21
Optional subjects	Optional subject I.		0	0		3												
	Optional subject II.						0	0		3								
	Industrial Internship	MK5SZGYM00MX17-EN									**4 weeks**							
Abbreviations:		Hours per week		22				20				26				19		
L= Lecture																		
P= Practice		**Total**	8	14		27	8	12		27	9	17		33	5	14		33
E= Evaluation																		
C= Credits		**Exam:**				2				3				1				1
e = exam		**Mid-semester grade:**				4				3				6				3
m = mid-semester grade																		
FE= final exam																		
s= signature																		

MODEL CURRICULUM OF ENGINEERING MANAGEMENT MSC MATERIAL HANDLING AND LOGISTICS SPECIALIZATION

Subject gro	Subject	Code	1st semester				2nd semester				3rd semester				4th semester			
			L	P	E	CR	L	P	E	CR	L	P	E	CR	L	P	E	CR
Science knowledge	Quantitative Methods	MK5KVANA04MX17-EN	2	2	m	4												
	Mechanics II.	MK5MEC2G04MX17-EN	1	2	m	4												
	Introduction to Nanotechnology	MK5NANOM04MX17-EN	1	2	m	4												
	Ecological Planning	MK5OKOTE04MX17-EN					0	2	k	4								
	Econometrics	MK5OKONM04MX17-EN					1	2	m	4								
Economics and Humanities	Development of Organization and Human Resource	MK5SZEMM04MX17-EN	2	2	k	4												
	Negotiation and Conflict Management	MK5TKOMM04MX17-EN									1	2	m	4				
	Leadership Competencies Development	MK5KOMPM04MX17-EN													2	2	m	4
	Advanced Corporate Finance	MK5HVLPM04MX17-EN	1	3	k	4												
	International and Management Accounting	MK5NVSZM04MX17-EN									2	2	m	4				
Professional core material	Digital System Design	MK5ALKMM04MX17-EN					1	2	m	4								
	Opearation Management	MK5HTEVM04MX17-EN					2	2	k	4								
	Advanced Quality Management	MK5HMINM04MX17-EN					2	2	m	4								
	Project Leadership	MK5PROVM04MX17-EN									2	2	m	4				
	Risk and Reliability	MK5KOCKM04MX17-EN									2	2	k	4				
	Control of Integrated Information System	MK5INFRM04MX17-EN													1	3	k	4
Differentiated professional skills	Advanced Production Logistics	MK5HTLOM04M117-EN	1	3	m	4												
	Digital Logistics	MK5DILOM04M117-EN					2	2	k	4								
	Supply Chain Informatics System	MK5ELIRM04M117-EN									2	2	m	4				
	System Engineering	MK5REMIM04M117-EN													2	2	m	4
	Complex Project	MK5KOMPM04M117-EN									0	4	m	4				
	MSc Thesis I.	MK5DIP1M09MX17-EN									0	3	m	9				
	MSc Thesis II.	MK5DIP2M21MX17-EN													0	7	m	21
Optional subjects	Optional Subject I.		0	0		3												
	Optional Subject II.						0	0		3								
	Industrial Internship	MK5SZGYM00MX17-EN									**4 weeks**							
Abbreviations:		Hours per week		22				20				26				19		
L= Lecture																		
P= Practice		**Total**	8	14		27	8	12		27	9	17		33	5	14		33
E= Evaluation																		
C= Credits		**Exam:**				2				3				1				1
e = exam		**Mid-semester grade:**				4				3				6				3
m = mid-semester grade																		
FE= final exam																		
s= signature																		

COMPLETION OF THE ACADEMIC PROGRAM

The Credit System

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

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

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

For the Engineering Management MSc program the following professional fields define the training:

- Natural Sciences (Mathematics, Physics, Chemistry and other subjects, e.g. Quantitative Methods, Mechanics, Ecology, Nanotechnology, Econometry) 20-35 credit points;
- Economics and Humanities (International Management and Economics, Analysis of Competitiveness, Labour Economics, Sustainable Development, Organisational Improvement, Human Resources Management, Communication Skills), other professional skills defined in the curriculum: 10-20 credit points;
- Engineering Management [System Analysis, Design and Control of Systems, Process Control, Technologies in different branches (engineering industry, chemical industry, nanotechnology, biotechnology, waste management), other professional skills defined in the curriculum]: 15-35 credit points.

Credit points assigned to field-specific subjects along with thesis: 40-60.

Minimum of credit points assigned to optional subjects: 6

Credit points assigned to thesis: 30

Credits total: 120

During the program students have to complete a total amount of 120 credit points. It means approximately 30 credits pro semester. The curriculum contains the list of subjects

(with credit points) and the recommended order of completing subjects which takes into account the prerequisite(s) of each subject.

There is a certain degree of freedom in the order students can complete the subjects. However, it is recommended that the suggested order be followed because some subjects can only be taken after the completion of the prerequisite subject(s), and/or can be the prerequisites for other subjects. You can find the recommended list of subjects in chapter "Guideline".

Guideline (Lisf of Subjects/Semesters)

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

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

The list of subjects you have to complete in the semesters according to the model curriculum of Engineering Management MSc programme **Construction Industry specialization**.

1st semester	2nd semester
Quantitative Methods	Ecological Planning
Mechanics II.	Econometrics
Introduction to Nanotechnology	Digital System Design
Development of Organization and	Operation Management
Advanced Corporate Finance	Advanced Quality Management
Energy Conscious Architecture	Building Energetics II.
Optional subject I.	Optional subject II.
3rd semester	**4th semester**
Negotiation and Conflict Management	Leadership Competencies Development
International and Management Accounting	Control of Integrated Information System
Project Leadership	Construction Management III.
Risk and Reliability	MSc Thesis II.
Reconstruction	
Complex Project	
MSc Thesis I.	
Industrial Internship	

The list of subjects you have to complete in the semesters according to the model curriculum of Engineering Management MSc programme **Industrial Process Engineering specialization**:

1st semester	2nd semester
Quantitative Methods	Ecological Planning
Mechanics II.	Econometrics
Introduction to Nanotechnology	Digital System Design
Development of Organization and	Operation Management
Advanced Corporate Finance	Advanced Quality Management
Production Technologies	Cellular Manufacturing
Optional subject I.	Optional subject II.
3rd semester	**4th semester**
Negotiation and Conflict Management	Leadership Competencies Development
International and Management Accounting	Control of Integrated Information System
Project Leadership	System Engineering
Risk and Reliability	MSc Thesis II.
Fuzzy Logics	
Complex Project	
MSc Thesis I.	
Industrial Internship	

The list of subjects you have to complete in the semesters according to the model curriculum of Engineering Management MSc programme **Material Handling and Logistics specialization**:

1st semester	2nd semester
Quantitative Methods	Ecological Planning
Mechanics II.	Econometrics
Introduction to Nanotechnology	Digital System Design
Development of Organization and Human Resource	Operation Management
Advanced Corporate Finance	Advanced Quality Management
Advanced Production Logistics	Digital Logistics
Optional subject I.	Optional subject II.
3rd semester	**4th semester**
Negotiation and Conflict Management	Leadership Competencies Development
International and Management Accounting	Control of Integrated Information System
Project Leadership	System Engineering
Risk and Reliability	MSc Thesis II.
Supply Chain Informatics System	
Complex Project	
MSc Thesis I.	
Industrial Internship	

Work and Fire Safety Course

According to the Rules and Regulations of University of Debrecen a student has to complete the online course for work and fire safety. Registration for the course and completion are necessary for graduation. For MSc students the course is only necessary only if BSc diploma has been awarded outside of the University of Debrecen.

Subject code: MUNKAVEDELEM

Link: http://munkavedelem.unideb.hu/1_eves-ENg.htm

Login: Neptun ID plus password

Students have to read the material until the end to get the signature on Neptun for the completion of the course.

Internship

Internship is a mandatory and integral part of the course of studies and strongly related to thesis. The duration of internship is at least 4 weeks (without interruption) and undertaken at a production company.

Credit points: 0

Physical Education

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

Optional Courses

According to the Rules and Regulations of University of Debrecen a student has to complete elective courses during his/her Master's training. These elective courses are opened by the Departments at the Faculty of Engineering at the beginning of the actual semester. You can find the list of the actual semester under "Current Students">"Useful Information about your Study">"Optional subjects".

A student can also select optional courses from other faculties of University of Debrecen to complete.

In the Engineering Management MSc programme you have to gain at least 6 credits with completing elective subjects.

Pre-degree Certification

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

Thesis

Thesis is the creative elaboration of a professional task (fields: engineering processes, finance, economics, marketing, corporate finance, management, quality and environment controlling, production and banking) in written form as defined in the requirements of the training program. By solving the task the student relies on his/her studies using national and international literature under the guidance of an internal and external supervisor. By preparing and defending thesis students who complete the Engineering Management master's program prove that they are capable of the practical applications of the acquired skills, summarizing the work done and its results in a professional way, creatively solving the tasks related to the topic and doing individual professional work.

Precondition for taking the state exam for MSc students is to prepare the thesis. Requirements of the training program contain the content requirements for thesis, the general aspects of the evaluation and the number of credit points assigned to thesis (30).

Thesis topics are announced by the departments until the end of Week 4 of the study period of the last but one semester. The department hands out thesis guides to assist

students with preparing thesis. Thesis topic can be suggested by the student, as well. The head of department decides on the acceptance of the topic. The conditions on the acceptance of thesis as National Conference of Scientific Students' Association (hereinafter NCSSA) topic are specified by the Faculty. The NCSSA work is supposed to meet the requirements in form and content for thesis. Furthermore, it is necessary that the committee of the Pre-NCSSA makes suggestions on the NCSSA work to become a thesis. Formal requirements of thesis are announced in writing by the department.

Thesis is prepared under the guidance of an internal supervisor previously approved by the department and with the assistance of an external supervisor also previously approved by the department.

The faculty academic calendar (issued by the Vice-Rector for Education) sets the thesis submission deadline, for want of this the head of department decides.

Thesis is evaluated by the referee. On the basis of the thesis review report the internal supervisor makes suggestions for the evaluation of thesis. Finally, the committee assesses thesis in a five-point system. If thesis has been unequivocally assessed with a fail by the referees, then the candidate is not allowed to take the state exam and is supposed to prepare a new thesis. The candidate has to be notified of the decision. Conditions on resubmitting the thesis are defined by the program coordinator.

State Exam

Students having obtained the pre-degree certificate will finish their studies in the Engineering Management master's (MSc) program by taking the state exam. State exam means the testing and evaluating of the knowledge (skill) necessary to obtain higher education qualification. In the state exam candidates prove that they can apply the acquired knowledge. Requirements of the training program contain the preconditions on taking the state exam and the procedure of the state exam itself. State exam can be taken in the first state exam period after the award of the pre-degree certificate. State exam is conducted in front of the state exam board. If the candidate fails to take the state exam until the termination of his/her student status, he/she is allowed to take the state exam after the termination of his/her student status according to the regulations (in relation to state exams) which applied at the time of the candidate's first taking the state exam.

State exam consists of different parts (as defined in the curriculum):

- defending thesis, answers to possible questions, remarks;
- oral exam: 1: Integrated Management Module: Advanced Corporate Finance, Advanced Operation Management, Advanced Quality Management, Project Management.

Engineering modules depending on the specialization:

- Oral exam 2: Engineering Module – Industrial Process Engineering Specialization: Production Technologies, Manufacturing Cells, Fuzzy Logic, Computer System Engineering.

- Oral exam 2: Engineering Module – Construction Industry Specialization: Energy-Conscious Architecture, Building Energetics, Reconstruction, Construction Management.

- Oral exam 2: Engineering Module – Material Handling and Logistics Specialization: Advanced Production Logistics, Digital Logistics, Computer Systems of Supply Chain, Computer System Engineering.

The latest that the requirements and topics of the oral part of the state exam are announced by the department is the study period of the final semester. The oral exam is evaluated on a five-point scale by the members of the committee. Final grade for the state exam will be decided on in a closed sitting. In case of equal votes the committee chair will decide. State exam results will be announced by the committee chair. A note of the state

exam will be taken. The marking scheme contains the diploma grade and the grades awarded for the different parts of the state exam.

Improving failed state exam

In order to obtain diploma state exam has be retaken - according to Rules and Regulations of the University - if any of its part is a fail. The ensuing state exam period is the soonest that the re-sit is allowed.

State exam board

Committee chair is called upon and mandated by the dean with the consent of the Faculty Council. He/she is selected from the acknowledged and well-known external experts of the professional field or the professors of the University. The state exam board consists of – besides the chairman – at least two members and the required number of examiners. The mandate of the state exam board is limited to a year. Students are allocated to different examination boards by the department.

