SZENT ISTVÁN EGYETEM

GÉPÉSZMÉRNÖKI KAR, GÖDÖLLŐ

ERASMUS COURSE CATALOGUE

2016/17 – 2nd SEMESTER

LIST OF CORE COURSES

The Faculty of Mechanical Engineering of Szent István University is currently offering the below-listed core courses for the 2nd semester of the 2016/17 academic year for exchange students. These courses are mainly part of the full degree courses. Exchange students are, in most cases, integrated with full degree international students during the semester workflow. **Additional courses** may be announced before the start of the semester, providing a wider range of courses to choose from. Find **short descriptions** of some subjects. Contact erasmus-in-godollo@szie.hu for more information.

For the BSc and MSc curricula and relevant faculty information please visit: http://www.gek.szie.hu/english/courses

COURSE CODE	COURSE NAME	CREDIT
SGMMAX12XXN	Mathematics II.	5
SGMMCX07XXN	Strenght of Materials	4
SGMFFX07XXN	Physics II.	3
SGMAVX01XXN	Fluid Mechanics	4
SGMGCX09XXN	Labour Safety	3
SGMIFX28XXN	Informatics II.	3
SGMMAX14XXN	Mathematical Statistics	3
SGMAGX01XXN	Electrotechnics	3
SMKKB2011XN	Technical Chemistry	3
SGMGSX16XXN	Machine Elements II.	3
SGMMGX02XXN	Basic Management	2
SGMETX02XXN	Basic Study of Energetics	2
	Manufacturing Technology	3
SGMFFX15XXN	Process Control	4
SGMJHX38XXN	Engines and Vehicles	4
SGMMTX01XMN	Measurement Science	3
SGMKLX13XXN	Building Service Engineering	4
SGMLGX02XXN	Machines of Material Handling	3
SGMMGX01XMN	Engineering Economics	3
SGMGSX01XMN	Ergonomics	3
SGMETX01XMN	Engineering Thermodynamics	3
SGMFFX02XMN	Computer Simulation	4
SGMJTX13XMN	Manufacturing Processes and Systems	4
	Ecotechnology	3

SGMMCX02XMN	Mechanical Vibrations	3
SGMKLX49	Solar Engineering	4

INFORMATICS II.

COURSE CODE: SGMIFX28XXN
ECTS CREDITS: 3
TEACHING HOURS PER WEEK: 2
TEACHER: Dr. Lászlóné OROVA
orova.laszlone@gek.szie.hu

SHORT DESCRIPTION:

The aims of this subject are to assist students in founding their programming skills and to introduce application of numerical methods of mathematics. Topics include algorithms, program languages, compliers-interpreters, syntax, data types, coding, controlling. Programs are written not only for basic algorithms but for several numerical methods like finding roots, fitting functions, integration, solving differential equations and finding eigenvalues and eigenvectors of matrixes. The numerical methods are demonstrated in spreadsheets as well.

Indicative Reading:

Kurt F. Lauckner, Zenia C. Bahorski (2009): The Computer Continuum
Office 2013 tutorial: http://www.fgcu.edu/Support/
Homepage: http://elearning.szie.hu GEK – SGMIF1A11AN - Informatics(Orova)

Student Workload:

Staff/Student Contact Time:	1) Lectures	0 hours
	2) Practical Work	39 hours
	3) Field study trip	0 hours
Directed Learning Time	Home Works (Homepage)	20 hours
Individual Learning Time:	Individual study	16 hours
Tests and Exam Time		0 hours
Total Work Time		**75 hours**

Assessment:

The assessment has two steps, and a five-graded 100 points evaluation system.
The two steps are:

- 1st to get the sign of course-unit teacher, which means the students fulfilled their obligations, and
- 2nd taking the test on the 13th week of the semester.

