SZÉCHENYI ISTVÁN UNIVERSITY
GYŐR

BSC PROGRAMMES

SZÉCHENYI ISTVÁN UNIVERSITY
BAROSS GÁBOR INSTITUTE OF BUILT ENVIRONMENT AND TRANSPORT

COURSE CATALOGUE
ECTS INFORMATION PACKAGE

2009

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SZÉCHENYI ISTVÁN UNIVERSITY
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1. General Information for Students

1.1. About the town of Győr

Situated half way along the road between Budapest and Vienna, Győr, with its 130,000 inhabitants, is one of the most fortuitously situated cities in Hungary. Close to the western border, located at a meeting point of major highways, railways, and three rivers (the Danube, Rába and Mosoni-Duna), Győr has for centuries been virtually unavoidable for anyone travelling to Western Europe.

The restoration of its Baroque downtown was awarded a European Prize for the Protection of Historic Buildings. With an important commercial and industrial heritage, Győr is today one of the most dynamically developing cities in Hungary.

Hungarian branches of multinational companies (e.g., Phillips and Audi) have established themselves here, encouraged by the presence of the existing large Hungarian companies (such as RÁBA). As a result, an enormous demand has been generated in the region for a highly skilled labour force.

1.2. Accessibility

Transportation to Hungary

Hungary is small enough for you not to need to get around by air. International air traffic goes through one airport, Ferihegy (www.bud.hu), near Budapest. From the airport you can take a minibus to your destination in Budapest. The Airport Minibus Service has a desk at the airport, so you will find them easily. This service has a set price independent of your destination within Budapest, but you should call it 24 hrs before you travel. When it's time to leave the country you can call the minibus to pick you up from your door: Have a nice trip!

Airport Minibus Service (www.airportshuttle.hu) It costs 2.990 HUF/ person. To return to the airport you must order the minibus 24 hours in advance. The transfer buses operate between the airport and five major provincial towns (Debrecen, Győr, Miskolc, Pécs, Szeged).

A taxi from the airport to a railway or bus station should cost no more than 4,000-5,000 HUF.

Transportation from Budapest

By train: Trains departing from Keleti Station arrive in Győr in 85 minutes. Besides the 9 or 10 InterCity trains that run daily, most international express trains from Western Europe stop in Győr, so it is possible to reach the city without having to go through Budapest, which makes a change.

Train tickets are fairly cheap in Hungary once you have a student card. Intercity trains are the smoothest way to travel: they are fast and comfortable, and tickets cost only 440 HUF more than for an ordinary train. Train tickets must be purchased in advance at the train station or from a travel agent.

The very smart site http://elvira.mav-start.hu/ , will help you plan your route and give you information on ticket prices.

By bus: Buses depart from Népliget bus station and the journey time is approx. 1,5 hour. International buses (from Vienna, Bratislava, Prague and Munich) also have scheduled stops in Győr.

By car: Take the M1 motorway. Győr is in the middle of the highway from Vienna to Budapest, cca 125 km far from the both cities.

Arriving in Győr

The railway station (Pályaudvar) is in the middle of the city, behind the City Hall (Városháza). From the station, head through the center, then cross the Mosoni-Duna river. The university is approximately 15 minutes from there. The bus station is located next to the railway station. The direct line to the university and to the student hostels is the bus No. 23. Sorry, no underground.

Incoming rules in Hungary

For a stay of less than 90 days every six months in Hungary, EU citizens or some non-EU citizens do not need a visa, but if their stay exceeds the period of 90 days they must apply for a residence permit at the Ministry of Internal Affairs, Bureau of Immigration and Citizenship-Regional Directorate. If you interrupt your stay within 90 days, the period starts again from the beginning.
Please note that in case of some countries the visa-free period only covers 30 days! Citizens of the UK can stay in Hungary without a visa for six months.
Applications for visas must be submitted at the Hungarian Embassy in the home country. (The process of issuing a visa takes 1 month maximum and will be valid for one year maximum.)
Students carrying out regular studies in Hungary as part of a co-operation programme may undertake paid work through a Student Work Association without time/hour limit.

1.3. Students card

The Szechenyi Istvan University provides for every enrolled student a student card. The type of this card is depending on the length of your study:

- **Provisory students card** - This card consist of two parts.
    - One bianco plastic card (without any personal data), which has to be validated by the semester stamp at the beginning of each semester (the stamp is valid to the end of the semester)
    - One personal document (green paper) which has to be validated in every 60 days, that you are student of the university.

  This two parts together is the provisory students card, and one part is valid just with the other part together. You have to check it, and if one of them is out of expiry of the validity period, you have to go back to the office to make it valid. AT the end of your study you have to give back the provisory card, it belongs to the university.

- **Permanent student card** – it is a plastic card with your personal data and picture which has to be validated by the semester stamp at the beginning of each semester (the stamp is valid to the end of the semester) This card belongs to you, you don't have to give it back at the end of your stay. The only problem is, that the preparing of this card takes at least 2-3 month, so if you come to the university for a shorter period, there is no sense to make it.

1.4. Accommodation

For the students applying to the university's programs we offer the possibility - in limited number - to have a place in the university student hostel, or provide help to find a flat to rent.

University Hostel

The hostel is an important scene to develop a communal life. It could be a place where friendship can be made, student community comes alive during the years you spend here.
In the two buildings of the University we are able to host 1620 student. 40% of the place is for the first year students. The occupation is for a whole academic year is preferred but there are always some places kept for the foreign student, you just have to apply in due time for accommodation (July 1 for the winter semester and November 1 for the spring semester)

Fees: The hostel fees are to be paid by remittance in every month and the cost is 20.000 HUF/person in the double bed room. Those who has a personal PC we can offer a wide band internet connection for half a year, costs 5000 Ft.

Renting a flat

If there is no more place in the student hostel or you don't like to live with others together you have the possibility to rent a flat in the town. Győr is a university town, so there are plenty of renting flat during

the academic year. The prices are about 40.000 – 50.000 HUF/Month (150-200 EUR) + common costs (like electricity, water, heating ect.) depending on the number of the rooms and the location of the flat. Of course you have also the possibility to share the flat with your friend, or you can join to a team, which has already a rented flat. In this case could be the costs very convenience.

If you rent an apartment, the postman will show up with your water, gas and electricity bills on a monthly basis. You must pay these by cash at the post office or by bank transfer. If you fail to pay them on time you will get a warm-hearted letter from the financial department of the provider in question telling you how late your payment is and informing you about the interest on your overdue payment. This is the first step. The second step is cutting your supply off, and you will be punished. In Hungary appliances run on 220-volt electricity. If the plug on your appliance does not fit into the socket you can buy an adapter at an electrical store.

1.5. Health and Social care

The free number for the ambulance service is 104.
General emergency number is 112.

This is the number you should call if you see, or are involved in, an accident. Hungarian doctors are famous throughout the world for their expertise, so you can trust them no matter what. First aid and emergency medical care is free for foreigners, the rest you will have to pay for, if you don't have a health insurance, valid in Hungary. State hospitals do not charge too much but if you go to a private clinic you can expect to pay quite a bit more. If you participate in an international student exchange program or study at a state institute you can get free medical care also in the campus, at the university doctor.

Pharmacies sell a number of over-the-counter products for less serious complaints. There are pharmacies open 24 hours a day, but you have to pay an additional 200 to 300 HUF if you go at night. You will find a bell by the door, which you have to press to speak with the pharmacist.

From 1 November, 2005 the medical care of EU citizens is ensured on the basis of the European Health Insurance Card just like in any other EU state. Agreements with non-EU states remain in force after the accession as well. You just need not to forget to take your European Health Insurance card or certificate, that you are insured at your home country and you can have the same medical care, like the Hungarian students.

In the case of the citizens of a non-EU state the insurance system is regulated by bilateral agreements. In case there is no such agreement with the country in question the provision of medical assistance is regulated by Hungarian legislation. In case of non EU citizenship please inquire about the actual legislation before coming to Hungary. If you are staying here at your own expense you should either purchase the most suitable insurance package at home or join the Voluntary Insurance Group in Hungary (the cost is 100% of the minimum wage).

The Széchenyi István University is total prepared to accept handicapped students. We have special rooms and passages for rolling chairs and all the rooms, offices in the campus are available for invalid persons.

1.6. Shopping

Stores are generally open from 10 am to 6 pm. Smaller shops may also close for a lunch break. Stores in shopping malls are open until later (7 or 8 pm). There are two kinds of non-stop shop: the little convenience store in the city center and the giant supermarket. Supermarkets are cheaper than inner-city stores and regularly offer special deals to attract consumers. If you have plenty of time to spend shopping for your meat, vegetables and fruits, the best place to do it is at the local market (piac or csarnok). Goods are still cheaper there.

The minimum wage in Hungary is 57 000 HUF (230 EUR) per month, an amount that allows only limited fun. In fact you have to do a lot of math to make it last until the end of the month. If you want to pay your rent, go out occasionally, and have the odd meal at a restaurant you need at least 75-100 000 HUF (3-400 EUR).

Here is a list of essentials to give you a rough idea of prices

1 kg loaf of bread	200-300 HUF	1-2 EUR
1 liter milk	190-240 HUF	0,8- 1 EUR
6 eggs	150 HUF	0,6 EUR
1 kg sugar	150 HUF	0,6 EUR
1 bottle of beer	260 HUF	1 EUR
1 bottle of wine	500-3000 HUF	2-12 EUR
single bus ticket	250 HUF	1 EUR
student monthly card for local transport	1800 HUF	7 EUR
cinema ticket	1400 HUF	5 EUR
museum entry fee	500-1000 HUF	2-4 EUR
Student train ticket to Budapest	1800 HUF	0,4 EUR
postage for a letter or postcard (international)	150-200 HUF	0,6-0,8 EUR

The official currency is the forint, or Hungarian forint (HUF). The coins in use are 5, 10, 20, 50, 100 and 200 forints. Banknotes come in denominations of 200, 500, 1 000, 2 000, 5 000, 10 000, and 20 000 - with elaborate graphic designs. There are also Braille signs on them for the visually impaired. Money can be exchanged and retrieved in banks or at ATMs (which you can find in the campus or in the city center). The exchange rate does not vary a great deal but it is still a good idea to check two or three places before the transaction. Most banks do not charge commission but pay you the exact amount according to the exchange rate. However, certain bank machines situated in the most attractive spots of the city center may charge 2 to 3% commission. There is a growing number of places that accept the most popular credit cards (American Express, Mastercard, Eurocard, Visa, etc.). In general you should ask the vendor or look out for the symbols on the shop window.