Course Descriptions for Engineering Management MSc

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

Subject group "Science Knowledge" (for all 3 specializations)

Quantitative Methods

Code: MK5KVANA04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

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

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

Literature:

Compulsory:

- Rice, J. A. (2007): Mathematical statistics and Data Analysis. Belmont. Thomson's.
- Wolfram, S. (2003): The mathematica book. Champaing. Wolfram Media.

Recommended:

- STATISTICS Methods and Applications:
- http://www.statsoft.com/textbook
- Murphy, P.: Introduction to Quantitative Methods:
- http://www.ucd.ie/statdept/classpages/introductiontoquantitativemet.htm
- Investopedia (www.investopedia.com) CFA Level 1 - Chapter 2: Quantitative Methods:

- http://www.investopedia.com/study-guide/cfa-exam/level-1/quantitative-methods/
- Cornuejols, G. - Trick, M.: Quantitative Methods for the Management Sciences (Course Notes)
- http://mat.gsia.cmu.edu/classes/QUANT/

Schedule

1st week Registration week	
2nd week: **Lecture:** Types of optimization problems: unconstrained and constrained optimization. **Practice:** Problems related to optimization.	3rd week: **Lecture:** Methods of optimization: derivative-based optimization. **Practice:** Problems related to derivative-based optimization.
4th week: **Lecture:** Derivative-free optimization I (genetic algorithms, neural networks). **Practice:** Problems related to derivative-free optimization.	5th week: **Lecture:** Derivative-free optimization II (decision trees, clustering). Network optimization. **Practice:** Problems related to derivative-free optimization.
6th week: **Lecture:** Survey of probability calculus (probability space, random variables, probability distributions, limit theorems) **Practice:** Problems related to probability calculus.	7th week: **Lecture:** Basics of statistics: point estimation, interval estimation, hypothesis testing **Practice:** Hypothesis testing.
8th week: 1st drawing week	
9th week: **Lecture:** Normality test, one- and two-factor ANOVA **Practice:** ANOVA	10th week: **Lecture:** Basics of decision theory – decision model, decision matrix, decision-making process. **Practice:** Process simulation
11th week: **Lecture:** Monte Carlo methods **Practice:** Process simulation.	12th week: **Lecture:** Basics of game theory **Practice:** Problems related to game theory.
13th week: **Lecture:** Time series characteristics. Time series regression.	14th week: **Lecture:** ARIMA models, Markov chains.

Practice: Problems related to time series.	**Practice:** Problems related to Markov chains.
15th week: 2nd drawing week	

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Mechanics II.

Code: MK5MEC2G04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The aim of the subject is to introduce the analytical and numerical methods used in mechanics for calculating stress and strain measures in engineering structures. Stress

resultant determination. Strength of materials. Material models, material constants. Sizing methods. Fundamentals of finite element method. Numerical calculations through finite element software.

Literature:

Compulsory:

- Mankovits, T. (2014): Numerical Analysis of Engineering Structures (Linear Elasticity and the Finite Element Method), University of Debrecen, Debrecen, Hungary, ISBN: 978-963-473-797-1, p. 181.

Recommended:

- Kovács, Á., Moharos, I., Oldal, I., Szekrényes, A. (2012): Finite Element Method, Typotex, Budapest, Hungary, p. 383.
- Zienkiewicz, O.C., Taylor, R.L. (2000): The Finite Element Method: Solid Mechanics, Butterworth-Heinemann, London, England, ISBN: 0750650559, p. 477.

Schedule

1st week Registration week	
2nd week: **Lecture:** Fundamentals of Strength of Materials. **Practice:** Determination of stress resultants. Mathematical preliminaries (vector-, matrix- and tensoralgebra).	3rd week: **Lecture:** Elastic and plastic deformation. Displacement fields. Physical interpretation of strain terms. State of deformation. **Practice:** Practical examples for strain calculations.
4th week: **Lecture:** State of stresses. Principal values of normal stresses, principal axes. Energy of strain. Constitutive equation (Hooke's law). **Practice:** Practical examples for stress calculations. Strain energy calculations in beams.	5th week: **Lecture:** Simple loadings I.: tension and compression, bending of prismatic beams. **Practice:** Practical examples for tension and compression and bending.
6th week: **Lecture:** Simple loadings II.: torsion of prismatic beams with circular and ring cross sections. **Practice:** Practical examples for torsion.	7th week: **Lecture:** Combined loadings I.: tension and bending, inclined bending, excentrical tension. **Practice:** Practical examples for combined loadings. **1st test.**
8th week: 1st drawing week	
9th week:	10th week:

Lecture: Combined loadings II.: tension and torsion, bending and torsion. Sizing methods. **Practice:** Practical examples for combined loadings.	**Lecture:** Fundamentals of linear elasticity. Displacement field, strain field, stress field. **Practice:** Calculation of strain and stress measures. Principal values of normal stresses, scalar invariants and equivalent stresses.
11th week: **Lecture:** The basic equation system of linear elasticity (equilibrium equation, constitutive equation, kinematic equation). Boundary conditions (kinematical boundary condition, dynamical boundary condition). **Practice:** Introduction of general purpose finite element software.	**12th week:** **Lecture:** Linear spring as a finite element. Formulation of the finite element method. General derivation of the displacement based finite element equilibrium equations. **Practice:** Solution of numerical examples by the usage of Femap 9.3 (prismatic bar problem, truss structure).
13th week: **Lecture:** Isoparametric finite elements. One-, two- and three-dimensional mapping. **Practice:** Solution of numerical examples by the usage of Femap 9.3 (plate with a hole, tube under internal pressure, analyzing pressure vessel).	**14th week:** **Lecture:** General purpose finite element programs. Modelling questions. Meshing, postprocessing. Error analysis. **Practice:** Solution of a numerical example by the usage of Femap 9.3 (analysis of an assembly). **2nd test.**
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classess 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 table:

Score	Grade
0-59	fail (1)

60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Introduction to Nanotechnology

Code: MK5NANOM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The chemistry and physics nanotechnology importance of 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 describing the importance of nanotechnology in practice and the role of chemistry and physics in development of nanotechnology.

Literature:

Compulsory:

- Bharat Bhushan (ed.): Springer handbook of nanotechnology, (2004) Berlin, New York, Springer-Verlag
- Alain Nouailhat: An Introduction to Nanoscience and Nanotechnology, (2008) WILEY, London

Recommended:

- Peter Fratzl, John W.C. Dunlop, Richard Weinkam (ed.): Materials Design Inspired by Nature: Function Through Inner Architecture, (2013), RCS Publishing
- Gabor L. Hornyak, J. J. Moore, H.F. Tibbals, J. Dutta: Fundamentals of Nanotechnology, (2008), CRC Press

Schedule

1st week Registration week

2nd week: **Lecture:** Introduction to the course, Historical perspective of micro and nano-manufacturing technology, advantages and applications of nanotechnology **Practice:** Ethics and environmental effects of nanotechnology	3rd week: **Lecture:** Materials overview, atomic structure, bonding, polymers, electrical characteristics, crystal structures and defects, physical chemistry of solid surfaces **Practice:** Real crystal structures models building
4th week: **Lecture:** Physical and chemical properties of materials Introduction to composites materials and there application. **Practice:** Properties' modification at different temperatures	5th week: **Lecture:** Overview of Nano Fabrication Methods: Top-down and bottom-up approaches **Practice:** Effects of grain size variation
6th week: **Lecture:** Lithography, deposition, material modification methods, processes and equipment **Practice:** Wet and dry etching	7th week: **Lecture:** Characterization Tools, Optical microscopy, Spectrophotometer, Scanning Electron Microscope, AFM, FFM **Practice:** Investigation of nano structures
8th week: 1st drawing week	
9th week: **Lecture:** Sol-gel processing, applications, properties of nano particles **Practice:** Making of colloid structure	10th week: **Lecture:** Dispersion in physical and chemical systems **Practice:** Investigation of colloid structures
11th week: **Lecture:** Introduction to nano-magnetism **Practice:** Nanomagnetism applications	12th week: **Lecture**: Nanomaterial inspired by nature **Practice:** Nature tech application
13th week: **Lecture:** Nano material characterization methods, Organic compounds and bio-applications of nano-materials **Practice:** Application of bio- and chemi sensors	14th week: **Lecture:** Application of nano-materials Carbon Nano Tubes **Practice:** Sensor technologies
15th week: 2nd drawing week	

Requirements

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 60 % 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).

Ecological Planning

Code: MK5OKOTE04MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

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

Topics:

Ecology, ecosystem services, DPSIR model, sustainable building, sustainable urban development, sustainable rural planning, green spaces, wetlands, ecohydrology, protection of the aquatic environment, pollution sources, system-thinking approach, engineering calculations and measures to be applied.

Literature:

Compulsory:

- Vaccari, D. A. (2006): Environmental biology for engineers and scientists. Hoboken. N.J. Wiley-Interscience.
- Perlman, D. L. – Milder J. (2004): Practical Ecology for Planners, Developers, and Citizens. Island Press. ISBN-10 1559637161
- Jolánkai G.: Systems approach to managing the aquatic environment. Text-book for post-graduate and PhD courses by the author. (will be digitally provided by the lecturer), p 85

Schedule

1st week Registration week	
2nd week: **Practice:** Introduction of the ecological approach in planning processes. New ideas and tools. The Millennium Ecosystem Assessment	3rd week: **Practice:** Driving-Pressure-Status-Impact-Response (DPSIR) model, part of the decision support system.
4th week: **Practice:** Settlement as ecosystem. The role and importance of ecosystems in urban areas. Interactions between natural and manmade environments.	5th week: **Practice:** Sustainable building, urban and regional development and planning – ecological approach applied in engineering. Smart cities. (water, waste and energy issues)
6th week: **Practice:** Effect of green spaces and open water surface (climate, moisture, temperature, ecosystem, aesthetics) in urban areas.	7th week: **Practice:** Introduction into Ecohydrology (part 1). Ecological aspects in the water management and rural planning. Engineering measures in wetlands (goals, types snd impacts).
8th week: 1st drawing week	
9th week: **Practice:** Introduction into the ecohydrology (part 2). Issues of the protection of the aquatic environment. Analysis of the physical, chemical, and biological indicators of water quality. Water balance equation.	10th week: **Practice:** System-thinking as the 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: **Practice:** Causes, consequences, and solutions of pollution in surface fresh	12th week: **Practice:** The fundamental tools of the water quality protection and management

waters. Pollution sources. Water quality management system as the tool for designing measures for the maintenance or improvement of the status of environment.	of aquatic environment: management strategies: waste water treatment. (Point pollution sources)
13th week:	**14th week:**
Practice: Management of diffuse pollution sources. Techniques to be applied for rivers and lakes: discharge and river management, lake-management. Ecohydrological aspects.	**Practice:** The theory of engineering calculations on the field of water quality management, transport and transformation processes.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation and attendance is also part of your final grade. You are expected to attend class 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 grade:

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Econometrics

Code: MK5OKONM04MV17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

The objective of this course is to prepare students for basic empirical work in economics. This course aims to make students familiar with the basic concepts of econometric analysis. In particular, the course will be focused on the data analysis, regression analysis, testing, and forecasting. By the end of the course, the student should be able to understand the scope and limitations of classical econometric techniques, read, write and properly interpret articles and reports of an applied econometric nature using these techniques.

Literature:

Compulsory:

- Wooldridge, J. (2013): Introductory Econometrics: A Modern Approach Upper Level Economics Titles Series. South-Western Cengage Learning. ISBN: 1111531048, 9781111531041. Fifth Edition.
- Ramanathan, R. (2002): Introductory econometrics with applications. Harcourt College Publishers. Fifth Edition. ISBN: 0-03-034342-9.

Recommended:

- Brooks, C. (2008): Introductory Econometrics for Finance. Second Edition. Cambridge University Press. ISBN: 1139472305, 9781139472302.
- Dougherty, C. (2011): Introduction to Econometrics. Fourth Edition. Oxford University Press. ISBN: 978-0-19-956708-9.