To achieve the 1st step, students have to score the electronic test (**e-test**) minimum 16 points of the 30 and the **Test_1** minimum 8 points of the 20, and have to attend practical works without absence. If absence occurs, students should ask the permit of the course-unit teacher and compensate with home works. Without the fulfilment of the 1st step the student can not pass to the 2nd step, which is the **Test_2** on the 13th (50 points).
Optional: small lecture on the 2nd, 3rd, 4th weeks for extra 8 points.
The five grades are 1, 2, 3, 4, 5 according to the scored points of the total 100, listed below in the table:

5 (excellent)	86-100 points
4 (good)	76-85 points
3 (satisfactory)	61-75 points
2 (pass)	51-60 points
1 (fail)	50 points and below

The student, who did not score at least 25 points by the Test_2 fails, but can make exam (electronic test + Test_1 + Test_2) twice again.

ELECTROTECHNICS

COURSE CODE:	SGMAGX01XXN
ECTS CREDITS:	3
TEACHING HOURS PER WEEK:	2+1
TEACHER:	Dr. Péter SEMBERY *sembery.peter@gek.szie.hu*

SHORT DESCRIPTION:

After an overview of fundamentals of general electrotechnics, students will learn about electric machins. The level of the study suits to needs of mechanical engineer, don't deal with construction of electrical machines, only with their operate and maintenance. Topics of the course: Basic terms and definitions: Atoms and electricitiy, Electromotive force, Power and energy, Resistance and Ohm's law, Direct and alternating current, Amplitude of sine waves, Phase relations and power ina c cicuits, Vector representation of ac waveforms. Resistive networks: Circuits and circuits elements, Series and parallel networks, Combination series – parallel networks. Inductance, capacitance and phase relations: Inductance and inductive reactance, Transformers, Capacitance and capacitative reactance, Combinations of inductance, capacitance and tesistance, Power-factor improvement. Electric motors: AC motor principles, Single-phase motors, Three-phase motors, Measurement of motor characteristics, Motor protection and control.

Required literature:

1. Sembery P.: Electrotechnics, lecture notes, Gödöllő

PROCESS CONTROL

COURSE CODE: SGMFFX15XXN
ECTS CREDITS: 4
TEACHING HOURS PER WEEK: **2+1**
TEACHER: Dr. István FARKAS
farkas.istvan@gek.szie.hu
Dr. János BUZÁS
buzas.janos@gek.szie.hu

SHORT DESCRIPTION:

Summary: The aim of the course is to give basic knowledge usable for describing, analyzing, modelling, simulation and control of dynamic systems from engineering practice. The main chapters are: process control fundamentals; configuration and hardware of control loop; mathematical model of control system; description of linear systems, analysis of linear systems in time and frequency domain; Laplace transform; signal flow chart reduction; properties of signal transfer elements; change of signal transfer properties with feedback.

Subject outline:

No.	Date	Lecture	Practical work (in class or field)
1.	1st week	Introduction, basic concepts	
2.	2nd week	Main functions and elements of control	Working with the MATLAB® user interface
3.	3rd week	Structure and elements of closed-loop control	
4.	4th week	Mathematical model of control loop	Automating commands with scripts, writing functions
5.	5th week	Mathematical model of linear systems, analysis of linear systems in time domain	

6.	6th week	Analysis of linear systems in operator domain	Modelling and simulating dynamic systems in Simulink®, solution of ordinary differential equations
7.	7th week	Analysis of linear systems in frequency domain	
8.	8th week	Connection methods of signal transfer elements, signal flow chart reduction	Mathematical modeling of a process and simulating in Simulink®
9.	9th week	Signal transfer properties of basic signal transfer elements I	
10.	10th week	Signal transfer properties of basic signal transfer elements II	Parameter sensitivity analysis
11.	11th week	Signal transfer properties of complex signal transfer elements I	
12.	12th week	Change of signal transfer properties with feedback	Parameter identification in MATLAB®
13.	13th week	New concepts in process control	
14.	14th week	Exam	Construct and simulating on/off and proportional control loops
15.	15th week	Discussion of exam	

Reading:

Farkas,I.: Process control I, Szent István University, Lecture Notes, Gödöllő, 2013, Hungary

Farkas,I.: Control aspects of postharvest technologies, Chapter No 29 of Handbook of postharvest Technology /ed. by A. Chakraverty, A.S. Mujumdar, G.S.V. Raghavan and H.S. Ramaswamy/, Marcel Dekker Inc., New York-Basel, 2003, pp. 845-866.