As a foreigner you may also open a bank account in Hungary, based on HUF or any other currency. This is called a non-residential account and all you need to open one is your passport. Money can be transferred at post offices and banks. The HUF is fully convertible, so feel free!

The euro will probably not be in use until 2012, but in certain places you will see prices quoted in euros for comparison. One EUR is between 270-280 HUF.

1.7. Internet

The Széchenyi István University provides free Internet access for their students in the PC cabinet C 100. You just have to show your student card and you can enter the cabinet and use the computers. If you want to have an own Internet access in the hostel room, you have to pay 5.000HUF/semester.
In Győr you can also find a number of Internet cafés, providing access to the World Wide Web for about 600-700 HUF/hour. Anyway, it is not difficult at all to find a place where you can check your e-mails or surf on the internet.

1.8. Just in case!

The free number on which to call the police is 107.
General emergency number is 112.

(They can contact always somebody, who is speaking on your mother language or at least English)
This is the numbers you should dial if you need help or wish to report a crime. The Hungarian policemen wear grey and blue uniforms and drive white/blue (sometimes green/blue) cars. They are entitled to ask to see your papers at any time, but this generally happens either late in the evening or for a good reason. It's just a routine check. There are various police units ensuring the safety of the city - for example in the downtown of Győr.

If you are arrested (and this rarely happens to foreign students) you have the right to speak with a lawyer, to use the help of an interpreter, and to contact your country's embassy within 24 hours.

Public safety is getting better: there are some very encouraging statistics, although inevitably there is still room for improvement. Whenever you are in a crowded place watch out for pickpockets and NEVER leave anything on view in your car that is valuable or eye-catching. This might all sound rather intimidating, but no matter where you go in the world it is always better to be safe than sorry.

1.9. Useful links

If you plan a study at our university we suggest you to visit the next web-pages:

http://uni.sze.hu
http://ipc.sze.hu
http://esn.sze.hu
www.mfa.gov.hu
www.om.hu
www.studyinhungary.hu
www.gyor.hu
www.vendegvaro.hu

2. Information about the University

Széchenyi István University - the first university to be established in the 21st century, in Hungary – is the primary server of the regional economy and public services sector, supplier of human resources and training needs in the North- Transdanubian region. The university provides education, as well as pursuing research work in the fields of engineering, IT, pedagogy, economics, international relations, law and administration, social work, medicine and health, and arts. Its activities encompass training at all levels, from the vocational courses through the BSc and MSc to the doctoral training and further training. The university offers unique training and research in the region, that serves primarily the engineering focused production activities, building on the North-Transdanubian economy and its social and institutional environment. Its educational activities provide students with high-level, valuable, professional, and practical education, in addition to the ability and willingness to adapt to any situation.

More information: http://info.sze.hu

2.1. Institutional Structure

Academic Departments	
Kautz Gyula Faculty of Economics	http://kgk.sze.hu/
Deák Ferenc Faculty of Law and Political Science	http://dfk.sze.hu/
Faculty of Engineering Sciences	http://mtk.sze.hu/
Jedlik Ányos Institute of Informatics, Electrical and Mechanical Engineering	http://mtk.sze.hu/
Baross Gábor Institute of Built Environment and Transport	http://eki.sze.hu/
Petz Lajos Institute of Health and Social Studies	http://www.eszi.sze.hu/
Varga Tibor Institute of Musical Art	http://zmi.sze.hu/
Doctoral Schools	
Multidisciplinary Doctoral School of Engineering: Modelling and Development of Infrastructural Systems	http://mmtdi.sze.hu/
Multidisciplinary Doctoral School of Social Sciences: Economy, Regionalism and Society in the integration of Central Europe	http://rgdi.sze.hu/
Doctoral School of Law and Political Sciences	http://doktiskjog.sze.hu/
Research Departments	
Regional University Knowledge Centre for Vehicle Industry	http://jret.sze.hu/
Cooperative Research Center for Vehicle Electronics and Logistics	http://jelkkk.sze.hu/

2.2. Education

The aim of the university is to provide initial training leading to a BSc and MSc and PhD degree in various fields, to offer post-graduate courses and to carry out research, consultancy and other professional activities. Over the years, the specialist fields covered by the university have been considerably expanded.
Degrees (BSc, MSc, PhD) are issued after the successful completion of a programme, after collecting the required number of credits, submission and defence of the final thesis.

The credits at Széchenyi István University are ECTS conform credits. (1 credit point consists of at least 25 student workload hours)

More information: http://ipc.sze.hu

Programmes, available at the university in 2010:

BA	International administration management	BSc	Informatics of economics
BA	Public administration management	BSc	Mechanical engineering
BA	Business and management	BSc	Mechatronic engineering
BA	International studies	BSc	Transportation engineering
BA	Trade and marketing	BSc	Engineering management
BSc	Civil engineering	BSc	Vocational technical instructor
BSc	Architectural engineering	BA	Social work
BSc	Environmental engineering	BSc	Health management
BSc	Electrical engineering	BSc	Nursing and medical care
BSc	Information technology	BA	Music teacher
BSc	Mechanical engineering		

MA	Law	MSc	Architecture
MA	Regional and Environmental Economic Studies	MSc	Transportation engineering
MA	Management and Leadership	MSc	Infrastructure engineering
MA	International business and management	MSc	Automotive engineering
MA	International and EU administration management	MSc	Mechatronic Engineering
MA	Logistic management	MSc	Electrical Engineering
MA	Marketing	MSc	Information technology
MA	Marketing (available in English)	MSc	Logistics engineering
MA	Music teacher	MSc	Vocational technical instructor

PhD	Regional and Economic Studies	PhD	Civil engineering
PhD	Law and Political Sciences	PhD	Transportation engineering
		PhD	Information technology

More information: http://info.sze.hu

2.3. Facilities at the university

Research facilities (IT, Laboratories)
The university has 40 engineering laboratories, of which a large number of them have been modernized through EU projects, so they can be used not only in education but also to promote scientific co-operation with companies in the region. There is a free Internet access for all students of the university's and there are numerous computer rooms available for academic instruction and use by the students.

The Library is the information centre for professional literature at the university, but it also operates as a public technical library in the Transdanubian region. Its collection contains both classical and contemporary Hungarian and foreign books connected to the special areas taught in the regular and specialised courses at the university. More information: http://lib.sze.hu/

The university provides a unique *sports* facility-network for physical education. The Sports Hall (jointly operated by the city) and the university Training Hall allow for PE activities from the morning until midnight. The cardio- and training rooms, the sports fields, park, the river Danube , and the swimming hall, which are either on campus or close to it, are facilities that are frequented by our students. More information: http://tsk.sze.hu/

The University Dormitory is one of the largest dormitories operating in Hungary. It provides, in three buildings (1 on campus and 2 off campus), accommodation for 1,600 students in rooms for two or three. This structure makes it suitable to accommodate paying guests as well, especially in the summer. It is convenient and practical for sports camps, student camps and conferences.
More information: http://kollegium.sze.hu/

The Students' Unions represent the interests of the students at each level and in each body of the university. The Students' Self-Government asserts the students' legal rights, decides on the allocation of state support and assists in dealing with the educational and social concerns of the students. More information: http://www.szeportal.hu

2.4. Research activities of the university

The institution - in accordance with the traditions – currently operates mostly applied research. Particular attention is paid to research activities that are multidisciplinary and fall within a scientific field. In addition to these activities, interdisciplinary projects that fall within the periphery of the fields of study at the university, which have a social and economic aspect to them and deal with critical problems, are also integrated into the research work of the university.

As the result of a project, the Regional University Knowledge Center for Vehicle Industry was established. This now works on the execution of a number of research projects in the field of the automotive industrial research. The Cooperation Research Center focuses on research fields in the automotive industry, electronics, logistics and transport infrastructure, and cooperates in joint research tasks with companies. An international researcher team was established for a 3-year project in the research area of applied mathematics, and a Knowledge Management Center was set up to coordinate and develop the university's research activities.

The scientific papers and studies of Széchenyi István University are published in the scientific journals of the university. These Journals (Acta Technica Jaurinensis, Hungarian Electronic Journal of Sciences) present the results of the research conducted at the university. This allows the possibility of a quick, refereed electronic publishing forum that is available at both national and international levels and improves the quantity and quality of the publication activities of the university.
More information: http://info.sze.hu , http://journal.sze.hu/ , http://hej.sze.hu/

2.5. International

The professors and departments of the university have established a working educational and research co-operation with more than 30 higher educational and some 70 industrial partners in Hungary. The university has institutional-level connections with more than 100 European institutions of higher education, and with numerous international partnerships outside Europe. Most of these programs are educational partnerships and some include professor and student exchange programmes. These are mainly financed through EU projects such as ERASMUS, LEONARDO, CEEPUS, FP6, and FP7. Since 2003 Széchenyi István University is a registered member of the EUA.