Schedule

1st week Registration week	
2nd 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) **Practice:** Calculating Problems – Computer related problems	**3rd week:** **Lecture:** Relationship among variables - Correlation Analysis (Types of correlation, Scatter diagrams, Correlation graph, Pearson's coefficient of correlation, rank correlation) **Practice:** Correlation (negative and positive correlation – examples, linear and non-linear correlation, Properties of Pearsonian Correlation Coefficient, Calculations for Coefficient of Correlation.
4th week: **Lecture:** Linear Regression – The simple regression model I.	**5th week:** **Lecture:** Linear Regression – The simple regression model II. - Goodness of Fit

Deriving the Ordinary Least Squares Estimates **Practice:** Calculating Problems – Computer related problems. (Dependent – independent variable, error term, fitted values and residuals, Algebraic Properties of OLS Statistics)	**Practice:** Calculating Problems - total sum of squares (SST), the explained sum of squares (SSE), and the residual sum of squares (SSR), R-squared of the regression.
6th week: **Lecture:** The Expected of the OLS estimators The Variances of the OLS Estimators - Unbiasedness of OLS **Practice:** Calculating Problems – Computer exercises	**7th week:** **Lecture:** Estimating the Error variance; (Variances of the OLS Estimators, Heteroskedasticity, homoskedasticity) **Practice:** Sampling Variances of the OLS Estimators, Case study analysis
8th week: 1st drawing week	
9th week: **Lecture:** Hypotheses Testing: The t Test, Confidence intervals, The F test **Practice:** Calculating Problems – Computer related problems. (Confidence intervals, F and t statistics)	**10th week:** **Lecture:** Nonlinear regression model I - Linearization **Practice:** The linearized regression - Logarithmic Functional Forms; Quadratic function, The double logarithmic functions
11th week: **Lecture:** Non-linear regression model II **Practice:** Functional forms - exponential, hyperbolic, polynomial model	**12th week:** **Lecture:** Multiple regression analysis I - estimation **Practice:** The 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 **Practice:** The Model with k Independent Variables – computer related problem	**14th week:** **Lecture:** Time series data analysis (The nature of time series data, Time series regression models, index numbers) **Practice:** Computer related problems – Complex model problem (estimation of time series regression model)
15th week: 2nd drawing week	

Requirements

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, teamwork and presentation (50p+50p+50p).

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 table:

%	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.

Subject group "Economics and Humanities" (for all 3 specializations)

Development of Organization and Human Resource

Code: MK5SZEMM04MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 1st semester

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

Topics:

The aim of this course is describing the organizational changes and the management of organizational development processes, tools and models through processing case studies.

Literature:

Compulsory:

- Mee-Yan Cheung-Judge, Linda Holbeche (2015): Organization Development: A Practitioner's Guide for OD and HR. Kogan Page; 2 edition. ISBN-10: 0749470178
- W. Warner Burke, Debra A. Noumair (2015): Organization Development: A Process of Learning and Changing. Pearson FT Press; 3 edition. ISBN-10: 0133892484
- W. Warner Burke (2013): Organization Change: Theory and Practice (Foundations for Organizational Science series). SAGE Publications, Inc; 4 edition. ISBN-10: 145225723X
- Raymond Noe, John Hollenbeck, Barry Gerhart, Patrick Wright (2013): Fundamentals of Human Resource Management with Connect Plus. McGraw-Hill/Irwin; 5 edition. ISBN-10: 0077801989
- Robert N. Lussier, John R. Hendon (2012): Human Resource Management: Functions, Applications, Skill Development. SAGE Publications, Inc; 1 edition. ISBN-10: 1412992427Recommended:

Schedule

1st week Registration week	
2nd week: **Lecture:** Situation analysis, Organizational Structure Determination, job Descriptions, information flow **Practice:** SWOT, PEST, BCG, Drawing an organization chart and information flow map	3rd week: **Lecture:** Identification of problems, exploring the causes of problems, Appointment of intervention points **Practice:** Ishikawa and pareto analyses, What you need to improve?
4th week: **Lecture:** The designation of specific (quantitative and qualitative) development goals, Appointment of persons involved in organizational development **Practice:** Ordering tools and methods of intervention points, Assigning tasks	5th week: **Lecture:** Establish a timetable **Practice:** Gantt chart
6th week: **Lecture:** Ordering quantitative and qualitative indicators of the planned interventions **Practice:** SMART method	7th week: **Lecture:** Planning corrective actions **Practice:** PDCA cycle
8th week: 1st drawing week	
9th week:	10th week:

Lecture: Human resource management planning system, Strategies, planning, evaluation **Practice:** Creating a concrete strategy	**Lecture:** Job and competence analysis, Elements and analyzes of the job system, Process analysis **Practice:** Job and competence analysis based on case studies
11th week: **Lecture:** Resource insurance systems, Recruitment, selection, insertion and retraction **Practice:** Case study, situational tasks	**12th week:** **Lecture:** Career management, Lifetime phases, career components **Practice:** Creating a career plan
13th week: **Lecture:** Performance Management and Performance Evaluation Systems, Design and strategy of Performance Management **Practice:** Case study	**14th week:** **Lecture:** Staff Development System and employee relations system **Practice:** Case study
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there is one test: the end-term test is on the 15th week. Students must sit for the test.

B, for a grade:

The course ends in a mid-semester grade based on the one test.

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Negotiation and Conflict Management

Code: MK5TKOMM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

Negotiation and Conflict Management

Literature:

Miscellaneous articles, clippings and videos of the most recent literature published in the Harvard Business Review

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction to the role of communication **Practice:** the role of communication in a professional environment, enhancing efficiency of conflict management and negotiations	**3rd week:** **Lecture:** Communication in a multi-lingual, multi-cultural professional environment I. **Practice:** cross-cultural understanding, rules of etiquette, verbal and non-verbal communication
4th week: **Lecture:** Communication in a multi-lingual, multi-cultural professional environment II. **Practice:** dos and don’ts in negotiations and conflict management	**5th week:** **Lecture:** The importance of the development of communication skills I. **Practice:** sources of conflict and misunderstanding in internal communication, external communication
6th week: **Lecture:** Complaining in person and on the phone, sources of conflicts **Practice:** complaining, handling complaints	**7th week:** **Lecture:** Complaining in person and on the phone **Practice:** complaining, handling complaints

8th week: 1st drawing week	
9th week: **Lecture:** Handling problems/complaints in person and on the phone **Practice:** describing problems, getting solutions, handling misunderstandings	10th week: **Lecture:** Complaints and handling complaints in writing **Practice:** checking letters of complaints and replies given to letter of complaints
11th week: **Lecture:** Speaking to business associates and superiors in a formal, informal or semi-formal situation **Practice:** setting the degree of formality, adjusting to the given degree of formality	12th week: **Lecture:** Types of negotiations and negotiators, Preparing for negotiations **Practice:** types of negotiations and what type(s) of negotiators are the most effective, listing and deciding on aims, imperatives, desirables and areas where you can make concessions
13th week: **Lecture:** Entering negotiations; the rules of bargaining **Practice:** getting what you want, give a little-get a little, types of negotiations	14th week: **Lecture:** Communicating results, decisions and other follow-up activities after negotiations **Practice:** how to close negotiations, verbal and written confirmation of what has been achieved/agreed
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students cannot 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.

Attendance is compulsory.

B, for a grade:

Completion of home assignments by deadline

Leadership Competencies Development

Code: MK5KOMPM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

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

Topics:

Preparing students for participating in the management tasks and competencies.

Literature:

Compulsory:

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

Schedule

1st week Registration week	
2nd week: **Lecture:** Defining leadership, the role or personality to be a leader, soft skills **Practice:** Group work, situational task, discussion with dispute method	**3rd week:** **Lecture:** Planning, organizing, directing, controlling, innovation, representation and make a decision **Practice:** Situational tasks in group
4th week: **Lecture:** Autocratic, bureaucratic, laissez-faire, democratic, transformational leadership style **Practice:** Tests measuring leadership styles, discussion of the results	**5th week:** **Lecture:** 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 **Practice:** Tests measuring leadership qualities, discussion of the results
6th week: **Lecture:** Wrong time management, time thieves, procrastination, planning, Eisenhower's principle, delegation **Practice:** Methods and techniques managing your time	**7th week:** **Lecture:** Grouping of conflicts, emergence of the conflicts, conflict management types **Practice:** Steps of problem-solving strategy test for defining the own conflict management style, situational tasks
8th week: 1st drawing week	
9th week:	**10th week:**

Lecture: Motivation in leadership, Abraham Maslow's hierarchy, Herzberg model **Practice:** Motivational leadership self-tests, situational tasks, how can you motivate your colleagues as a leader	**Lecture:** Working in team, leading team, differences between the team and the group **Practice:** Competencies for team leading in practice
11th week: **Lecture:** What is a problem? How can it be solved? **Practice:** Problem solving methods	**12th week:** **Lecture:** Determining emotional intelligence, highlighting the EM's role and its effect in the leadership **Practice:** Tests measuring the emotional intelligence, discussion of the results
13th week: **Lecture:** Planning and organization processes, control of activities **Practice:** Case studies, team work	**14th week:** **Lecture:** Stability under stress, self-confidence, sturdiness, serenity **Practice:** Situational tasks in group
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Advanced Corporate Finance

Code: MK5HVLPM04MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+3

Topics:

Cash flow analysis. Future value of money and present value of money. The relationship between future value and present value. Economic evaluation of investments with identical (different life-times). Investment decision making processes. The value of bonds Project Analysis. Capital investment process; Sensitivity analysis, Option algebra. Investments and economic rents. The relationship between risk and return. Examination of portfolio risk. Valuation of stocks, Performance measurement and financial decisions, Economic and market value added.

Literature:

Compulsory:

- Brealey, R. A. - Myers, S. C. – Allen, F (2011): Principles of Corporate Finances. McGraw-Hill/Irwin. ISBN: 0077356381, 9780077356385
- Ogden, J. – Jen, F. C. – O'Connor, P. F. (2002): Advanced corporate finance. Prentice Hall. ISBN-10 0130915688

Recommended:

- Scott Besley - Eugene F. Brigham (2011): Principles of Finance. Cengage Learning. ISBN: 1111527369, 9781111527365

Schedule

1st week Registration week	
2nd week: **Lecture:** Corporate finance investment and financing decisions. The financial goal of the corporation. Future value calculation I. **Practice:** Preparatory overview of financial calculation I. Calculation Problems – Cash	**3rd week:** **Lecture:** Review of the future value and present value calculation. **Practice:** Preparatory overview of financial calculation II. Calculation exercises: Ordinary annuity and annuity due. Review

flow analysis. Future value and present value. Continuous compounding.	of the future value and present value calculation. Valuing Cash Flows in Several Periods.
4th week: **Lecture:** The present value of an investment opportunity. Net Present Value. The opportunity cost of capital. Profitability index. **Practice:** Calculation Problems – Net present value.	**5th week:** **Lecture:** Net present value and other investment criteria. Making investment decisions I. Investment in Physical Capital and Human Capital. **Practice:** Calculation Problems/computer related problems – Internal rate of return, modified IRR, problem of limited resources.
6th week: **Lecture:** Making investment decisions II. **Practice:** Calculation Problems – equivalent annual cost- choosing the discount rate, choosing among projects.	**7th week:** **Lecture:** Investment decisions – economic rent – purchasing decisions, annuities. Complex investment problem - Sensitivity analysis. Interest rates, risk, inflation and present value. **Practice:** Calculation Problems, Complex investment problem – computer related problems.
8th week: 1st drawing week	
9th week: **Lecture:** Valuation of bonds, Duration, volatility. Market value added - Economic value added. **Practice:** Price and interest rate, time to maturity, yield to maturity, and yield to call. Calculation Problems (Stocks, financial indicators).	**10th week:** **Lecture:** The Value of Common Stocks, Project analysis I. **Practice:** Risk and rates of return, cost of capital. Computer related problems.
11th week: **Lecture:** Portfolio analysis. Portfolio returns and risk. Diversifiable risk and market risk. **Practice:** Portfolio analysis – Calculation problems.	**12th week:** **Lecture:** Options I. (Call options, put options). Exercise price. Position and profit diagram. **Practice:** Calculation Problems – computer related problems.
13th week: **Lecture:** Options II. – Option algebra **Practice:** Option strategies – computer related problems (bull, bear call/put	**14th week:** **Lecture:** Integrated financial/ investment problems. International investment decisions. **Practice:** Computer related problems.

spread, call/put butterfly, Call/put straddle options).	
15th week: 2nd drawing week	

Requirements

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, 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 table:

%	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, end-term tests and the teamwork is at least good (4). The offered grade is the average of them.

International and Management Accounting

Code: MK5NVSZM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

This course introduces the 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 the knowledge and ability to prepare, understand, evaluate, and execute financial and non-financial reports used in business organizations. Managers face 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 is an important skill for a career in corporate management, business consulting, financial services.