Farkas,I. /ed/: Modelling, control and optimization. Greenhouse, drying and farm energy system, Gödöllő University of Agricultural Sciences, Textbook, 1998, Gödöllő, Hungary

Stephanopoulos,G.: Chemical process control: an introduction to theory and practice, Prentice-Hall, 1984

ENGINES AND VEHICLES

COURSE CODE:	SGMJHX38XXN
ECTS CREDITS:	4
TEACHING HOURS PER WEEK:	2+2
TEACHER:	Dr. Péter KISS *kiss.peter@gek.szie.hu*

SHORT DESCRIPTION:

The basic objective of the course is to introduce the engine and vehicle technology for the students. The main topics of the subject are: theory, classification and principle of engines. Petrol and Diesel engines. Structures of engines. Testing and engine's curves. Theory, classification and principle of vehicles. On- and off-road vehicles. Transmission, steering, undercarriage, suspension, braking. Safety of vehicles. Vehicle's energetics.

Required literature

Richard van Basshuysen, Fred Schafer: Modern Engine Technology. SAE International 2007. ISBN 978-0-7680-1705-2

Heinz Heisler: Advanced Vehicle Technology. Butterworth-Heinemann 2002. ISBN 0 7506 5131 8

Recommended literature

A.J. Martyr M.A. Plint: Engine Testing Theory and Practice. SAE International 2007. SAE ISBN 978-0-7680-1850-9

Milton Automotive Handbook. Robert Bosch GmbH, 2007 ISBN: 978-0-470-51936-3,

ENGINEERING ECONOMICS

COURSE CODE:	SGMMGX01XMN
ECTS CREDITS:	4
TEACHING HOURS PER WEEK:	2
TEACHER:	Dr Miklós DARÓCZI *daroczi.miklos@gek.szie.hu*

SHORT DESCRIPTION:

The main chapters of the course: fundamentals of engineering economics, cost terminology, breakeven analysis, depreciation, money and time relationships, purchasing and financing alternatives, capital budgeting process, replacement analysis, comparing decision alternatives.

COMPUTER SIMULATION

COURSE CODE: SGMFFX17XXN
ECTS CREDITS: 4
TEACHING HOURS PER WEEK: 2+1
TEACHER: Dr. István FARKAS
farkas.istvan@gek.szie.hu

SHORT DESCRIPTION:

The aim of the course is to introduce the development of physical based mathematical models using examples from engineering practice. Then computational realization and solution of mathematical models of dynamic systems in interactive graphical simulation environment. Measurement based identification of model parameters and model validation. The topics of the main case studies: The topics of the main case studies: modelling of a free flow tank, modelling and simulation of filling a boiler, modelling of grain flow in dryers.

Subject outline: No.	**Date**	**Lecture**	**Practical work (in class or home)**
1.	1st week	Introduction, basic concepts	Mathematical background
2.	2nd week	Modelling, simulation, identification, control	Modelling and simulating of dynamic systems
3.	3rd week	Mathematical modelling	Black-box modelling technique
4.	4th week	Block-oriented modelling	Block-oriented modelling of Ordinary Differential Equations (ODEs)
5.	5th week	Project week	Project week
6.	6th week	Part exam	Evaluation of part exam
7.	7th week	Derivation of a physically based model	Project work

8.	8th week	Filling a boiler as a modelling example	Project work
9.	9th week	Numerical solutions of ODE 1	Project work
10.	10th week	Numerical solutions of ODE 2	Project work
11.	11th week	Numerical solutions of a control task	Project work
12.	12th week	Part exam substitution	Evaluation of part exam substitution
13.	13th week	Modelling of grain flow in dryers	Case study
14.	14th week	Project work evaluation	Discussion
15.	15th week	Final evaluation	

SOLAR ENGINEERING

COURSE CODE:	SGMKLX49
ECTS CREDITS:	4
TEACHING HOURS PER WEEK:	3+0
TEACHER:	Márta SZABÓ *szabo.marta@gek.szie.hu*

SHORT DESCRIPTION:

The course presupposes basic knowledge in the use of renewable energy sources. After an overview of solar geometry, students will learn about the meteorological and climate criteria of using solar radiation. Different solar systems with sizing and economic will be discussed based on the different types of solar energy used (active-passive, heating, cooling and photovoltaic).