The university considers it a priority to expand its offer of international education and to create an opportunity for foreign students to participate in partial or full degree courses in a foreign language at Széchenyi István University. To help achieve this goal, the International Project Center was established as the primary contact point for international networking.
More information: http://ipc.sze.hu

2.6. Why to choose Széchenyi István University?

- Balanced, multidisciplinary profile
- Young and innovative
- Well equipped infrastructure (Laboratories, computer rooms, student dormitories)
- Disabled students/teachers are welcome

Introduction to the ECTS system

ECTS is a tool that helps to design, describe, and deliver programmes and award higher education qualifications. The use of ECTS, in conjunction with outcomes-based qualifications frameworks, makes programmes and qualifications more transparent and facilitates the recognition of qualifications. ECTS can be applied to all types of programmes, whatever their mode of delivery (school-based, work-based), the learners' status (full-time, part-time) and to all kinds of learning (formal, non-formal and informal).

ECTS is the credit system for higher education used in the European Higher Education Area, involving all countries engaged in the Bologna Process. ECTS is one of the cornerstones of the Bologna process. Most Bologna countries have adopted ECTS by law for their higher education systems.

Among other objectives, the Bologna Process aims at the establishment of a system of credits as a proper means of promoting the most widespread student mobility. ECTS contributes to several other Bologna objectives:

- ECTS credits are a key element of the Bologna Framework for Qualifications, compatible with the European Qualifications Framework for lifelong learning (EQF). ECTS credits are used in formulating national qualifications frameworks for higher education, which may contain more detailed national credit arrangements.
- ECTS helps institutions to implement the objective of quality assurance (see section. In some countries, ECTS is a requirement for accreditation of higher education programmes or qualifications.
- ECTS is also increasingly used by institutions in other continents and thus plays a role in the growing global dimension of the Bologna Process.

ECTS

ECTS is a learner-centred system for credit accumulation and transfer based on the transparency of learning outcomes and learning processes. It aims to facilitate planning, delivery, evaluation, recognition and validation of qualifications and units of learning as well as student mobility. ECTS is widely used in formal higher education and can be applied to other lifelong learning activities.

ECTS credits

ECTS credits are based on the workload students need in order to achieve expected learning outcomes. Learning outcomes describe what a learner is expected to know, understand and be able to do after successful completion of a process of learning. They relate to level descriptors in national and European qualifications frameworks.

Workload indicates the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study and examinations) required to achieve the expected learning outcomes.

60 ECTS credits are attached to the workload of a fulltime year of formal learning (academic year) and the associated learning outcomes. In most cases, student workload ranges from 1,500 to 1,800 hours for an academic year, whereby one credit corresponds to 25 to 30 hours of work.

Use of ECTS credits

Credits are allocated to entire qualifications or study programmes as well as to their educational components (such as modules, course units, dissertation work, work placements and laboratory work). The number of credits ascribed to each component is based on its weight in terms of the workload students need in order to achieve the learning outcomes in a formal context.

Credits are awarded to individual students (full-time or part-time) after completion of the learning activities required by a formal programme of study or by a single educational component and the successful assessment of the achieved learning outcomes. Credits may be accumulated with a view to obtaining qualifications, as decided by the degree-awarding institution. If students have achieved learning outcomes in other learning contexts or timeframes (formal, nonformal or informal), the associated credits may be awarded after successful assessment, validation or recognition of these learning outcomes.

Credits awarded in one programme may be transferred into another programme, offered by the same or another institution. This transfer can only take place if the degree-awarding institution recognises the credits and the associated learning outcomes. Partner institutions should agree in advance on the recognition of periods of study abroad.

Credit transfer and accumulation are facilitated by the use of the ECTS key documents (Course Catalogue, Student Application Form, Learning Agreement and Transcript of Records) as well as the Diploma Supplement.

For further information, please visit the following website:

http://ec.europa.eu/education/lifelong-learning-policy/doc/ects/guide_en.pdf

Reference

ECTS's Users Guide

Luxembourg Office for Official Publications of the European Communities, 2009

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BSc programme in Architect Engineering

1. Aim of the program
The aim of the program is to train architect engineers particularly in the field of building consruction activity (construction, manufacturing, services, business, authority work, certain building design and research tasks), who are under control capable of fulfilling technical tasks described above, through scientific, technical and artistic, as well as economic, human and linguistic skills.

2. Program content
Duration: 8 semesters
ECTS credits: 240 credits
1 local credit = 1 ECTS credit

Specialisations offered:
- Building construction
- Urban planning

Compulsory industrial placement: minimum 6 weeks

3. Requirements
Diploma thesis work requirements:
In their diploma thesis work students work out a concrete arhcitect engineering task or do some research work. This has to be done during one semester based on university studies, literature survey and with the assistance of supervisors. With the diploma thesis work the candidate proves that he/she acquired the necessary proficiency to use the theoretical knowledge in practice, is able to fulfil the analyser and designer function of an architect engineer, and can use professional literature productively.

Requirements to be met before the final state exam:
- 240 credits (including 15 credits for the diploma thesis work),
- completed industrial placement,
- approved diploma thesis by an internal as well as an external consultant.

Further requirement to get the degree:
You should have an oral or written intermediate level exam of a foreign language (English, German, Italian, French, Spanish or Russian). It is equivalent to the B2 level of the Council of Europe Common European Framework of Reference for Languages.

Contents of the final state exam:
- oral presentation of the diploma thesis work,
- oral exam of fixed and chosen professional courses amounting to at least 20 credits.

Degree qualification:
Average of three marks: the oral presentation of the diploma thesis work, the final oral exam and the weighted average of all completed courses during the program.

Description of the institutional grading system:
5 = excellent
4 = good
3 = medium
2 = satisfactory
1 = failed

4. List of courses

Compulsory courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_AK002_1	Economics	4	4	1
2.	NGB_ED002_1	Basics of Architecture I.	2	2	1
3.	NGB_EP001_1	Descriptive Geometry I.	5	4	1
4.	NGB_EP004_1	Building Constructions I.	4	4	1
5.	NGB_EP007_1	Drawing and Composition I.	2	2	1
6.	NGB_EV004_1	Vernacular Architecture	2	2	1
7.	NGB_JE002_1	Legal Studies	2	2	1
8.	NGB_MA002_1	Mathematics I. Analysis	4	4	1
9.	NGB_SE001_1	Mechanics I.	4	4	1
10.	NGB_TT006_1	Modern Societies	2	2	1
11.	NGB_ED002_2	Basics of Architecture II.	2	2	2
12.	NGB_ED003_1	Residential Building Design I.	2	2	2
13.	NGB_EP001_2	Descriptive Geometry II.	5	4	2
14.	NGB_EP002_1	Building Materials I.	3	3	2
15.	NGB_EP004_2	Building Constructions II.	4	4	2
16.	NGB_EP007_2	Drawing and Composition II.	2	2	2
17.	NGB_EP008_1	Building Physics	2	2	2
18.	NGB_EV003_1	History of Architecture I.	2	2	2
19.	NGB_MA002_2	Mathematics II. Linear Algebra	4	4	2
20.	NGB_SE001_2	Mechanics II.	4	4	2
21.	NGB_SE012_1	Geotechnics 1.	3	3	2
22.	NGB_ED003_2	Residential Building Design II.	4	4	3
23.	NGB_EP002_2	Building Materials II.	3	3	3
24.	NGB_EP004_3	Building Constructions III.	4	4	3
25.	NGB_EP006_1	History of Art	2	2	3
26.	NGB_EP007_3	Drawing and Composition III.	2	2	3
27.	NGB_EP009_1	Building Technology I.	4	4	3
28.	NGB_EV003_2	History of Architecture II.	2	2	3
29.	NGB_EV005_1	Town Construction	2	3	3
30.	NGB_SE001_3	Mechanics III.	4	4	3
31.	NGB_SE004_1	Structures I.	3	3	3
32.	NGB_SE052_1	Design of Engineering Structures	2	2	3
33.	NGB_ED003_3	Residential Building Design III.	4	4	4
34.	NGB_ED004_1	Public Building Design I.	2	2	4
35.	NGB_EP004_4	Building Constructions IV.	4	4	4
36.	NGB_EP005_1	Building Service Engineering I.	2	2	4
37.	NGB_EP007_4	Drawing and Composition IV.	2	2	4
38.	NGB_EP009_2	Building Technology II.	4	4	4
39.	NGB_ET005_1	Geoinformatics I.	4	4	4
40.	NGB_EV003_3	History of Architecture III.	2	2	4
41.	NGB_EV006_1	Urban Planning I.	2	2	4
42.	NGB_SE004_2	Structures II.	2	3	4
43.	NGB_SE004_3	Structures III.	3	3	4
44.	NGB_ED004_2	Public Building Design II.	5	4	5
45.	NGB_ED005_1	Theory of Design	2	2	5
46.	NGB_EP004_5	Building Constructions V.	4	4	5
47.	NGB_EP005_2	Building Service Engineering II.	2	2	5
48.	NGB_EP007_5	Drawing and Composition V.	2	2	5
49.	NGB_EP009_3	Building Technology III.	2	2	5
50.	NGB_EV003_4	History of Architecture IV.	2	2	5
51.	NGB_EV006_2	Urban Planning II.	3	3	5
52.	NGB_EV007_1	Building Administration	2	2	5

53.	NGB_SE004_4	Structures IV.	2	3	5
54.	NGB_SE004_5	Structures V.	3	2	5
55.	NGB_EP007_6	Drawing and Composition VI.	2	2	6
56.	NGB_EV003_5	History of Architecture V.	2	2	6
57.	NGB_EV003_6	History of Architecture VI.	2	2	7
58.	NGB_EP013_1	Diploma Planning / Final Thesis	15	4	8
59.	NGB_TT005_1	Sociology	2	2	8
60.	NGB_TS001_1-4	Physical training I.-IV.	0		
Total			**179**		

Compulsory language courses
(students must choose 2 terms of one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_IT001_1	Intermediate Exam Prep Course I.	0	4
2.	NGB_IT001_2	Intermediate Exam Prep Course II.	0	4
3.	NGB_IT024_1	Technical Communication Prep Course I.	0	4
4.	NGB_IT024_2	Technical Communication Prep Course II.	0	4