Literature:

Compulsory:

- Kaplan Publishing (2015): ACCA Paper F2 and FIA Diploma in Accounting and Business, Management Accounting (MA/FMA) Complete Text, Kaplan Publishing UK, ISBN: 978-1-78415-441-7
- Study materials provided by the lecturer

Recommended:

- Warren, C. - Reeve, J. – Duchac, J (2015): Financial & Managerial Accounting. Cengage Learning. 13th Edition. ISBN: 130548049X, 9781305480490
- Maher, M. – Stickney, C. – Weil, R. (2011): Managerial Accounting: An Introduction to Concepts. Methods and Uses. Cengage Learning. 11th Edition. ISBN: 1111571260, 9781111571269

Schedule

1st week Registration week	
2nd week: **Lecture:** The overview of financial accounting. Legal frameworks. The aim of accounting law (IFRS accounting, according to standards. The smallholder's concept. Scope of the Accounting Act. Structure of the Accounting Act. Accounting principles, Accounting obligations. Structure of	**3rd week:** **Lecture:** The annual report (financial statement IFRS). Balance structure, relationship with account classes. Structure of the profit and loss account and its relationship with the account classes. **Practice:** For an existing company's financial statements. Understand the balance sheet,

account classes and their relationships with other account classes. Accounting for specific economic events. Types of accounting documents.

Practice: Accounting of different business events. The content elements of the basic accounting documents of accounting and bookkeeping documents are familiar to them in the context of actual tasks.

4th week:

Lecture: The role and limits of traditional management accounting. Management accounting as the most important constructor element of controlling. Controlling definition, aims and functions within the organization. The place of management accounting in corporate management. Structure of the management accounting information system. The final product of management accounting is the management report. Responsibility principle in management accounting.

Practice: A complex task is solved by using the lessons learned so far and the topics to be studied during the semester, as well as the students to gain insight into the topics to be dealt with during the semester. Planning, control, management, information supply.

6th week:

5th week:

Lecture: Cost Consciousness. Definition of cost management. The areas of Cost Planning. Planning of costs, cost allocation, cost calculation, coverage analysis. Interpretation of capacity and cost. The operating of capacity, capacity are his maintenances. Non-controllable resources, flexible controllable resources. Substance (CAPEX) and human (HUMEX) expenditures of investment and development.

the financial statement, the supplementary attachment, the content of the business report.

5th week:

Lecture: Cost Accounting. The purpose of cost calculation. Definition and clarification of cost, expenditure, and expense concepts. Nature and behavior of costs. Accounting Cost, Economic Cost, Normal Cost, Economic and Accounting Profit Relationship. Costs related to continuous operation, functions costs (OPEX). The concept of explicit cost, implicit cost (accountable, non-eligible). Remittance of Costs. Analytic and ledger register of costs.

Practice: The relationship between costs, expenses and expenditures through a concrete example. The identification of costs, expenses and expenditures in the process from procurement to sales. The identification of accounting processes for major processes. Voucher order.

7th week:

Lecture: Certified and not certified expenses. Relationship between costs and expenditures. Total Cost Procedure, expense result statement according to procedure. Expenses incurred during the period and incurring a period. Possibilities for additional grouping of costs. Accountability, volume relationship, the form of appearance, complexity, classification according to level of

Practice: Practical questions of cost management. Practical application of coverage analysis in a numerical example. The contact of the resource and capacity through exercises.	responsibility, controllability, and influence ability. **Practice:** Identification of certified and non-certified costs. Analysis of Total Cost and cost procedures. The structure of their information system and their peculiarities.
8th week: 1st drawing week	
9th week: **Lecture:** Principles of cost calculation: justiceship, emphasis direct costs; consistency; completeness; accruals, correct choice of the project funds. Time horizon of cost calculation. Structure of a possible calculation data sheet. The identification of the direct costs. Cost calculation methods, costing. **Practice:** Exercising structure of a possible calculation data sheet. Identifying the elements through practical examples. Determining the value of the self-produced stocks.	**10th week:** **Lecture:** Divisor costing (simple, equivalent); complementing costing (global; sorter; activity-based), mixed costing; normative costing. Other traditional cost calculation methods. Connection between the content of the production costs and the outcome. Positive negative stock changes. **Practice:** Knowing prime cost calculation through practical examples. Equivalent, simple one stage, multistage, divisor costing examples. Complementing costing examples (global; sorter). Normative costing examples.
11th week: **Lecture:** New calculation methods. Information request of the activity-based cost calculation, and its structure. Identifying costing places. Repair option of the effectiveness of the cost allocation. Comparison the traditional and activity-based complementing method. **Practice:** Practical questions of identifying costing places. Solving several examples with the activity-based cost calculation methods. Comparison the traditional and activity-based complementing method through practical examples.	**12th week:** **Lecture:** Classification of economic analysis. Grouping criteria's. Time, analytical procedure, scope, status and frequency of the production process, method and content of analysis. Balance sheet, profit and loss statement, cash flow analysis. Creating indicators. Liquidity, asset management, tax treatment, profitability. Comprehensive analysis of economic activity. **Practice:** Analysis of the report of an existing economically active company based on the principles known in the lecture
13th week: **Lecture:** Analysis the Balance sheet. Quick Diagnosis Indicators. Liquidity quick ratio, Stability and indebtedness indicator.	**14th week:** **Lecture:** Efficiency indicators. Yields (Net sales, gross output, value-free production, net production value, value added, and

Analysis status of the assets. The process of converting assets into cash. Liquidity analysis. Vertical analysis options. Vertical indicators of assets and sources. Horizontal indicators. Analysis of profit and loss statement. Categories of the profit and loss and selecting the right projection funds. Analysis of income status. Profitability indicators. **Practice:** Analysis of the report of an existing economically active company based on the principles known in the lecture. Analysis the Balance sheet, and the Profit and loss statement.	enterprise income funds). Returns indicators. ROCE (rate of return on capital employed), EPS (earnings per share), ROA (return on asset), ROE (return on equity), ROI (return on investment), ROIC (return on invested capital), EBIT (operational / business / profit), EBITDA (EBIT+ amortization). NOPLAT (Net Operating Profit Less Adjusted Taxes). **Practice:** Analysis of the report of an existing economically active company based on the principles known in the lecture
15th week: 2nd drawing week	

Requirements

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. During the semester there are two tests: the mid-term test on the 7th week and the end-term test on the 14th week. Students must sit for the tests. Solving team tasks on the exercises, pre-published themes for presentation.

B, for a grade:

Marks offered based on both test and team tasks, otherwise written exam.

Subject group “Field-Specific Subjects” (for all 3 specializations)

Digital System Design

Code: MK5ALKMM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

Number of teaching hours/week (lecture + practice): 1+2

Topics:

Analogue vs. Digital Systems, Logical Operations, Binary System, Combinational Logic Circuits, Sequential Logic Blocks, A/D and D/A Conversion, Digital Logic Concepts and Combinational Logic Design System Interface, Logic System Design, Data Acquisition, Fourier Analysis, Discrete Fourier Transform, Fast Fourier Transform, Filters, Transfer Functions and Laplace Transforms, Discrete Sequences and Systems, Periodic Sampling, Continuous- and Discrete-Time Signals, State-Space Models, State Space Analysis and System Properties

Literature:

Compulsory:

- Bishop, R. H., The Mechatronics Handbook, CRC Press, 2002
- Papaniappan, R., Digital System Design, Ventus Publishing ApS, 2011
- Girod, B., Signals and Systems, John Wiley and Sons, 2011
- Lyons, R. G., Understanding Digital Signal Processing, 2004
- Hayes, M. H., Digital Signal Processing, McGraw-Hill, 1999
- Hsu, H. P., Theory and Problems of Signals and Systems, McGraw-Hill, 1995
- Sabin, W. E., Discrete-Signal Analysis And Design, John Wiley and Sons, 2008

Schedule

1st week Registration week	
2nd week: **Lecture:** Analogue vs. Digital Systems **Practice:** Analogue vs. Digital Systems	3rd week: **Lecture:** Logical Operations, Binary System **Practice:** Logical Operations, Binary System
4th week: **Lecture:** Combinational Logic Circuits, Sequential Logic Blocks **Practice:** Sequential Logic Blocks	5th week: **Lecture:** A/D and D/A Conversion **Practice:** A/D and D/A Conversion
6th week: **Lecture:** Digital Logic Concepts and Combinational Logic Design System Interface **Practice:** Combinational Logic Design	7th week: **Lecture:** Logic System Design, Data Acquisition **Practice:** Logic System Design, Data Acquisition
8th week: 1st drawing week	
9th week: **Lecture:** Fourier Analysis, Discrete Fourier Transform	10th week: **Lecture:** Fast Fourier Transform, Filters **Practice:** Fast Fourier Transform, Filters

Practice: Fourier Analysis, Discrete Fourier Transform	
11th week:	**12th week:**
Lecture: Transfer Functions and Laplace Transforms	**Lecture:** Discrete Sequences and Systems, Periodic Sampling
Practice: Transfer Functions and Laplace Transforms	**Practice:** Periodic Sampling
13th week:	**14th week:**
Lecture: Continuous- and Discrete-Time Signals, State-Space Models	**Lecture:** State Space Analysis and System Properties
Practice: Continuous- and Discrete-Time Signals, State-Space Models	**Practice:** State Space Analysis and System Properties
15th week: 2nd drawing week	

Requirements

A, for signature:

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester.

During the semester there are two tests: the mid-term test is in the 8th week and the end-term test in the 15th week. Students have to sit for the tests.

B, for grade:

The course ends in mid-term grade. The grade for the test is given according to the following table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

Operation Management

Code: MK5HTEV204MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

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

Topics:

The course focuses on the advanced aspects of the production and service management. The goal of the course to summary the advanced engineering technique. Emphasis is placed on the practical implementation of recommendations generated from the advanced modelling and system's understanding gained in the full range of Industrial engineering. The primary goal of the course is to allow students to see the applications of theories in a more realistic and intricate setting to gain a broader view of production and service management.

Literature:

Compulsory:

- Arnold, J. R. Tony; Chapman, Stephen N.; Clive, Lloyd M.: Introduction to Materials Management, Pearson New International Edition Pearson Education 2013
- Ashok D. Belegundu, Tirupathi R. Chandrupatla: Optimization Concepts and Applications in Engineering, (2nd ed.) Cambridge University Press 2011
- William Stevenson: Operations Management (11th ed.) McGraw-Hill 2011

Recommended:

- Hirano, Hiroyuki: JIT Implementation Manual - The Complete Guide to Just-In-Time Manufacturing: Volume 3 - Flow Manufacturing - Multi-Process Operations and Kanban Taylor & Francis, 2009
- Baudin, Michel: Working with Machines: The Nuts and Bolts of Lean Operations with Jidoka Taylor & Francis 2007

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction to operation management **Practice:** Examples, case studies	3rd week: **Lecture:** Building of Process Management System **Practice:** Examples, case studies
4th week: **Lecture:** Production Planning, create Value flow **Practice:** Examples, case studies	5th week: **Lecture:** Production control, SPC **Practice:** Examples, case studies
6th week: **Lecture:** Inventory Planning Deterministic Models EOQ models **Practice:** Examples, case studies	7th week: **Lecture:** Inventory control: MRP I-II, ERP **Practice:** Examples, case studies

8th week: 1st drawing week	
9th week: **Lecture:** JIT comparison of push and pull systems, MTO-MTS dilemma **Practice:** Examples, case studies	**10th week:** **Lecture:** OEE – overall equipment efficiency, Capacity analyzing **Practice:** Examples, case studies
11th week: **Lecture:** Production process modeling: eEPC –VSM **Practice:** Examples, case studies	**12th week:** **Lecture:** Service pool line model **Practice:** Examples, case studies
13th week: **Lecture:** Service quality level improving **Practice:** Examples, case studies	**14th week:** **Lecture:** Service and production development (Six sigma) **Practice:** Examples, case studies
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there are two tests: the mid-term test is on the 8th week and the end-term test is on the 14th week. Students must sit for the tests. The minimum requirement of the mid-term and the end-term test is 60% separately. If the score of any test is below 60%, 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 60 % or better the retake test is success.

B, for a grade:

The course ends in an examination.

The grade is given according to the following table:

Score	Grade
0-59	fail (1)
60-69	pass (2)

70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

Advanced Quality Management

Code: MK5HMINM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 2nd semester

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

Topics:

The subject contains the advanced concepts of quality management. The aim of the course is students become familiar with the elements, installation, operation and tools of integrated management system. During the subject students can be familiar with seven new methods and quality improvement methods.