Optional economic and human courses
(12 credits should be selected)

	Course code	Title	Credits	Lessons per week
1.	NGB_ET010_1	Strategic Planning	2	2
2.	NGB_KA001_1	Busines Law and Protection of Industrial Property	2	2
3.	NGB_KM001_1	Technical Chemistry	2	2
4.	NGB_KM002_1	Environmental Protection	2	2
5.	NGB_KM034_1	Engineering Communication	2	2
6.	NGB_SE002_1	Civil Engineer in the Society	2	2
7.	NGB_SM044_1	Voluntary Support Practice	4	4
8.	NGB_SV050_1	Career Planning, Labour Market Studies	2	2

Specialisation of building construction

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ED006_1	Industrial and Agricultural Design	2	2	6
2.	NGB_EP004_6	Building Constructions VI.	4	4	6
3.	NGB_EP010_1	Computer Aided Architectural Design I.	3	3	6
4.	NGB_ED004_3	Public Building Design III.	5	4	6
5.	NGB_EP011_1	Building Construction Project I.	4	6	6
6.	NGB_EV009_1	Conservation of Historical Buildings	3	2	6
7.	NGB_SE008_1	Construction of Structures I.	3	3	6
8.	NGB_SE008_2	Construction of Structures II.	3	3	6
9.	NGB_EP010_2	Computer Aided Architectural Design II.	3	3	7
10.	NGB_EP011_2	Building Construction Project II.	9	9	7
11.	NGB_SE005_2	Geotechnics II.	3	3	7
12.	NGB_EP012_1	Building Diagnostics	2	2	8
13.	NGB_ET003_1	Quality Management	2	2	8
14.	NGB_SE008_3	Cosntruction of Structures III.	3	3	8
Total			**49**		

Specialisation of urban planning

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ED006_1	Industrial and Agricultural Design	2	2	6
2.	NGB_EP004_6	Building Constructions VI.	4	4	6
3.	NGB_EP010_1	Computer Aided Architectural Design I.	3	3	6
4.	NGB_ET014_1	Communal Works I.	3	3	6
5.	NGB_EV002_1	Urban and Landscape Design I.	3	3	6
6.	NGB_KM004_1	Environmental Assessment I.	4	4	6
7.	NGB_RT001_1	Development of Settlement and Region I.	3	3	6
8.	NGB_EP010_2	Computer Aided Architectural Design II.	3	3	7
9.	NGB_ET014_2	Communal Works II.	3	2	7
10.	NGB_EV002_2	Urban and Landscape Design II.	3	3	7
11.	NGB_KM004_2	Environmental Assessment II.	4	4	7
12.	NGB_RT001_2	Development of Settlement and Region II.	5	3	7
13.	NGB_SE005_2	Geotechnics II.	3	3	7
14.	NGB_EV009_1	Conservation of Historical Buildings	3	2	8
15.	NGB_RT001_3	Development of Settlement and Region III.	3	3	8
Total			**49**		

BSc programme in Civil Engineering

1. Aim of the program

The aim of the program is to train well-prepared civil engineers, who are capable of fulfilling design, construction, maintenance and operational, corporate and authority tasks, they are able to work on planning and development projects independently, having a command of a foreign language.

Taking into account their specialisations, our civil engineers can:
- get design licences after the required professional practice,
- work out common development tasks independently,
- provide considerable contribution to complex engineering design.

In the whole field of civil engineering our graduates can:
- take up technical manager duties,
- take up technical supervisor duties,
- work in constructional, maintenance and operational, corporate and authority fields,
- fulfil urban engineering tasks.

2. Program content

Duration: 8 semesters
ECTS credits: 240 credits
1 local credit = 1 ECTS credit

Program structure:

Fields	**Credits**	**%**
Natural sciences	51	21
Economic and human studies	24	10
Compulsory professional subjects	100	42
Specialised professional subjects	50	21
Diploma thesis work	15	6
Total	240	100

Specialisations offered:
- Transport infrastructure
- Structural engineering
- Municipal engineering

Compulsory industrial placement: minimum 6 weeks

3. Requirements

Diploma thesis work requirements:

In their diploma thesis work students work out a concrete civil engineering task or do some research work. This has to be done during one semester based on university studies, literature survey and with the assistance of supervisors. With the diploma thesis work the candidate proves that he/she acquired the necessary proficiency to use the theoretical knowledge in practice, is able to fulfil the analyser, designer function of a civil engineer, and can use professional literature productively.

Requirements to be met before the final state exam:
- 240 credits (including 15 credits for the diploma thesis work),
- completed industrial placement,
- approved diploma thesis by an internal as well as an external consultant.

Further requirement to get the degree:
You should have an oral or written intermediate level exam of a foreign language (English, German, Italian, French, Spanish or Russian). It is equivalent to the B2 level of the Council of Europe Common European Framework of Reference for Languages.

Contents of the final state exam:
- oral presentation of the diploma thesis work,
- oral exam of fixed and chosen professional courses amounting to at least 20 credits.

Degree qualification:
Average of three marks: the oral presentation of the diploma thesis work, the final oral exam and the weighted average of all completed courses during the program.

Description of the institutional grading system:

5 = excellent
4 = good
3 = medium
2 = satisfactory
1 = failed

4. List of courses

Compulsory courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_AK002_1	Economics	4	4	1
2.	NGB_EP001_1	Descriptive Geometry	4	4	1
3.	NGB_JE001_1	Legal Studies	2	2	1
4.	NGB_KM001_1	Technical Chemistry	2	2	1
5.	NGB_KM002_1	Environmental Protection	2	2	1
6.	NGB_MA002_1	Mathematics I. Analysis	4	4	1
7.	NGB_SE001_1	Mechanics I.	5	4	1
8.	NGB_SZ003_1	Informatics I.	4	4	1
9.	NGB_EP002_1	Building Materials I.	3	3	2
10.	NGB_ET003_1	Quality Management	2	2	2
11.	NGB_ET005_1	Geoinformatics I.	4	4	2
12.	NGB_FI004_1	Physics	4	4	2
13.	NGB_MA002_2	Mathematics II. Linear Algebra	4	4	2
14.	NGB_SE001_2	Mechanics II.	5	4	2
15.	NGB_SV001_1	Company Economics	4	3	2
16.	NGB_SZ003_2	Informatics II.	4	4	2
17.	NGB_EP002_2	Building Materials II.	4	3	3
18.	NGB_EP003_1	Buildings I.	4	4	3
19.	NGB_ET001_1	Computer Graphics	4	3	3
20.	NGB_ET005_2	Geoinformatics II.	3	3	3
21.	NGB_MA002_3	Mathematics III. Probability and Statistics	4	4	3
22.	NGB_NJ001_1	EU Studies	2	2	3
23.	NGB_SE001_3	Mechanics III.	5	4	3
24.	NGB_SE003_1	Engineering Methods I.	4	3	3
25.	NGB_SE004_1	Structures I.	3	3	3
26.	NGB_EP003_2	Buildings II.	4	4	4
27.	NGB_ET005_3	Geoinformatics III.	3	3	4
28.	NGB_ET006_1	Urban Engineering I.	3	3	4
29.	NGB_ET007_1	Transport Infrastructure I.	3	3	4
30.	NGB_ET008_1	Hydraulic Engineering I.	3	3	4
31.	NGB_SE003_2	Engineering methods II.	4	3	4
32.	NGB_SE004_2	Structures II.	3	3	4
33.	NGB_SE004_3	Structures III.	3	3	4
34.	NGB_SE005_1	Geotechnics I.	4	3	4
35.	NGB_EP003_3	Buildings III.	3	4	5
36.	NGB_ET006_2	Urban Engineering II.	3	3	5
37.	NGB_ET007_2	Transport Infrastructure II.	3	3	5
38.	NGB_ET007_3	Transport Infrastructure III.	3	3	5
39.	NGB_ET008_2	Hydraulic Engineering II.	3	3	5
40.	NGB_SE003_3	Engineering Methods III.	4	3	5
41.	NGB_SE004_4	Structures IV.	3	3	5
42.	NGB_SE004_5	Structures V.	3	2	5
43.	NGB_SE005_2	Geotechnics II.	3	3	5
44.	NGB_ET004_1	Construction Management I.	4	3	6
45.	NGB_ET007_4	Transport Infrastructure IV.	3	3	6
46.	NGB_ET008_3	Hydraulic Engineering III.	3	3	6
47.	NGB_SE005_3	Geotechnics III.	3	3	6
48.	NGB_ET004_2	Construction Management II.	4	3	7
49.	NGB_TS001_1-4	Physical training I.-IV.	0		
Total			**165**		

Compulsory language courses
(students must choose 2 terms of one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_IT001_1	Intermediate Exam Prep Course I.	0	4
2.	NGB_IT001_2	Intermediate Exam Prep Course II.	0	4
3.	NGB_IT024_1	Technical Communication Prep Course I.	0	4
4.	NGB_IT024_2	Technical Communication Prep Course II.	0	4

Compulsory diploma thesis courses
(students choose one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_ET099_1	Diploma thesis	15	2
2.	NGB_SE099_1	Diploma thesis	15	2

Optional economic and human courses
(10 credits should be selected)

	Course code	Title	Credits	Lessons per week
1.	NGB_ET010_1	Strategic Planning	2	2
2.	NGB_EV001_1	Preservation of Builit Heritage	3	2
3.	NGB_KA001_1	Busines Law and Protection of Industrial Property	2	2
4.	NGB_KM034_1	Engineering Communication	2	2
5.	NGB_SE002_1	Civil Engineer in the Society	2	2
6.	NGB_SM044_1	Voluntary Support Practice	4	4
7.	NGB_SV002_1	Production Management	4	3
8.	NGB_SV050_1	Career Planning, Labour Market Studies	2	2
9.	NGB_TT005_1	Sociology	2	2
10.	NGB_TT006_1	Modern Societies	2	2

Specialisation of transport infrastructure
(50 credits to be selected)

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ET009_1	Traffic Engineering I.	3	3	6
2.	NGB_ET011_1	Roads I.	3	3	6
3.	NGB_ET012_1	Railways I.	3	3	6
4.	NGB_ET013_1	Transport Construction Project I.	3	1	6
5.	NGB_KM004_1	Environmental Assessment I.	5	4	6
6.	NGB_ET009_2	Traffic Engineering II.	3	3	7
7.	NGB_ET011_2	Roads II.	3	3	7
8.	NGB_ET012_2	Railways II.	3	3	7
9.	NGB_ET013_2	Transport Construction Project II.	3	1	7
10.	NGB_KM004_2	Environmental Assessment II.	5	4	7
11.	NGB_KO027_1	Public Transport I.	3	3	7
12.	NGB_SE005_4	Geotechnics IV.	3	3	7
13.	NGB_SE007_1	Bridges I.	3	3	7
14.	NGB_ET011_3	Roads III.	3	3	8
15.	NGB_ET012_3	Railways III.	3	3	8
16.	NGB_SE007_2	Bridges II.	4	3	8
Total			**53**		

Specialisation of structural engineering
a.) Compulsory specialisation courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_KM004_1	Environmental Analysis I.	5	4	6
2.	NGB_SE008_1	Construction of Structures I.	3	3	6
3.	NGB_SE008_2	Construction of Structures II.	3	3	6
4.	NGB_SE009_1	Construction Project I.	3	1	6
5.	NGB_EP014_1	Building Construction 1.	4	5	7
6.	NGB_EV003_1	History of Architecture I.	3	2	7
7.	NGB_SE005_4	Geotechnics IV.	3	3	7
8.	NGB_SE007_1	Bridges I.	3	3	7
9.	NGB_SE009_2	Construction Project II.	3	1	7
10.	NGB_SE010_1	Analysis of Structures	4	3	7
11.	NGB_EP014_2	Buildings Construction 2.	4	4	8
12.	NGB_SE007_2	Bridges II.	4	3	8
13.	NGB_SE008_3	Construction of Structures III.	3	3	8
Total			**45**		

b.) Optional specialisation courses
(5 credits to be selected)

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_SE013_1	CASD I. (Design of Structures with Finite Element Method)	3	3	6
2.	NGB_SE013_2	CASD II. (Computer Aided Design of Structures)	3	3	7
3.	NGB_KM004_2	Environmental Analysis II.	5	4	7
4.	NGB_EV003_2	History of Architecture II.	3	2	8

Specialisation of municipal engineering
(50 credits to be selected)

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ET009_1	Traffic Engineering I.	3	3	6
2.	NGB_ET014_1	Communal Works I.	3	3	6
3.	NGB_ET015_1	Settlement Development Project I.	3	2	6
4.	NGB_EV002_1	Urban and Landscape Design I.	3	3	6
5.	NGB_KM004_1	Environmental Assessment I.	5	4	6
6.	NGB_RT001_1	Development of Settlement and Region I.	3	3	6
7.	NGB_ET014_2	Communal Works II.	3	2	7
8.	NGB_ET015_2	Settlement Development Project II.	3	2	7
9.	NGB_EV002_2	Urban and Landscape Design II.	3	3	7
10.	NGB_EV003_1	History of Architecture I.	3	2	7
11.	NGB_KM004_2	Environmental Assessment II.	5	4	7
12.	NGB_KO027_1	Public Transport I.	3	3	7
13.	NGB_RT001_2	Development of Settlement and Region II.	3	2	7
14.	NGB_RT001_2	Development of Settlement and Region III.	3	2	7
15.	NGB_EV003_2	History of Architecture II.	3	2	8
16.	NGB_RT001_4	Development of Settlement and Region IV.	3	3	8
Total			**52**		

BSc programme in Environmental Engineering

1. Aim of the program

The aim of the program is to train specialists in environmental engineering, who have a wide range of basic skills in natural sciences, knowledge of local, regional, national and global environmental problems and their management methods, and are able to use environmentally friendly technologies. They know and apply the advanced measurement and informatics tools, as well as they have appropriate social and strong communication skills. In the possession of their specialised knowledge they are capable of innovative solutions for occurrent tasks.

2. Program content

Duration: 7 semesters
ECTS credits: 210 credits
1 local credit = 1 ECTS credit

Program structure:

Fields	**Credits**	**%**
Natural sciences	50	23
Economic and human studies	20	10
Compulsory professional subjects	79	38
Specialised professional subjects	46	22
Diploma thesis work	15	7
Total	210	100

Specialisations offered:
- Environmental assessment
- Environmental technology

Compulsory industrial placement: minimum 6 weeks

3. Requirements

Diploma thesis work requirements:

In their diploma thesis work students work out a concrete environmental engineering task or do some research work. This has to be done during one semester based on university studies, literature survey and with the assistance of supervisors. With the diploma thesis work the candidate proves that he/she acquired the necessary proficiency to use the theoretical knowledge in practice, is able to fulfil the analyser, problem solving function of an environmental engineer, and can use professional literature productively.

Requirements to be met before the final state exam:
- 210 credits (including 15 credits for the diploma thesis work),
- completed industrial placement,
- approved diploma thesis by an internal as well as an external consultant.

Further requirement to get the degree:

You should have an oral or written intermediate level exam of a foreign language (English, German, Italian, French, Spanish or Russian). It is equivalent to the B2 level of the Council of Europe Common European Framework of Reference for Languages.

Contents of the final state exam:
- oral presentation of the diploma thesis work,
- oral exam of fixed and chosen professional courses amounting to at least 10 credits.

Degree qualification:
Average of three marks: the oral presentation of the diploma thesis work, the final oral exam and the weighted average of all completed courses during the program.

Description of the institutional grading system:

5 = excellent
4 = good
3 = medium
2 = satisfactory
1 = failed

4. List of courses

Compulsory courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_AK002_1	Economics	4	4	1
2.	NGB_EP001_1	Descriptive Geometry	4	4	1
3.	NGB_KM001_1	Technical Chemistry	2	2	1
4.	NGB_KM002_1	Environmental Protection	2	2	1
5.	NGB_KM006_1	Biology I.	2	2	1
6.	NGB_KM008_1	Geology and Geophysics I.	2	2	1
7.	NGB_MA002_1	Mathematics I. Analysis	4	4	1
8.	NGB_SZ003_1	Informatics I.	4	4	1
9.	NGB_ET008_1	Geoinformatics I.	4	4	2
10.	NGB_FI004_1	Physics	4	4	2
11.	NGB_KM003_1	Engineering Physics	4	4	2
12.	NGB_KM005_1	Chemistry I.	6	6	2
13.	NGB_KM006_2	Biology II.	2	2	2
14.	NGB_KM008_2	Geology and Geophysics II.	2	2	2
15.	NGB_MA002_2	Mathematics II.Linear Algebra	4	4	2
16.	NGB_SV001_1	Company Economics	4	4	2
17.	NGB_SZ003_2	Informatics II.	4	4	2
18.	NGB_ET005_3	Geoinformatics III.	3	3	3
19.	NGB_JE002_1	Legal Studies	2	2	3
20.	NGB_KM005_2	Chemistry II.	6	6	3
21.	NGB_KM007_1	Ecology	4	4	3
22.	NGB_KM010_1	Soil Protection	6	4	3
23.	NGB_KM012_1	Air Protection	6	4	3
24.	NGB_KM030_1	Environmental Hygiene	2	2	3
25.	NGB_MA002_3	Mathematics III. Probability and Statistics	4	4	3
26.	NGB_KM004_1	Environmental Assessment I.	6	4	4
27.	NGB_KM009_1	Environmental Analytics and Measurement	8	8	4
28.	NGB_KM011_1	Water Protection	6	4	4
29.	NGB_KM013_1	Conservation Biology	6	3	4
30.	NGB_KM016_1	Environmental Management I.	2	2	4
31.	NGB_NJ001_1	EU Studies	2	2	4
32.	NGB_KM004_2	Environmental Assessment II.	6	4	5
33.	NGB_KM014_1	Waste Management	6	4	5
34.	NGB_KM016_2	Environmental Management II.	2	2	5
35.	NGB_KM017_1	Environmental Policy I.	2	2	5
36.	NGB_KM015_1	Noise, Vibration and Radiation Protection	2	2	6
37.	NGB_KM017_2	Environmental Policy II.	2	2	6
38.	NGB_KM031_1	Ecological Field Work	2	2	6
39.	NGB_TS001_1-4	Physical training I.-IV.	0		
Total			**147**		

Compulsory language courses
(students must choose 2 terms of one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_IT001_1	Intermediate Exam Prep Course I.	0	4
2.	NGB_IT001_2	Intermediate Exam Prep Course II.	0	4
3.	NGB_IT024_1	Technical Communication Prep Course I.	0	4
4.	NGB_IT024_2	Technical Communication Prep Course II.	0	4

Compulsory diploma thesis courses
(students choose one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_KM099_1	Diploma thesis	15	2
2.	NGB_FI091_2	Diploma thesis	15	2

Optional economic and human courses
(4 credits should be selected)

	Course code	Title	Credits	Lessons per week
1.	NGB_ET010_1	Strategic Planning	2	2
2.	NGB_EV001_1	Preservation of Builit Heritage	3	2
3.	NGB_KA001_1	Busines Law and Protection of Industrial Property	2	2
4.	NGB_SE002_1	Civil Engineer in the Society	2	2
5.	NGB_SM044_1	Voluntary Support Practice	4	4
6.	NGB_SV050_1	Career Planning, Labour Market Studies	2	2
7.	NGB_TT005_1	Sociology	2	2
8.	NGB_TT006_1	Modern Societies	2	2