Literature:

Compulsory:

- Kim-Soon Ng (2012): Quality Management and Practices. InTech, Chapters published. 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, 978-0-13-287097-9
- B. G. Dale: Managing Quality, Wiley-Blackwell, 2007, ISBN 978-1-4051-4279-3

Schedule

1st week Registration week	
2nd week: **Lecture:** ISO 9000 standards, PDCA, Documentation system, General Requirements, Quality Management Manual **Practice:** Analyze examples for the ISO 9001:2008	**3rd week:** **Lecture:** Responsibilities of management, Customer Focus, Quality Policy **Practice:** Analyze examples for the ISO 9001:2008
4th week:	**5th week:**

Lecture: MSZ EN ISO 14001:2005, elements and structure **Practice:** Analyze examples for the MSZ EN ISO 14001:2005	**Lecture:** MSZ 28001:2008, occupational health and safety, elements and structure **Practice:** Analyze examples for the MSZ 28001:2008
6th week: **Lecture:** ISO 13485:2003, MSZ EN ISO 22000, Elements and Structure **Practice:** Analyze examples for the ISO 13485:2003 and MSZ EN ISO 22000	**7th week:** **Lecture:** MSZ ISO/ICE 15408, ISO/ICE 27001:2005, information safety, elements and structure **Practice:** Analyze examples for the MSZ ISO/ICE 15408 and ISO/ICE 27001:2005
8th week: 1st drawing week	
9th week: **Lecture:** Affinity diagrams, charts the relationship between each other, Wood chart, graph matrix **Practice:** Analyze examples for the methods	**10th week:** **Lecture:** Matrix data analysis, decision-making process card program analyst **Practice:** Analyze examples for the methods
11th week: **Lecture:** Arrow diagrams, Gantt diagram **Practice:** Analyze examples for the methods	**12th week:** **Lecture:** Brainstorming, action plan, block diagram, SWOT, FMEA, QFD, why-why, Poka-Yoke, NGT, Multivoting, Logframe matrix **Practice:** Analyze examples for the methods, Analyze examples for the methods
, 13th week: **Lecture:** Definition of TQM, model of TQM, Principles of TQM **Practice:** Case studies	**14th week:** **Lecture:** Quality and lean in the manufacturing, Methodologies, effects, tools **Practice:** Case studies
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further

absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Project Leadership

Code: MK5PROVM04MX17-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

Organizations are increasingly using projects as ways to manage innovation and change, and to make things happen fast, as well as for generating revenue. This course addresses the need to evolve project management skills and competencies from 'technical' to 'leadership', and the growing expectations that project management practitioners embrace professional standards and qualifications.

Literature:

Compulsory:

- Coleman, S.: Project Leadership, Routledge, 2016

Recommended:

- Bull, R. Camper: Moving from Project Management to Project Leadership, CRC Press, 2010
- Burke, R.: Project Leadership and Entrepreneurship, 2014
- Cross, B. L.: Project Leadership - Creating Value with an Adaptive Project Organization, CRC Press, 2014

Schedule

1st week Registration week	
2nd week: **Lecture:** What is Project Leadership? **Practice:** Case study	3rd week: **Lecture: :** Relationships and the Project Leader **Practice:** Case study
4th week: **Lecture:** The Project and its Impact on Project Leadership **Practice:** Case study	5th week: **Lecture:** Leading the project: Phase A – Shaping and Scoping **Practice:** Case study
6th week: **Lecture:** Leading the project: Phase B – Start-up **Practice:** Case study	7th week: **Lecture:** Leading the project: Phase C – Delivery **Practice:** Case study
8th week: 1st drawing week	
9th week: **Lecture:** Leading the project: Phase D – Closure **Practice:** Case study	10th week: **Lecture:** What makes a project leader - Vision and the Big Picture **Practice:** Case study
11th week: **Lecture:** What makes a project leader - Building Key Relationships **Practice:** Case study	12th week: **Lecture:** What makes a project leader - Communication and Engagement **Practice:** Case study
13th week: **Lecture:** Building Personal Capability **Practice:** Case study	14th week: **Lecture: :** Building Organizational Capability **Practice:** Case study
15th week: 2nd drawing week	

Requirements

A, for a signature:

- attendance on study trips
- attendance on the prescribed lectures of scientific and trade conferences
- attendance on at least 60% of course lectures

B, for a grade:

- individual or group analysis of a digital logistics case study
- presentation of the case study

Risk and Reliability

Code: MK5KOCKM04MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year, 1st semester

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

Topics:

Fundamentals of risk, uncertainty, and reliability. Methods to analyse 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.

Literature:

Compulsory:

- 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.

Schedule

1st week Registration week	
2nd week: Lecture: Basic concepts and definitions: Risk vs. Reliability, Hazards, Failures, Uncertainty sources Practice: Selection of research project topic	3rd week: Lecture: Traditional design; Safety Factors; Probabilistic Design Practice: Safety fastor Measures and reliability block diagram

4th week: **Lecture:** Reliability engineering; Reliability measures; Reliability block diagrams **Practice:** Reliability block diagrams	**5th week:** **Lecture:** Failure: definitions and modelling (HW vs SW failures; component vs system-level failures) **Practice:** Select system, list failures & provide example of a failure or reliability
6th week: **Lecture:** Failure modes and effects analysis (FMEA), Criticality analysis (CA) **Practice:** Generate FMECA for selected system	**7th week:** **Lecture:** Fault Tree Analysis (FTA), Event Tree Analysis (ETA) **Practice:** Generate FTA for selected system and compare to FMECA results
8th week: 1st drawing week	
9th week: **Lecture:** Probabilistic Risk Assessment (PRA) **Practice:** Generate ETA for selected system and compare to FMECA result	**10th week:** **Lecture:** Risk considerations in early design stages **Practice:** Analyses of design states
11th week: **Lecture:** Failure analysis during functional design (FFDM) Design repository **Practice:** Use of design repository for selected system	**12th week:** **Lecture:** Functional failure identification and propagation (FFIP) **Practice:** Generate FFIP for selected system
13th week: **Lecture:** Cost-benefit analysis (CBA) **Practice:** Cost-benefit analysis (CBA)	**14th week:** **Lecture:** Hazard identification methods , Process hazards checklists , Hazards surveys and analysis Hazard and operability in industry **Practice:** Course summary
15th week: 2nd drawing week	

Requirements

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 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 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).

Control of Integrated Information System

Code: MK5INFRM04MX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 2nd year, 2nd semester

Number of teaching hours/week (lecture + practice): 1+3

Topics:

This course aims to make students familiar with the integration of aviation operational information. In particular, the course will be focused on the special information systems applied in Aviation. By the end of the course, the student should be able to comprehensively overview the information systems that are used by the stakeholders in Aviation, their interactions and integrations. The course focuses on the theory and application of the following: System integration principles, system and task analysis, Implementing Safety Management System in Aviation, Airport systems, Airline systems, Air Traffic Control systems, Airline/Airport/Air Traffic control centers, system integration, tasks, layout, resource management, Integrated management systems.

Literature:

Compulsory:

- Massoud Bazargan (2016): Airline Operations and Scheduling, 2nd Edition, ISBN-13: 978-0754679004, ISBN-10: 0754679004.
- Andreas Wittmer, Thomas Bieger, Roland Müller (2011): Aviation Systems: Management of the Integrated Aviation Value Chain, ISBN: 978-3-642-20080-9.

Recommended:

- Thomas L. Seamster, Barbara G. Kanki (2016): Aviation Information Management: from documents to data, ISBN-13: 978-0754619666, ISBN-10: 0754619664.
- Alan J. Stolzer, John J. Goglia (2016): Implementing Safety Management Systems in Aviation, 2nd Edition, ISBN: 978-1-4724-3175-2.

Schedule

1st week Registration week	
2nd week: **Lecture:** Aviation Operational information: context, structure. **Practice:** Case study	**3rd week:** **Lecture:** System integration principles, system and task analysis, system engineering **Practice:** Case study
4th week: **Lecture:** Implementing Safety Management System in Aviation, regulatory background, safety culture, risk assessment **Practice:** Case study	**5th week:** **Lecture:** Airport system: Baggage Handling Systems (BHS), Flight Information Display Systems (FIDS), Departure Control Systems (DCS), Weight & Balance Systems. **Practice:** Team problems for airport systems
6th week: **Lecture:** Airport systems: Common Used Terminal Equipment (CUTE) Systems; Building Management Systems (BMS), Access Control Systems (ACS), Airport Operation Databases (AODB), Resource Management Systems (RMS) **Practice:** Team problems for airport systems	**7th week:** **Lecture:** Airline systems: Global Distribution System (GDS), Airline Reservation System (ARS), Billing Settlement Plan (BSP), Pricing and Revenue Management **Practice:** Team problems for airline systems
8th week: 1st drawing week	
9th week:	**10th week:**

Lecture: Airline systems: Navigational Database, Crew Planning, Flight Scheduling, Maintenance Planning, Electronic Flight Plan (EFB) **Practice:** Team problems for airline systems	**Lecture:** Air Traffic control systems: Multi Radar Tracking System (MRS), Flight Data Processing (FDP), Data Communication System (DCMS), Voice Communications System. **Practice:** Team problems for Air Traffic Control systems.
11th week: **Lecture:** Air Traffic control systems: Data Recording System, Automatic Terminal Information Service (ATIS), Controller Working Position System, Remote Tower concept **Practice:** Team problems for Air Traffic Control systems.	**12th week:** **Lecture:** Airline Control center, system integration, tasks, layout, resource management **Practice:** Team and/or individual work presentation
13th week: **Lecture:** Airport Control center, system integration, tasks, layout, resource management **Practice:** Team and/or individual work presentation	**14th week:** **Lecture:** Air Traffic Control center, system integration, tasks, layout, resource management **Practice:** Team or individual work presentation
15th week: 2nd drawing week	

Requirements

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, 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 table:

%	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, end-term tests and the teamwork is at least good (4). The offered grade is the average of them.

Subject group "Differentiated Field-Specific Subjects" for Construction Industry specialization

Energy Conscious Architecture

Code: MK5ENTEM04M317-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+3

Topics:

Climate and buildings. Principle of energy conscious design. Site planning and analysis. Basics of heat transfer and solar radiation. Direct, indirect and hybrid solar systems. Passive cooling. Active solar systems. Passive houses.

Literature:

Compulsory:

- Goswami, D. Y. Principles of solar engineering, 3rd edition, CRC Press Taylor & Francis Group, 2015.
- Moss, J. K. Heat and Mass Transfer in Buildings, 2nd edition, Taylor & Francis, 2007.
- Hodge, B. Alternative Energy Systems and Applications, Wiley, 2009.

- Richarz, C. and Schulz, C. Energy efficiency refurbishments, FSC, 2013.

Recommended:

- Moss, J. K. Energy Management in Buildings, Taylor & Francis, 2006.
- Littler, J. and Thomas, R. Design with energy The conservation and use of energy in buildings, Cambridge University Press, 2003.
- Al-Shemmeri, T. Energy Audits, Willey-Blackwell, 2011.
- Kalmár, F. Energy conscious heating, Akadémia Kiadó, 2011.
- EPBD recast (http://eur-lex.europa.eu)

Schedule

1st week Registration week	
2nd week: **Lecture:** Climate and buildings. Energy and built environment. **Practice:** Basic examples of calculation.	3rd week: **Lecture:** Basics of heat transfer and solar radiation. **Practice:** Basic examples of calculation.
4th week: **Lecture:** Site planning and analysis. **Practice:** Basic examples of calculation.	5th week: **Lecture:** Energy demand and internal environment. **Practice:** Basic examples of calculation.
6th week: **Lecture:** Form and orientation, external and internal layout, windows. **Practice:** Basic examples of calculation.	7th week: **Lecture:** Passive solar systems I. (direct, indirect) **Practice:** Basic examples of calculation.
8th week: 1st drawing week	
9th week: **Lecture:** Passive solar systems II. (hybrid) **Practice:** Basic examples of calculation.	10th week: **Lecture:** Active solar systems I. (collectors) **Practice:** Basic examples of calculation.
11th week: **Lecture:** Active solar systems II. (PV) **Practice:** Basic examples of calculation.	12th week: **Lecture:** Basic examples of calculation. **Practice:** Passive cooling I. (shade).
13th week: **Lecture:** Passive cooling II. (ventilation, evaporative cooling). **Practice:** Basic examples of calculation.	14th week: **Lecture:** Passive houses. **Practice:** Basic examples of calculation.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor. 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 midyear 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.

Building Energetics II.

Code: MK5EPE2M04M317-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

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

Topics:

Basic knowledge of the following themes: The relations between the energy, the economy, the society and the environment. The basic definitions of the energy management, the systems of the energy supply and the different kinds of converters. The importance of the building energetics, the EPBD directive and the Hungarian regulations. The energy model of the building. The energy performance of the building (method of calculation). The relevant regulations, requirements, rules. Energy performance certification. Improving the energy efficiency of the building and possibilities of reducing the energy need and energy use of the building. The cost optimal level - methods and requirements. The nearly zero energy buildings.