Specialisation of environmental assessment
a.) Compulsory specialisation courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_KM018_1	Environmental State Evaluation I.	4	4	5
2.	NGB_KM019_1	Environmental Information Systems I.	4	4	5
3.	NGB_KM018_2	Environmental State Evaluation II.	4	4	6
4.	NGB_KM019_2	Environmental Information Systems II.	4	4	6
5.	NGB_KM018_3	Environmental State Evaluation III.	4	4	7
6.	NGB_KM020_1	Immission Mapping - Noise	6	6	7
Total			**26**		

b.) Optional specialisation courses
(12 credits to be selected)

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_FI008_1	Environmental Radiation and Its Effects	2	2	5
2.	NGB_FI009_1	The Use of Nuclear Energy and Its Impact on the Environment	2	2	5
3.	NGB_KM021_1	Technological Systems	4	4	5
4.	NGB_KM022_1	Energy and Environment I.	3	3	5
5.	NGB_ET006_1	Urban Engineering I.	3	3	6
6.	NGB_ET014_1	Communal Works I.	3	3	6
7.	NGB_EV002_1	Urban and Landscape Design I.	3	3	6
8.	NGB_KM022_2	Energy and Environment II.	3	3	6
9.	NGB_ET006_2	Urban Engineering II.	3	3	7
10.	NGB_ET007_4	Transport Infrastructure IV.	3	3	7
11.	NGB_ET014_2	Communal Works II.	3	2	7
12.	NGB_EV002_2	Urban and Landscape Design II.	3	3	7
13.	NGB_EV003_1	History of Architecture I.	3	2	7
14.	NGB_EV003_2	History of Architecture II.	3	2	7

c.) Optional courses from the other specialisation
(6 credits to be selected)

Specialisation of environmental technology
a.) Compulsory specialisation courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_KM021_1	Technological Systems	4	4	5
2.	NGB_KM022_1	Energy and Environment I.	3	3	5
3.	NGB_KM022_2	Energy and Environment II.	3	3	6
4.	NGB_KM023_1	Environmental Chemistry	3	3	6
5.	NGB_KM024_1	Environmental Safety Technology	3	3	6
6.	NGB_KM025_1	Environmental Performance Evaluation	4	4	6
7.	NGB_KM026_1	Energetics Auditing	4	4	6
Total			**24**		

b.) Optional specialisation courses
(14 credits to be selected)

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ET008_1	Hydrualic Engineering I.	3	3	5
2.	NGB_FI008_1	Environmental Radiation and Its Effects	2	2	5
3.	NGB_FI009_1	The Use of Nuclear Energy and Its Impact on the Environment	2	2	5
4.	NGB_KM018_1	Environmental State Evaluation I.	4	4	5
5.	NGB_KM033_1	Agroecology	2	2	5
6.	NGB_ET008_2	Hydraulic Engineering II.	3	3	6
7.	NGB_KM018_2	Environmental State Evaluation II.	4	4	6
8.	NGB_KM027_1	Microbiology	4	4	6
9.	NGB_ET008_3	Hydraulic Engineering III.	3	3	7
10.	NGB_KM018_3	Environmental State Evaluation III.	4	4	7

c.) Optional courses from the other specialisation
(6 credits to be selected)

BSc programme in Transport Engineering

1. Aim of the program

The aim of the program is to train transport engineers, who are suitable for the planning, preparation, operation and management of transport and logistics processes, providing related administrative and regulatory tasks, as well as completing selection process, operation and maintenance functions, including infrastructure, management and IT system elements. In the possession of the acquired knowledge they are capable of proceeding in the second cycle of the training.

2. Program content

Duration: 7 semesters
ECTS credits: 210 credits
1 local credit = 1 ECTS credit

Program structure:

Fields	Credits	%
Natural sciences	40	19.0
Economic and human studies	29	13.8
Compulsory professional subjects	86	41.0
Specialised professional subjects	40	19.0
Diploma thesis work	15	7.2
Total	210	100

Specialisations offered:
- Rail transport systems
- Logistics systems
- Passenger transport systems

Compulsory industrial placement: minimum 6 weeks

3. Requirements

Diploma thesis work requirements:

In their diploma thesis work students work out a concrete transport engineering task or do some research work. This has to be done during one semester based on university studies, literature survey and with the assistance of supervisors. With the diploma thesis work the candidate proves that he/she acquired the necessary proficiency to use the theoretical knowledge in practice, is able to fulfil the analyser, problem solving function of a transport engineer, and can use professional literature productively.

Requirements to be met before the final state exam:
- 210 credits (including 15 credits for the diploma thesis work),
- completed industrial placement,
- approved diploma thesis by an internal as well as an external consultant.

Further requirement to get the degree:

You should have an oral or written intermediate level exam of a foreign language (English, German, Italian, French, Spanish or Russian). It is equivalent to the B2 level of the Council of Europe Common European Framework of Reference for Languages.

Contents of the final state exam:
- oral presentation of the diploma thesis work,
- oral exam of fixed and chosen professional courses amounting to at least 10 credits.

Degree qualification:
Average of three marks: the oral presentation of the diploma thesis work, the final oral exam and the weighted average of all completed courses during the program.

Description of the institutional grading system:

5 = excellent
4 = good
3 = medium
2 = satisfactory
1 = failed

4. List of courses

Compulsory courses

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_AG003_1	Construction of Machines	4	4	1
2.	NGB_AJ002_1	Engineering Materials	4	4	1
3.	NGB_FI002_1	Engineering Physics	4	4	1
4.	NGB_KM001_1	Technical Chemistry	2	2	1
5.	NGB_KO001_1	Transportation	4	4	1
6.	NGB_MA003_1	Mathematics I. Analysis	4	4	1
7.	NGB_SZ003_1	Informatics I.	4	4	1
8.	NGB_AG002_1	Mechanics - Statics	4	4	2
9.	NGB_AG005_1	Machine Elements of Vehicles	4	3	2
10.	NGB_AG015_1	Fluid Mechanics	4	4	2
11.	NGB_AK002_1	Economics	4	4	2
12.	NGB_KO002_1	Transport Processes I.	4	3	2
13.	NGB_MA002_2	Mathematics II. Linear Algebra	4	4	2
14.	NGB_SZ003_2	Informatics II.	4	4	2
15.	NGB_AG002_3	Mechanics - Dynamics	4	4	3
16.	NGB_AU003_1	Electrical Technics	4	4	3
17.	NGB_JE002_1	Legal Studies	2	2	3
18.	NGB_KO002_2	Transport Processes II.	4	3	3
19.	NGB_KO003_1	Transport Technology I.	4	3	3
20.	NGB_LO001_1	Logistics I.	4	3	3
21.	NGB_LO002_1	Transport Economics I.	4	3	3
22.	NGB_MA002_3	Mathematics III. Probability and Statistics	4	4	3
23.	NGB_KO003_2	Transport Technology II.	5	4	4
24.	NGB_KO004_1	Transport Informatics	4	4	4
25.	NGB_KO005_1	Operational Research in Transport	3	3	4
26.	NGB_LO001_2	Logistics II.	4	4	4
27.	NGB_LO002_2	Transport Economics II.	5	4	4
28.	NGB_RT030_1	Transport Statistics	4	5	4
29.	NGB_LO004_1	Transport Trade Technology I.	3	3	4
30.	NGB_KO003_3	Transport Technology III.	4	4	5
31.	NGB_KO006_1	Transport Planning	3	3	5
32.	NGB_LO004_2	Transport Trade Technology II.	3	3	5
33.	NGB_KO007_1	Quality Management of Services	3	3	6
34.	NGB_KO008_1	Transport Safety	3	2	6
35.	NGB_KO009_1	Operation and Maintenance I.	3	2	6
36.	NGB_LO004_3	Transport Trade Technology III.	2	2	6
37.	NGB_AG008_1	Labour Safety	2	2	7
38.	NGB_KM002_1	Environmental Protection	2	2	7
39.	NGB_LO005_1	Service Management	4	2	7
40.	NGB_NJ001_1	EU Studies	2	2	7
Total			**143**		

Compulsory language courses
(students must choose 2 terms of one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_IT001_1	Intermediate Exam Prep Course I.	0	4
2.	NGB_IT001_2	Intermediate Exam Prep Course II.	0	4
3.	NGB_IT024_1	Technical Communication Prep Course I.	0	4
4.	NGB_IT024_2	Technical Communication Prep Course II.	0	4

Compulsory diploma thesis courses
(students choose one course)

	Course code	Title	Credits	Lessons per week
1.	NGB_ET099_1	Diploma thesis	15	2
2.	NGB_KO099_1	Diploma thesis	15	2
3.	NGB_LO099_1	Diploma thesis	15	2

Optional professional courses
(6 credits should be selected)

	Course code	Title	Credits	Lessons per week
1.	NGB_AU041_1	Railway Telecommunication and Guards	2	2
2.	NGB_KO010_1	Air Transport	2	2
3.	NGB_KO011_1	Transport Administration	2	2
4.	NGB_KO012_1	Telematics	2	2
5.	NGB_KO013_1	Quality Management of Transport Services	2	2
6.	NGB_KO014_1	Management of Customer Services	2	2
7.	NGB_KO015_1	History of Transport	2	2
8.	NGB_KO016_1	History of Engineering	2	2
9.	NGB_KO017_1	Modelling in Transport Planning	2	2
10.	NGB_KV025_1	Alternative Vehicles	4	2

Optional economic and human courses
(6 credits should be selected)

	Course code	Title	Credits	Lessons per week
1.	NGB_FI005_1	History of Physics	2	2
2.	NGB_KA001_1	Business Law and Protection of Industrial Property	2	2
3.	NGB_MT001_1	History of Education and Pedagogy	2	2
4.	NGB_MT002_1	Psychology and Personality Development I.	3	2
5.	NGB_MT002_2	Psychology and Personality Development II.	3	2
6.	NGB_MT005_1	Teacher Communication	2	2
7.	NGB_SM044_1	Voluntary Support Practice	4	3
8.	NGB_SV002_1	Production Management	4	3
9.	NGB_SV050_1	Career Planning, Labour Market Studies	2	2
10.	NGB_TT005_1	Sociology	2	2
11.	NGB_TT006_1	Modern Societies	2	2
12.	NGB_TT007_1	Information Society	2	2

Specialisation of rail transport systems

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_KO019_1	Railway System Technology	5	4	5
2.	NGB_KO020_1	Railway Information Systems	4	4	5
3.	NGB_KO021_1	Railway Economics	5	4	5
4.	NGB_KO022_1	Rail Transport Service Planning	4	4	5
5.	NGB_KO023_1	Railway Transport and Infrastructure I.	5	4	6
6.	NGB_KO024_1	Transport Planning and Operation Control	5	4	6
7.	NGB_KO025_1	Project Teamwork in Railway Topics	4	4	6
8.	NGB_KO026_1	Rail System Management	4	4	6
9.	NGB_KO023_2	Railway Transport and Infrastructure II.	4	4	7
Total			**40**		

Specialisation of logistics systems

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_LO006_1	Material Handling and Storage I.	4	4	5
2.	NGB_LO007_1	Packaging I.	5	4	5
3.	NGB_LO008_1	Forwarding I.	3	2	5
4.	NGB_LO008_2	Forwarding II.	2	2	5
5.	NGB_LO009_1	Supply Chain Management I.	4	4	5
6.	NGB_LO006_2	Material Handling and Storage II.	4	4	6
7.	NGB_LO007_2	Packaging II.	4	3	6
8.	NGB_LO008_3	Forwarding III.	5	4	6
9.	NGB_LO009_2	Supply Chain Management II.	2	2	6
10.	NGB_LO010_1	Logistics Project	3	3	6
11.	NGB_LO008_4	Forwarding IV.	2	2	7
12.	NGB_LO009_3	Supply Chain Management III.	2	2	7
Total			**40**		

Specialisation of passenger transport systems

	Course code	Title	Credits	Lessons per week	Term
1.	NGB_ET006_1	Urban Engineering I.	3	3	5
2.	NGB_KO027_1	Public Transport I.	3	3	5
3.	NGB_KO028_1	Tourism	3	3	5
4.	NGB_KO029_1	Rail Systems in Passenger Transport	3	3	5
5.	NGB_KO030_1	Information Systems in Passenger Transport	6	4	5
6.	NGB_ET007_4	Transport Infrastructure IV.	3	3	6
7.	NGB_ET009_1	Traffic Engineering I.	3	3	6
8.	NGB_KO027_2	Public Transport II.	3	3	6
9.	NGB_KO031_1	Traffic Planning and Control	3	3	6
10.	NGB_KO032_1	Project Teamwork in Passenger Transport	6	4	6
11.	NGB_KO009_2	Operation and Maintenance II.	4	4	7
Total			**40**		

5. Course Descriptions (in alphabetical order)

ECTS Course description

Subject:	**Agroecology**	**Subject code:**	**NGB_KM033_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Agricultural production and ecological balance. Sustainable farming. Environmental friendly plant cultivation. Environmental friendly animal breeding. Use of renewable energy sources in agriculture. Use of biomass as energy.			
Recommended material			
Dr. Neményi, M. Environment tolerant agrarian production.			

ECTS Course description

Subject:	**Air Protection**	**Subject code:**	**NGB_KM012_1**
Credits:	6	**Lessons per week:**	4
Teacher:	Zoltán Papp, Dr., Anikó Zseni, Dr.	**Language:**	Hungarian
Email:	zseniani@sze.hu	**Term:**	autumn
Pre-study requirements:	Physics	**Assessment:**	exam
Description of the subject			
Atmospheric fundamentals. Climate evolving factors. The global processes of environmental pollution. Ozone layer and stratospheric ozone layer depletion. Greenhouse effect and the enhancement of it as a result of rising levels of greenhouse gases. Acid rain. Gas and solid pollutants of the air and methods of their separation. Air pollution caused by burning of fossil fuel, transport, municipal and industrial activity. Legal regulation of air protection			
Recommended material			
Nagy, Géza - Papp, Zoltán: Levegőtisztaság-védelem. Lecture notes, SZIF, 1998. HEFOP e-textbook: Levegőtisztaság-védelem (ed.: Radnainé Dr. Gyöngyös Zsuzsanna, 2008), http://www.mk.uni-pannon.hu/hefop33			

ECTS Course description

Subject:	**Air Transport**	**Subject code:**	**NGB_KO010_1**
Credits:	2	**Lessons per week:**	2
Teacher:	András Katona, Dr., István Szily, Dr.	**Language:**	Hungarian
Email:	szily@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
The subject deals with the technological, organizational, economic, transport, security and environmental protection questions of air transport and the collaboration with other transport sectors.			
Recommended material			
Domokos Ádám (ed.): Légiközlekedés. Vass Balázs: Repülőgépek, helikopterek, rakéták. Műszaki Könyvkiadó, Budapest, 1982. Csanádi, Nagyváradi, Winkler: A magyar repülés története. Műszaki Könyvkiadó, Budapest, 1977.			

ECTS Course description

Subject:	**Alternative vehicles**	**Subject code:**	**NGB_KV025_1**
Credits:	4	**Lessons per week:**	2
Teacher:	Csaba Tóth-Nagy, PhD	**Language:**	Hungarian
Email:	tothncs@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Harmful emissions of vehicles, environmental norms and trends, environmental effects and challenges. Structure and function alternative energy-converters: external- and alternative internal-combustion engines. Types and function of modern electric motors. Structure and function of inverters and frequency switchers. Structure and function of hybrid electric drives. Structure and function of fuel cells. Alternative energy sources: F-T diesel, biodiesel, etanol, metanol, hydrogen. Basics of vehicle simulation. Function of vehicle simualtion software. Harmful emmission reduction in alternative vehicles.			
Recommended material			
Study-aids, departmental issues, scientific publications.			

ECTS Course description

Subject:	**Analysis of Structures**	**Subject code:**	**NGB_SE010_1**
Credits:	4	**Lessons per week:**	3
Teacher:	György Lőrincz, Dr.	**Language:**	Hungarian
Email:	lorincz@sze.hu	**Term:**	autumn
Pre-study requirements:	Mechanics III	**Assessment:**	exam

Description of the subject

Modeling of structural systems and structural elements. Possibilities and consequences of selection and variation. Stiffness and flexibility requirements. Determination of loads. Computation of internal forces and deformations. Acceptability conditions of structures. Influence lines and their application on statically determinate structures. Maximum diagrams of internal forces. Statically indeterminate structures. Principles and computational technics; comparison and evaluation of the solution methods. Beams on elastic supports and elastic bedding. Particular problems of simple frameworks. Basic data and elementary relationships of the displacement method, application on indeterminate frameworks. Procedure of Cross.

Recommended material

Kurutzné Kovács Márta: Tartók statikája (Műegyetemi kiadó, 2003)
Pásztor Erzsébet-Tamássy Tamás: Tartók statikája Példatár I. (Műegyetemi kiadó, 1999)
Gáspár Zsolt-Tarnai Tibor: Statika (Műegyetemi kiadó, 2002)
Roller Béla: Tartók statikája I. (BME jegyzet)
Roller Béla-Árvay Kálmán: Tartók statikája II. (BME jegyzet)
Mohácsy László: Tartószerkezetek átalakítása Műszaki könyvkiadó, Bp., 1978)

ECTS Course description

Subject:	**Basics of Architecture I**	**Subject code:**	**NGB_ED002_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Nóra Géczy, PhD	**Language:**	Hungarian
Email:	nora@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Students of architecture are assigned such design tasks, which necessitate an architectural approach, creativeness and problem-solving skills. In contrast with most activities characterising students' former studies, architectural designing is a creative process, a major speciality of which is the fact that the project, the product is unique in details or as a whole. In the case of a design activity, the role of education is to teach the basics of the profession (which are necessarily applied in the design process) and to help students develop and improve their relevant skills. The aim of the lectures is to introduce students to the methodology of architectural planning and basics of designing. At first students learn about the forms of nature and transforming artificial forms, ergonomy, aspects of environmental psychology. Another objective is to get acquainted with contemporary architectural trends. In practice students prepare 2D-3D colour and proportional studies.			
Compulsory material			
Recommended material			
Király Sándor: Az arányosításról Moholy-Nagy László: Az anyagtól az építészetig			

ECTS Course description

Subject:	**Basics of Architecture II**	**Subject code:**	**NGB_ED002_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Nóra Géczy, PhD	**Language:**	Hungarian
Email:	nora@sze.hu	**Term:**	spring
Pre-study requirements:	Basics of Architecture I	**Assessment:**	continuous assessment

Description of the subject

Students are introduced to the fundamentals of architecture and the various phases of professional practice. The lectures intend to present such ideas (via some of the latest architectural projects) that imply general aesthetic, functional and structural knowledge. By introducing students to general problems concerning the design of architectural environment, the design of buildings and some related specific requirements, this subject intends to form such an approach to buildings that helps students grasp the gist and the inner structure of a given building.
At studio practicals students are introduced to the basics of architecture and design. Students prepare several minor design assignments during the semester. Assignment types include model building, architectural graphics and engineering drawing. During the semester, four to five minor assignments are prepared, each within two to three weeks. Design tasks have some special topic or motto, e.g. plan, place, material, construction and space.