Literature:

Compulsory:

- Al-Shemmeri, T. Energy Audits, Willey-Blackwell, 2011.
- EPBD recast (http://eur-lex.europa.eu)
- Richarz, C. and Schulz, C. Energy efficiency refurbishments, FSC, 2013.

Recommended:

- Hodge, B. Alternative Energy Systems and Applications, Wiley, 2009.
- Kalmár, F. Energy concious heating, Akadémia Kiadó, 2011.
- Moss, J. K. Energy Management in Buildings, Taylor & Francis, 2006.
- Moss, J. K. Heat and Mass Transfer in Buildings, 2nd edition, Taylor & Francis, 2007.
- Littler, J. and Thomas, R. Design with energy The conservation and use of energy in buildings, Cambridge University Press, 2003.

Schedule

1st week Registration week	
2nd week: **Lecture:** The relations between the energy, the economy, the society and the environment. The basic definitions of the energy management, the systems of the energy supply and the different kinds of converters **Practice:** Basic heat transfer calculations	3rd week: **Lecture:** The importance of the building energetics, the EPBD directive and the Hungarian regulations. The relevant regulations, requirements, rules **Practice:** Basic heat transfer calculations
4th week: **Lecture:** The energy model of the building. The energy balance of the building. Components of the energy balance. **Practice:** Basic heat transfer calculations	5th week: **Lecture:** Degree-day method **Practice:** Basic examples of calculation
6th week: **Lecture:** Net energy need for heating. Summer overheating of a building **Practice:** Basic examples of calculation	7th week: **Lecture:** Heating primer energy use calculation methods. **Practice:** Examples of calculation
8th week: 1st drawing week	
9th week: **Lecture:** Ventilation primer energy use calculation methods. **Practice:** Basic examples of calculation	10th week: **Lecture:** Cooling primer energy use calculation methods. **Practice:** Basic examples of calculation
11th week:	12th week:

Lecture: DHW and lighting systems primer energy use calculation methods. **Practice:** Basic examples of calculation	**Lecture:** The cost optimal level - methods and requirements **Practice:** Basic examples of calculation
13th week: **Lecture:** The nearly zero energy buildings. Energy performance certification **Practice:** Basic examples of calculation	**14th week:** **Lecture:** Improving the energy efficiency of the building and possibilities of reducing the energy need and energy use of the building **Practice:** Basic examples of calculation
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor. 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 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.

Reconstruction

Code: MK5REKOM04M317-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

During the semester students are familiar with the whole process (steps, phases) of the building reconstruction.

Literature:

Compulsory:

- Edward Allen, Joseph Iano (2013): Fundamentals of Building Construction: Materials and Methods. Wiley; 6 edition. ISBN-10: 1118138910
- Madan L Mehta, Walter Scarborough, Diane Armpriest (2012): Building Construction: Principles, Materials, & Systems. Pearson; 2 edition. ISBN-10: 0132148692
- Francis D. K. Ching (2014): Building Construction Illustrated. Wiley; 5 edition. ISBN-10: 1118458346*Recommended:*

Schedule

1st week Registration week	
2nd week: **Lecture:** Status survey I. **Practice:** On-site visual inspection, material sampling	3rd week: **Lecture:** Status survey II. **Practice:** Making of documents, photographs, site plan, floor plan
4th week: **Lecture:** Analysis, structural analysis **Practice:** Collection of structural errors	5th week: **Lecture:** Examination of external structural elements I. **Practice:** Plinth, pattern, cellar
6th week: **Lecture:** Examination of external structural elements II. **Practice:** Main wall, pillars	7th week: **Lecture:** Structure analysis **Practice:** Slab, roofing
8th week: 1st drawing week	
9th week: **Lecture:** Examination of internal structural elements I. **Practice:** Main wall, pillars, column, beam	10th week: **Lecture:** Examination of internal structural elements II. **Practice:** Slab, balcony, internal slab
11th week: **Lecture:** Examination of internal structural elements III.	12th week: **Lecture:** Roof structure examination I. **Practice:** Flat roof, water, heat and sound insulation, sloping concrete

Practice: Examination of partition walls and masonry walls, substrate, crack, water test	
13th week:	**14th week:**
Lecture: Roof structure examination II.	**Lecture:** Roof structure examination III.
Practice: High roof, beams	**Practice:** Rafters and roof rails
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

During the semester there is one test: the end-term test is on the 15th week. Students must sit for the test.

B, for a grade:

The course ends in a mid-semester grade based on the one test.

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Construction Management III

Code: MK5EPS3M04M317-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

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

Topics:

In the course of the lecture there are two main topics. One of them is how the expert opinion on the appreciations of states of buildings must be compile. The second one is the building processes in an existing building.

Literature:

Compulsory:

- Douglas, J. – Ransom, B.: Understanding Building Failures. 4th Edition. Routledge, 2013. 326 pp.

Recommended:

- Cowan, H. – Smith, P. (Ed.): Dictionary of Architectural and Building Technology. 4th Edition. Taylor & Francis, 2004. (Digitally printed version: 2010.) 338 pp.
- Davies, N. – Jokiniemi, E.: Dictionary of Architecture and Building Construction. Elsevier, Amsterdam – Boston - Heidelberg, 2008. 726 pp.

Schedule

1st week Registration week	
2nd week: Lecture: The structure of building Practice: Case study: building visit	3rd week: Lecture: Damaged forms of buildings materials Practice: Case study: building visit
4th week: Lecture: Damaged forms of buildings construction and buildings Practice: Case study: building visit	5th week: Lecture: State valuation of building constructions and buildings Practice: Case study: building status survey
6th week: Lecture: Repairing and renovations Practice: Case study: building visit	7th week: Lecture: Expert opinion (documentation) Practice: Case study: building visit
8th week: 1st drawing week	
9th week: Lecture: Reinforce and reconstruction of foundations Practice: Building materials	10th week: Lecture: Reinforce and reconstruction of wall and pillars Practice: Building materials
11th week:	12th week:

Lecture: Reinforce and reconstruction of ceilings	**Lecture:** Reinforce and reconstruction of roofs
Practice: Building materials	**Practice:** Materials for repair
13th week:	**14th week:**
Lecture: Reconstruction of water proofing and thermal insulation	**Lecture:** Building a new floor or building in the roof (attic)
Practice: Materials for repair	**Practice:** Materials for repair
15th week: 2nd drawing week: FINAL TEST	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three occassions 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:

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

Complex Project

Code: MK5KOMPM04M317-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

During the semester the students creating a complete construction investment in practice.

Literature:

Compulsory:

- Frank J. Fabozzi, Harry M. Markowitz (2011): The Theory and Practice of Investment Management: Asset Allocation, Valuation, Portfolio Construction, and Strategies. Wiley; 2 edition. ISBN-10: 0470929901
- Brad Hardin, Dave McCool (2015): BIM and Construction Management: Proven Tools, Methods, and Workflows. Wiley; 2 edition. ISBN-10: 1118942760

Schedule

1st week Registration week	
2nd week: **Practice:** Define the target of project	3rd week: **Practice:** Material and method
4th week: **Practice:** Project log frame	5th week: **Practice:** Define the structure of the project
6th week: **Practice:** The methods of literature research	7th week: **Practice:** Databases of academic journals and books
8th week: 1st drawing week	
9th week: **Practice:** The methods of data processing	10th week: **Practice:** The methods of data processing
11th week: **Practice:** The methods of data analysis	12th week: **Practice:** The methods of data analysis
13th week: **Practice:** The methods of data visualizing	14th week: **Practice:** The methods of data visualizing
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

B, for a grade:

The grade based on the student's project presentation.

Subject group "Differentiated Field-Specific Subjects" for Industrial Process Engineering specialization

Production Technologies

Code: MK5TERMM04M217-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+3

Topics:

The aim of this course is to develop the systematic approach and process-oriented thinking of the students which allows them to select the 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 process, manufacturing control engineering design tasks.

Literature:

Compulsory:

- Mikell P. Groover (2014): Fundamentals of Modern Manufacturing, Danvers, MA, John Wiley & sons, Inc.

Schedule

1st week Registration week

2nd week: **Lecture:** Basic concepts of Manufacturing **Practice:** Laboratory safety, Engineering Materials	3rd week: **Lecture:** Fundamentals of metal casting. Metal casting processes **Practice:** Metal casting
4th week: **Lecture:** Particulate processing **Practice:** Production of powders	5th week: **Lecture:** Bulk deformation processes in metalworking **Practice:** Sheet metalworking
6th week: **Lecture:** Joining and Assembly Processes **Practice:** Soldering, adhesive bonding, mechanical assembly	7th week: **Lecture:** Surface processing operations **Practice:** Heat treatment of steel
8th week: 1st drawing week	
9th week: **Lecture:** Processing of ceramics and cements **Practice:** Shaping processes in glassworking	10th week: **Lecture:** Shaping processes for plastics **Practice:** Bulk deformation of clay
11th week: **Lecture:** Shaping processes for plastics **Practice:** Vacuum forming	12th week: **Lecture:** Manufacturing technology of composite materials **Practice:** Making of carbon fiber reinforced PMC
13th week: **Lecture:** Quality control and Inspection **Practice:** Material Testing Methods	14th week: **Lecture:** Integrated manufacturing systems **Practice:** Project work
15th week: 2nd drawing week	

Requirements

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 60 % 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).

Cellular Manufacturing

Code: MK5GYCELM04M217-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

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

Topics:

In this course, we will cover the following topics: design of different manufacturing systems, design and control of cellular manufacturing systems, and planning and control problems encountered in manufacturing systems. At the end of the semester the students should be have a basic understanding of the design, operation and control of cellular manufacturing systems and be able to use quantitative methods to model, analyze, and optimize such systems.

Literature:

Compulsory:

- N. Singh, D. Rajamani: Cellular Manufacturing Systems: Design, planning and control 1996th Edition ISBN-10: 041255710X
- Nahmias, S. 2004. Production and Operations Analysis. 5th Edition. McGraw Hill/Irwin. ISBN 0-07-241741-2

Schedule

1st week Registration week	
2nd week: Lecture: Introduction to Cellular manufacturing Practice: Case studies	3rd week: Lecture: Types of cellular Practice: Case studies
4th week: Lecture: Intelligent automation Practice: Jidoka Problem Solving	5th week: Lecture: Intelligent automation Practice: Jidoka tools
6th week: Lecture: Material flow scheduling Practice: Heijunka	7th week: Lecture: Production flow analysis Practice: Methods of flow analysis
8th week: 1st drawing week	
9th week: Lecture: Flexible manpower line Practice: Technics of optimizing the number of workers	10th week: Lecture: Standard work Practice: methods of planning standard work
11th week: Lecture: Flexible manufacturing Practice: Control of cellular flexible manufacturing systems	12th week: Lecture: One piece flow Practice: Lot streaming
13th week: Lecture: Multi process handling Practice: Case studies	14th week: Lecture: Combined cellular Manufacturing Practice: Case studies
15th week: 2nd drawing week	

Requirements

Etiquette:

A large portion of class time is spent sharing opinions and sharing information. Therefore, it is of utmost importance to communicate with courtesy and professionalism. Professional courtesy includes respecting others' opinions, being courteous and respectful, and working together in the spirit of cooperation. Discussions and assignments

will be graded on quality and professionalism. Please refrain from using cell phones or other disruptive electronic devices while attending class, and please silence all sounds made by such devices while class is in session.

A, for a signature:

Participation in practice classes is compulsory. Students must attend practice classes and they do not have more than three absence during the semester. In case a student does so, they will not get a signature for the subject, and they must repeat the course. Students cannot take part in any other practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Delayed practice classes will be held on a later date, which will be discussed with the professor.

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 take the tests.

B, for a grade (ESE):

The course ends up with an exam based on the average result of the two tests.

The minimum requirement of the mid-term and the end-term test is 60% in each test. 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, the student once can take a retake test of the whole semester material.

Fuzzy Logics

Code: MK5MESTM04M217-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

The aim of the subject is expanding the artificial intelligence basics knowledge. The subject contains the basic concepts of Fuzzy logic and Support Vector Machine methods. During

the subject students can be familiar with artificial intelligence case studies in industrial environment.

Literature:

Compulsory:

- Gegov, Alexander: Fuzzy Networks for Complex Systems, Springer-Verlag Berlin, 2010., pp. 290.
- Lilly, John H.: Fuzzy control and identifi cation John Wiley & Sons, Inc., Hoboken, pp. 231. [3] Pedrycz, Witold – Gomide, Fernando: Fuzzy Systems Engineering, John Wiley & Sons, Inc., Hoboken, 2007., pp. 526
- Klir, G.J., T.A. Folger: Fuzzy Sets, Uncertainty, and Information, Prentice Hall Int. Inc.,1988.
- Vladimir N. Vapnik: Statistical Learning Theory, AT&T Research Laboratories, A Wiley-Internscience Publication, John Wiley & Sons, Inc., 1998., ISBN 0-471-03003-1*Recommended:*

Schedule

1st week Registration week	
2nd week: **Lecture:** Introduction into Artificial Intelligence **Practice:** Basic mathematical background of logic I.	**3rd week:** **Lecture:** Industrial environment and processes and history of Fuzzy logic **Practice:** Basic mathematical background of logic II.
4th week: **Lecture:** Operations with Fuzzy logics **Practice:** Operations with logic, logical signs, negation, conjunction etc.	**5th week:** **Lecture:** Fuzzy relations **Practice:** Theoretical background of graphs and relations
6th week: **Lecture:** Theoretical background of Defuzzification methods I. **Practice:** COG, COA methods	**7th week:** **Lecture:** Theoretical background of Defuzzification methods I. **Practice:** MOM, COM methods
8th week: 1st drawing week	
9th week: **Lecture:** The most important membership functions in Fuzzy logic **Practice:** Case studies of sigmoid and logistic function	**10th week:** **Lecture:** Neuro Fuzzy Systems, Fuzzy Neural Networks **Practice:** Examples: Integration of fuzzy logic and neural networks
11th week:	**12th week:**

Lecture: Theoretical background of Support Vector Machine (SVM) method **Practice:** SVM Classification	**Lecture:** Connections between Support Vector Machine (SVM) and Fuzzy logic **Practice:** Case studies of image processing I.
13th week: **Lecture:** Linear regression **Practice:** Case studies of image processing II.	**14th week:** **Lecture:** Parameter deviations in industrial environment **Practice:** Technical parameters and Statistical Process Control deviations
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice classes is compulsory. Students must attend practice classes and may not miss more than three practice classes during the semester. In case a student does so, the subject will not be signed and the student must repeat the course. Students can't take part in any practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. In case of further absences, a medical certification needs to be presented. Missed practice classes must be made up for at a later date, being discussed with the tutor.

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 table:

Score	Grade
0-59	fail (1)
60-69	pass (2)
70-79	satisfactory (3)
80-89	good (4)
90-100	excellent (5)

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

System Engineering

Code: MK5RENDM04M217-EN and MK5RENDM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

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

Topics:

This course in systems engineering examines the principles and process of creating effective systems to meet application demands. Concepts, problems, and methods of systems engineering are introduced in lectures and discussions and applied in assignments and through semester-long group projects.

Literature:

Compulsory:

- Kossiakoff, A., Sweet, W. (2003). Systems Engineering Principles and Practice. John Wiley and Sons, Inc: Hoboken, New Jersey. ISBN 0-471- 23443-5

Schedule

1st week Registration week	
2nd week: Lecture: Definition of a system Practice: Case studies	3rd week: Lecture: Structure of a complex system Practice: Fault-tree analysis
4th week: Lecture: The system life cycle Practice: Case studies of Life-cycle cost analysis	5th week: Lecture: Reliability Engineering Practice: Reliability component relationship
6th week: Lecture: Maintainability Engineering Practice: MTA and RCM tools	7th week: Lecture: Advanced System Quality Planning Practice: The steps and methods of ASQP
8th week: 1st drawing week	
9th week: Lecture: Needs analysis, Risk analysis Practice: VOC investigation, Risk factor calculation and risk reporting	10th week: Lecture: Quality function deployment Practice: Requirements of system
11th week: Lecture: Quality function deployment Practice: Different dimensions of QFD	12th week: Lecture: : Functional analysis Practice: The methods of functional analysis

13th week:	14th week:
Lecture: Value/Cost Engineering **Practice:** Sample cost breakdown structure	Final test
15th week: 2nd drawing week	

Requirements

Etiquette:

A large portion of class time is spent sharing opinions and sharing information. Therefore, it is of utmost importance to communicate with courtesy and professionalism. Professional courtesy includes respecting others' opinions, being courteous and respectful, and working together in the spirit of cooperation. Discussions and assignments will be graded on quality and professionalism. Please refrain from using cell phones or other disruptive electronic devices while attending class, and please silence all sounds made by such devices while class is in session.

A, for a signature:

Participation in practice classes is compulsory. Students must attend practice classes and they do not have more than three absence during the semester. In case a student does so, they will not get a signature for the subject, and they must repeat the course. Students cannot take part in any other practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Delayed practice classes will be held on a later date, which will be discussed with the professor.

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 take the tests.

B, for a grade (ESE):

The course ends up with an exam based on the average result of the two tests.

The minimum requirement of the mid-term and the end-term test is 60% in each test. 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, the student once can take a retake test of the whole semester material.

Complex Project

Code: MK5KOMPM04M217-EN and MK5KOMPM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

In particular, the course will be focused on the student's ability development to manage complex exercises and implement technical, economic, financial and management tasks so that students are able to make comprehensive, comparative and scientific analysis. The course is highly interactive with challenging complex problem solving, team work, individual presentation and case studies.

The course focuses on the theory and application of the following:

Collection of data; The method of data processing and analysis; evaluation of data, data visualizing, interpretation of results. Strategy planning, performance measurement, handle cost constraints, examination of the change in a complex project environment, strategies for identifying and handling scope creep, risk management planning.

Literature:

Compulsory:

- Brealey, R. A. - Myers, S. C. – Allen, F (2014): Principles of Corporate Finances. 11th Edition. McGraw-Hill/Irwin, 2014. ISBN-13: 9780077151560.
- Ploccak, J. – Remington, K. (2012): Tools for Complex Projects. Gower Publishing, Ltd., 2012. ISBN 1409458725, 9781409458722.

Recommended:

- Wysocki, R. K. (2011): Executive's Guide to Project Management: Organizational Processes and Practices for Supporting Complex Projects. John Wiley & Sons, 2011. ISBN 1118089243, 9781118089248
- Stefano Gatti (2013): Project Finance in Theory and Practice Designing, structuring and financing private and public projects ELSEVIER INC.
- Correia, C. – Flynn, D. K. - Besley – Ulian, E. – Wormald, M. (2012): Financial Management. 6th edition. Juta and Company Ltd. ISBN: 0702171573, 9780702171574.
- Yogesh Kumar Singh (2006): Fundamental Of Research Methodology And Statistics. New Age International, 2006. ISBN 8122418864, 9788122418866.

Schedule

1st week Registration week	
2nd week: **Practice:** Structure of Construction Investment	3rd week: **Practice:** documents, plans, permissions Historical
4th week: **Practice:** Authorization documents	5th week: **Practice:** Prime contractor selection criteria
6th week: **Practice:** Building contract and peculiarities	7th week: **Practice:** Participants in building processes, tasks, responsibilities
8th week: 1st drawing week	
9th week: **Practice:** Storage, depositing and logistics of building materials	10th week: **Practice:** Substructure works
11th week: **Practice:** Structural works	12th week: **Practice:** Finishing works
13th week: **Practice:** Area retrieval and protocol	14th week: **Practice:** Warranty, Own project presentation
15th week: 2nd drawing week	

Requirements

A, for signature:

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Student can't make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, to be discussed with the tutor. Students are required to bring the necessary utensil (e.g. calculator) for the course with them to each practice. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class.

During the semester there are two tests: the mid-term test is in the 7th week and the end-term test in the 14th week. Students have to sit for the tests.

B, for grade:

The minimum requirement of the mid-term test and the end-term test is 50% separately.

The course ends in mid-semester grade, the grade is calculated as:

- 30%-30% from the two tests,
- 40% from the result of the teamwork.

The minimum requirement for passing is 50%, the grade for the final mark is given according to the following table:

Score	Grade
0 - 49	fail (1)
50 - 62	pass (2)
63 - 75	satisfactory (3)
76 - 88	good (4)
89 - 100	excellent (5)

If the score of any test is below 50%, the student once can take a retake test of the whole semester material.

Subject group "Differentiated Field-Specific Subjects" for Material Handling and Logistics specialization

Advanced Production Logistics

Code: MK5HTLOM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 1st year, 1st semester

Number of teaching hours/week (lecture + practice): 1+3

Topics:

In this course, students are taught different material flow techniques, which can be applied in push and pull logistics system. This course covers these fields: planning line capacity, planning work in process, planning material flow, planning material supply.

Literature:

Compulsory:

- Nahmias, S. 2004. Production and Operations Analysis. 5th Edition. McGraw Hill/Irwin. ISBN 0-07-241741-2
- Askin, R.G. and J.B. Goldberg. 2002. Design and Analysis of Lean Production Systems. John Wiley & Sons Inc. ISBN 0-471-11593-2

Schedule

1st week Registration week	
2nd week: **Lecture:** Total Flow Management Model **Practice:** Production flow	3rd week: **Lecture:** Capacity planning **Practice:** Line capacity planning
4th week: **Lecture:** Push flow **Practice:** I. MRP II	5th week: **Lecture:** Material flow scheduling **Practice:** Heijunka
6th week: **Lecture:** Standard work **Practice:** methods of standard work planning	7th week: **Lecture:** Inventory in the material flow **Practice:** Supermarket design
8th week: 1st drawing week	
9th week: **Lecture:** Inventory in the material flow, Pull flow **Practice:** Puffer design, MTS planning	10th week: **Lecture:** Pull flow **Practice:** MTO planning
11th week: **Lecture:** Mizusumashi and milk run **Practice:** Material flow in manufacturing	12th week: **Lecture:** Techniques of components' supply **Practice:** Methods of continuous supply
13th week: **Lecture:** Techniques of components' supply **Practice:** Methods of continuous supply	14th week: **Lecture:** Techniques of components' supply **Practice:** Sequential supply
15th week: 2nd drawing week	

Requirements

Etiquette:

A large portion of class time is spent sharing opinions and sharing information. Therefore, it is of utmost importance to communicate with courtesy and professionalism. Professional courtesy includes respecting others' opinions, being courteous and respectful, and working together in the spirit of cooperation. Discussions and assignments will be graded on quality and professionalism. Please refrain from using cell phones or other disruptive electronic devices while attending class, and please silence all sounds made by such devices while class is in session.

A, for a signature:

Participation in practice classes is compulsory. Students must attend practice classes and they do not have more than three absence during the semester. In case a student does so, they will not get a signature for the subject, and they must repeat the course. Students cannot take part in any other practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Delayed practice classes will be held on a later date, which will be discussed with the professor.

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 take the tests.

B, for a grade (ESE):

The course ends up with an exam based on the average result of the two tests.

The minimum requirement of the mid-term and the end-term test is 60% in each test. 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, the student once can take a retake test of the whole semester material.

Digital Logistics

Code: MK5DILOM04M117-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 2nd semester

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

Topics:

There is widespread recognition among leaders in most industries that the role of digital technology is rapidly shifting, from being a driver of marginal efficiency to an enabler of fundamental innovation and disruption. While it is clear that digital technology will transform most industries, there are a number of challenges that need to be understood and addressed. This course is about the latest developments and trends from the digitalization of business and society affecting logistics during that what is called the Fourth Industrial Revolution.

Focus of the course: effects of digitization on management and technical facilitation of material flows in supply chains.

Literature:

Compulsory:

- Wang, Y.; Pettit, S: E-Logistics, Pearson Education, 2012
- Graham, D.; Manikas, I.; Folinas, D. K.: E-Logistics and E-Supply Chain Management, Eurospan Group, 2013
- Ross, D. F.: Introduction to e-Supply Chain Management, CRC Press, 2002

Recommended:

- Arnold, J. R. Tony; Chapman, Stephen N.; Clive, Lloyd M.: Introduction to Materials Management, Pearson Education, 2014
- Grant, David B.: Logistics Management, Pearson Education, 2012

Schedule

1st week Registration week	
2nd week: **Lecture:** Key concepts of material handling, logistics and supply chain management – the effects of global business and industry digitization. **Practice:** Case study	**3rd week:** **Lecture:** The digital transformation of logistics: Threats and opportunities. **Practice:** Case study
4th week: **Lecture:** Digitalization in purchasing, procurement and inbound logistics. **Practice:** Case study	**5th week:** **Lecture:** Industry 4.0 - Intelligent operations and material management in production logistics and packaging. **Practice:** Case study
6th week: **Lecture:** Distribution - impact of e-commerce on logistics **Practice:** Case study	**7th week:** **Lecture:** Warehousing and inventory management - systems and software. **Practice:** Case study
8th week: 1st drawing week	
9th week: **Lecture:** Transportation - self driving and autonomous vehicles, e-Fleet management. **Practice:** Case study	**10th week:** **Lecture:** Case study **Practice:** Case study

11th week: **Lecture:** Telematics & Telematics Technology, Reverse logistics and circular economy, Workforce and consumers in the Digital Era. Sharing economy or Uberization **Practice:** Case study	**12th week:** **Lecture:** Progression of capabilities: functional excellence, Progression of capabilities: enterprise logistics management **Practice:** Case study
13th week: **Lecture:** Progression of capabilities: supply chain integration and collaboration **Practice:** Case study	**14th week:** **Lecture:** IoT, cloud, digital supply chain and machine learning vs boxes-and-materials supply chain - new business models **Practice:** Case study
15th week: 2nd drawing week	

Requirements

A, for a signature:

- attendance on study trips
- attendance on the prescribed lectures of scientific and trade conferences
- attendance on at least 60% of course lectures

B, for a grade:

- individual or group analysis of a digital logistics case study
- presentation of the case study

Supply Chain Informatics System

Code: MK5ELIRM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

The students can acquire knowledge of supply chain system (operations, warehousing, transportation, procurement and so on). The students will learn about: design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics,

synchronizing supply with demand and measuring performance globally, The students can also gain insights into the practice methods: procurement, logistic, information technology, center location problem, inventory management, unit load management, risk analysis, value stream analysis. Main target of the course is to teach the students a global thinking, and to understand the connections of the whole supply chain process. By the end of the semester the students will acquire and be able to use these kinds of methods and thinking.

Literature:

Compulsory:

- Oxford Express Series - English for Logistics; ISBN: 978-0-19-457945-2
- Donald Waters - Global Logistics New Directions in Supply Chain Management; 2010; ISBN: 9780749457037
- Alan Rushton, Phil Croucher, Peter Baker - The Handbook of Logistics and Distribution Management; 2010; ISBN: 9780749457143
- Martin Christopher - Logistics and Supply Chain Management; 2011; ISBN: 9780273731122
- Sunil Chopra · Peter Meindl - Supply Chain Management, Strategy, Planning, and Operation; 2012; ISBN: 9780132743952
- Virginia Anderson · Lauren Johnson - Systems Thinking Basics: From Concepts to Causal Loops; 2015; ISBN: 9781883823122 · ASIN: 1883823129

Schedule

1st week Registration week	
2nd week: **Lecture:** Supply chain history, models and paradigm changes today **Practice:** Supply chain models	3rd week: **Lecture:** Tactical logistic management **Practice:** Logistic systems and tools
4th week: **Lecture:** Procurement methods and supplier management **Practice:** Make or Buy analysis	5th week: **Lecture:** Supply chain in logistic strategy **Practice:** Material flow matrix with CRAFT method
6th week: **Lecture:** Incoming logistic, Warehousing **Practice:** center location planning	7th week: **Lecture:** Stock management, packaging **Practice:** Stock level forecast methods
8th week: 1st drawing week	
9th week:	10th week:

Lecture: Packaging optimisation **Practice:** Unit forming unit load planning	**Lecture:** Stock management, packaging **Practice:** Stock level forecast methods
11th week: **Lecture:** Packaging optimisation **Practice:** Unit forming unit load planning	**12th week:** **Lecture:** Incoterms and parity Handling and information flow in a production process Production efficiency improvement, wastes **Practice:** Stochastic & deterministic material flow, Material flow matrix, Value stream analysis, production modelling
13th week: **Lecture:** Waste supply chain management (WSC) Recycling & Return management (RM), **Practice:** Single channel and multichannel service, queuing models	**14th week:** **Lecture:** Logistic information network, Risk management, financial aspects of Supply Chain Informatic Systems **Practice:** Waiting time analysis. Global decision
15th week: 2nd drawing week	

Requirements

There are two tests during the semester: the 1st test in the 8th week and the 2nd test in the 15th week – and there are three design tasks. Attendance at lectures is strongly recommended, but not obligatory. Participation at practice classes is compulsory. Students must attend practice classes and do not it miss more than three times during the semester. If a student misses the classes more than three times, the subject will not be signed and the student must repeat the course. A student can't make up a practice with another group. The attendance at lectures and at practice classes will be recorded by the staff of the department. Being late is equivalent with an absence. In case of further absences, medical certificates need to be presented. Missed practice classes should be made up for at a later date, being discussed with the tutor. Students are required to bring the calculator and the printed materials of the lectures to each occasion (both lectures and practice classes). Active participation is evaluated by the teacher. Students are required to actively participate at every class. Students have to submit all the two tests and the design tasks until the deadline and they have to reach the minimum points. The minimum points are required to have mid-semester grade.

The students can achieve maximum 100 points from the 2 test and the design task. The maximum point of the first and second test is 30 points, and he have to achieve min. 18 from each. The maximum points of the design task is 40 points and he have to achieve minimum 2 point. In total the students shall achieve 61 points to pass the exam.

The course ends in an exam grade (ESE). The grade for the test is given according to the following table: Score Grade 0-59 fail (1) 60-69 pass (2) 70-79 satisfactory (3) 80-89 good (4) 90-100 excellent (5).

If the score of any test is below 60, the student once can take a retake test of the whole semester material.

System Engineering

Code: MK5RENDM04M217-EN and MK5RENDM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 2nd semester

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

Topics:

This course in systems engineering examines the principles and process of creating effective systems to meet application demands. Concepts, problems, and methods of systems engineering are introduced in lectures and discussions and applied in assignments and through semester-long group projects.

Literature:

Compulsory:

- Kossiakoff, A., Sweet, W. (2003). Systems Engineering Principles and Practice. John Wiley and Sons, Inc: Hoboken, New Jersey. ISBN 0-471- 23443-5

Schedule

1st week Registration week	
2nd week: **Lecture:** Definition of a system **Practice:** Case studies	**3rd week:** **Lecture:** Structure of a complex system **Practice:** Fault-tree analysis
4th week: **Lecture:** The system life cycle **Practice:** Case studies of Life-cycle cost analysis	**5th week:** **Lecture:** Reliability Engineering **Practice:** Reliability component relationship
6th week: **Lecture:** Maintainability Engineering **Practice:** MTA and RCM tools	**7th week:** **Lecture:** Advanced System Quality Planning **Practice:** The steps and methods of ASQP
8th week: 1st drawing week	
9th week:	**10th week:**

Lecture: Needs analysis, Risk analysis **Practice:** VOC investigation, Risk factor calculation and risk reporting	**Lecture:** Quality function deployment **Practice:** Requirements of system
11th week: **Lecture:** Quality function deployment **Practice:** Different dimensions of QFD	**12th week:** **Lecture: :** Functional analysis **Practice:** The methods of functional analysis
13th week: **Lecture:** Value/Cost Engineering **Practice:** Sample cost breakdown structure	**14th week:** Final test
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation in practice classes is compulsory. Students must attend practice classes and they do not have more than three absence during the semester. In case a student does so, they will not get a signature for the subject, and they must repeat the course. Students cannot take part in any other practice class with another group. Attendance at practice classes will be recorded by the practice leader. Being late is equivalent with an absence. Delayed practice classes will be held on a later date, which will be discussed with the professor.

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 take the tests.

B, for a grade (ESE):

The course ends up with an exam based on the average result of the two tests.

The minimum requirement of the mid-term and the end-term test is 60% in each test. 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, the student once can take a retake test of the whole semester material.

Complex Project

Code: MK5KOMPM04M217-EN and MK5KOMPM04M117-EN

ECTS Credit Points: 4

Evaluation: mid-semester grade

Year, Semester: 2nd year, 1st semester

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

Topics:

In particular, the course will be focused on the student's ability development to manage complex exercises and implement technical, economic, financial and management tasks so that students are able to make comprehensive, comparative and scientific analysis. The course is highly interactive with challenging complex problem solving, team work, individual presentation and case studies.

The course focuses on the theory and application of the following:

Collection of data; The method of data processing and analysis; evaluation of data, data visualizing, interpretation of results. Strategy planning, performance measurement, handle cost constraints, examination of the change in a complex project environment, strategies for identifying and handling scope creep, risk management planning.

Literature:

Compulsory:

- Brealey, R. A. - Myers, S. C. – Allen, F (2014): Principles of Corporate Finances. 11th Edition. McGraw-Hill/Irwin, 2014. ISBN-13: 9780077151560.
- Ploccak, J. – Remington, K. (2012): Tools for Complex Projects. Gower Publishing, Ltd., 2012. ISBN 1409458725, 9781409458722.

Recommended:

- Wysocki, R. K. (2011): Executive's Guide to Project Management: Organizational Processes and Practices for Supporting Complex Projects. John Wiley & Sons, 2011. ISBN 1118089243, 9781118089248
- Stefano Gatti (2013): Project Finance in Theory and Practice Designing, structuring and financing private and public projects ELSEVIER INC.
- Correia, C. – Flynn, D. K. - Besley – Ulian, E. – Wormald, M. (2012): Financial Management. 6th edition. Juta and Company Ltd. ISBN: 0702171573, 9780702171574.
- Yogesh Kumar Singh (2006): Fundamental Of Research Methodology And Statistics. New Age International, 2006. ISBN 8122418864, 9788122418866.

Schedule

1st week Registration week

2nd week: **Practice:** Structure of Construction Investment	3rd week: **Practice:** documents, plans, permissions Historical
4th week: **Practice:** Authorization documents	5th week: **Practice:** Prime contractor selection criteria
6th week: **Practice:** Building contract and peculiarities	7th week: **Practice:** Participants in building processes, tasks, responsibilities
8th week: 1st drawing week	
9th week: **Practice:** Storage, depositing and logistics of building materials	10th week: **Practice:** Substructure works
11th week: **Practice:** Structural works	12th week: **Practice:** Finishing works
13th week: **Practice:** Area retrieval and protocol	14th week: **Practice:** Warranty, Own project presentation
15th week: 2nd drawing week	

Requirements

A, for signature:

Participation at practice is compulsory. Student must attend the practices and my not miss more than three practice during the semester. In case a student misses more than three, the subject will not be signed and the student must repeat the course. Student can't make up a practice with another group. The attendance on practice will be recorded by the practice leader. Being late is counted as an absence. In case of further absences, a medical certificate needs to be presented. Missed practices should be made up for at a later date, to be discussed with the tutor. Students are required to bring the necessary utensil (e.g. calculator) for the course with them to each practice. Active participation is evaluated by the teacher in every class. If student's behavior or conduct doesn't meet the requirements of active participation, the teacher may evaluate their participation as an absence due to the lack of active participation in class.

During the semester there are two tests: the mid-term test is in the 7th week and the end-term test in the 14th week. Students have to sit for the tests.

B, for grade:

The minimum requirement of the mid-term test and the end-term test is 50% separately.

The course ends in mid-semester grade, the grade is calculated as:

- 30%-30% from the two tests,
- 40% from the result of the teamwork.

The minimum requirement for passing is 50%, the grade for the final mark is given according to the following table:

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76 - 88	good (4)
89 - 100	excellent (5)

If the score of any test is below 50%, the student once can take a retake test of the whole semester material

DIPLOM

Within 30 days of the successful state exam the diploma is issued and given out by the Faculty at the graduand's special request. Otherwise, the diploma will be awarded to him/her at the graduation ceremony of the Faculty.

The diploma is an official document decorated with the coat of arms of Hungary which verifies the successful completion of studies in the Engineering Management master's program. The diploma contains the following data: name of HEI (higher education institution); institutional identification number; serial number of diploma; name of diploma holder; date and place of his/her birth; level of qualification; training program; specialization; mode of attendance; place, day, month and year issued. Furthermore, it has to contain the rector's (or vice-rector's) original signature and the seal of HEI. The University keeps a record of the diplomas issued.

At the graduand's special request a certificate on the completion of studies is issued. The document does not contain any reference to qualification, it merely proves that the candidate has taken a successful state exam. The Faculty keeps a record of the certificates issued.

Calculating diploma grade

Grade=(A+B)/2, where

A: Average of the grades of the subjects of the state exam

B: Grade awarded for defending thesis

Classification of the award:

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

Award with Distinction

An award with Distinction is permitted where a student obtained grade 5 in all subjects of the state exam. The average of thesis grade, his/her exam grades and mid-semester grades during his/her studies is at least 4,00. Moreover, he/she is not permitted to have a grade worse than grade 3 during his/her studies.