Compulsory material

Kepes György: A látás nyelve. Gondolat Kiadó

Recommended material

Lissák György: A formáról. Láng Kiadó
Kepes György: A világ új képe. Corvina Kiadó

ECTS Course description

Subject:	**Biology I**	**Subject code:**	**NGB_KM006_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
History of taxonomy. Taxonomic diversity of the Earth. Viruses. Bacteria. Protists. Algae (Cromista). Plants. Animals.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**Biology II**	**Subject code:**	**NGB_KM006_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Biology I	**Assessment:**	exam
Description of the subject			
History of molecular and cell biology. Molecules of life. Protein Structure and Function. Nucleic Acids, the Genetic Code, and the Synthesis of Macromolecules. Photosynthesis. Biodegradation. Structure, and components of the cell. Membrane structure and transports. Basic tissue types of plants and animals.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**Bridges I**	**Subject code:**	**NGB_SE007_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Zoltán Tóth, Dr.	**Language:**	Hungarian
Email:	tothz@sze.hu	**Term:**	autumn
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

History of bridge construction, trends of development. Loads of bridges, rules and standards of planning, design and construction. Structural arrangements of the substructures: foundations, piers, abutments, wall piers, wing walls. Superstructures of bridges: structural systems and arrangements (plate bridges, beam bridges, prefabricated superstructure bridges, arch and sector bridges, truss bridges, suspended and slanted cable bridges). Bridge platform of public roads and its accessories (isolation, dilatational structures, abutment structures, rails). Calculation principles of the main girders of road and railway bridges. Provisional road and railway bridges, calculation principles and structures. Steady and temporary wooden bridges.

Recommended material

Dr. Tóth Zoltán: Hidak I.
Dr. Jankó László: Vasbeton hídszerkezetek I-II. (BME jegyzet, Műegyetemi kiadó 1998)
Medved Gábor: Történetek a világ hídjairól (Terc, Budapest, 2001)
Palotás-Medved-Nemeskéri-Kiss-Trager: Hidak (Műszaki könyvkiadó 1987)
Dr Gáll Imre: Budapesti Duna hidak (Műszaki könyvkiadó 1984)

ECTS Course description

Subject:	**Bridges II**	**Subject code:**	**NGB_SE007_2**
Credits:	4	**Lessons per week:**	3
Teacher:	Zoltán Tóth, Dr. György Németh, Dr.	**Language:**	Hungarian
Email:	tothz@sze.hu, nemethgy@sze.hu	**Term:**	spring
Pre-study requirements:	Bridges I, Structures II, Structures IV	**Assessment:**	exam

Description of the subject

Construction of reinforced concrete bridges: conventional monolith reinforced plate and beam bridges, precast structures, free concreted and free assembled structures. Fabrication and assembling of steel bridges. Fabrication of structural part-units. Different assembling methods: scaffolding, free assembling, floating into position, lifting in, thrusting in. Systems of bridge maintenance and its economic importance. Maintenance of concrete, reinforced concrete, stressed reinforced concrete, steel and stone bridges. Maintenance of the bridge platforms and bridge accessories.

Recommended material

Szécsi László- Molnár Viktor: Hídépítés (SZE jegyzet)
Tóth Zoltán: Hídfenntartás (SZE jegyzet)
dr. Platthy Pál: Közúti acélhidak (BME jegyzet)
Szépe Ferenc: Acélszerkezetek II. Acélhidak I (BME jegyzet)
dr.Jankó László: Vasbeton hídszerkezetek I-II. (BME jegyzet)

ECTS Course description

Subject:	**Building Administration**	**Subject code:**	**NGB_EV007_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Iván Németh, Dr.	**Language:**	Hungarian
Email:	nemethivan@gmail.com	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Introduction of social claims on control that made the evolvement of building law necessary. Introduction to the system of building law; the relationship between central and local control. The main elements of Hungarian building control. The correspondence and dissemblance between the building laws of Hungary and other European countries. The application of building law (domain of rules of the authorities). Overlook on other codes linking to the professional area.

Recommended material

Hungarian Constitution; Code of Act and Service of Administration (2004/CXL; KET)
Decree of Ministry of Local Government on rules of authorities (37/2007/XII.13.)
Code of Establishment and Protection of Built Environment (1997/LXXVIII)
Decree of Government on national domiciliation and building demands (253/1997. XII.20.)
Actions of Court of Constitution in the theme

ECTS Course description

Subject:	**Building Construction 1**	**Subject code:**	**NGB_EP014_1**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:	Buildings II	**Assessment:**	exam

Description of the subject

Variations of floor constructions; main aspects in choice; arches, types of ancient arches; beam floors, board and panel floors, slabs, suspended ceilings; roofs; composite roof forms; wooden chair roof systems; spatial bracing of wooden roofs; tiling - applied materials and aspect of choice; steel roofs. Loft constructions; frame systems; principles and variations. Hall constructions; two and three dimensional load cycles in hall constructions; reinforced concrete hall constructions. Steel hall constructions; spatial bracing of steel hall constructions; wall systems, roof and skylights of hall constructions.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II. Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Construction 2**	**Subject code:**	**NGB_EP014_2**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	spring
Pre-study requirements:	Building Construction 1	**Assessment:**	exam

Description of the subject

Dividing wall systems; construction principles of Lightweight Facade Walls, variations. Curtain Walls; frame and pillar systems; independent curtain wall systems with interior beams; openings; operational principles, design; doors and gates; wooden doors. Steel and Plastic doors. Windows; wooden steel windows and windows of combined materials; windows without thermal bridges. Glass systems; glazings of openings; profile glass systems, glass concrete; shading systems; variations on lightweight partition walls and their design; suspended ceilings; floorings and their materials; special floorings.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II. Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Construction Project I**	**Subject code:**	**NGB_EP011_1**
Credits:	4	**Lessons per week:**	6
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	spring
Pre-study requirements:	Building Constructions IV, Residential Building Design III	**Assessment:**	exam
Description of the subject			
Organization of design among co-workers: developing the collaboration, responsibility-sharing in team, hierarchical task sharing, decision-making policies. Task: design of a chosen building construction from a functional analysis to detailed plans.			
Compulsory material			
Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian Dr. Attila Koppány: Building Construction vol. I-II. Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian			
Recommended material			
Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian Dr. Gyula Sebestyén: Lightweight Construction. Műszaki Könyvkiadó. Budapest. (book) - Hungarian György Wesner (ed.): Handbook of Lightweight Construction (book) - Hungarian Martin Mittag: Building Construction. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian			

ECTS Course description

Subject:	**Building Construction Project II**	**Subject code:**	**NGB_EP011_2**
Credits:	9	**Lessons per week:**	9
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Construction Project I, Public Building Design II	**Assessment:**	exam

Description of the subject

Continuation of teamwork from the previous semester, analysis of design variations, ability of optimum solution, design of details to any unique manufactory design, conceptualization of typical constructions, presentation.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II. Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Gyula Sebestyén: Lightweight Construction. Műszaki Könyvkiadó. Budapest. (book) - Hungarian
György Wesner (ed.): Handbook of Lightweight Construction (book) - Hungarian
Martin Mittag: Building Construction. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions I**	**Subject code:**	**NGB_EP004_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Tasks and importance of building constructions in building; subjects and divisions of building construction; main information of building systems; fundaments of loadbearing, demarcating and mounting systems: design of walls, slabs, roofs, tiling, stairs, frames, foundations; chimneys, air ventilation; rings and lintels; opening constructions; claddings, principles of waterproof system – examples.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions II**	**Subject code:**	**NGB_EP004_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	spring
Pre-study requirements:	Building Constructions I	**Assessment:**	exam

Description of the subject

Requirements on foundations; foundation types, shallow foundation; strip and pier foundation, horizontal grillage foundation. Deep foundation; pile and cylinder foundation, cut-off wall foundation. Load bearing wall systems - construction and material; masonry block walls, cast-in-situ walls building; monolithic wall systems; prefabricated wall systems; block and panel walls, lightweight wall systems; partition walls; claddings and surface finishing. Stairs; principles of designing; variations; interior stairways; hand-rails. Steel stairs, steel ladders.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions III**	**Subject code:**	**NGB_EP004_3**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Constructions II	**Assessment:**	exam

Description of the subject

Variations of floor constructions; main aspects in choice; arches, types of ancient arches; beam floors, board and panel floors, slabs, suspended ceilings; roofs; composite roof forms; wooden chair roof systems; spatial bracing of wooden roofs; tiling - applied materials and aspect of choice; steel roofs. Loft constructions; frame systems; principles and variations. Hall constructions; two and three dimensional load cycles in hall constructions; reinforced concrete hall constructions. Steel hall constructions; spatial bracing of steel hall constructions; wall systems, roof and skylights of hall constructions.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions IV**	**Subject code:**	**NGB_EP004_4**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	spring
Pre-study requirements:	Building Constructions III	**Assessment:**	exam

Description of the subject

Dividing wall systems; construction principles of Lightweight Facade Walls, variations. Curtain Walls; frame and pillar systems; independent curtain wall systems with interior beams; openings; operational principles, design; doors and gates; wooden doors. Steel and Plastic doors. Windows; wooden Steel windows and windows of combined materials; windows without thermal bridges. Glass systems; glazings of openings; profile glass systems, glass concrete; shading systems; variations on lightweight partition walls and their design; suspended ceilings; floorings and their materials; special floorings.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions V**	**Subject code:**	**NGB_EP004_5**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Constructions IV	**Assessment:**	exam

Description of the subject

Claddings; Historic overview, variations on materials and constructions. Principles of design; imbricated roofings; tile and slate roofings; table roofings; continuous hard and soft roofings; thatch roofings; steel plate constructions; auxiliary steel constructions of roofings; steel plate roofings; flat roof waterproof membranes and their layers - variations; draining systems of flat roofs; modified bitumenous and plastic plate waterproof membranes; insulation of flat roof systems; questions of vapour in flat roofs; vapour ventilation and vapour pressure equalization; details of flat roofs.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Constructions VI**	**Subject code:**	**NGB_EP004_6**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Koppány, Dr.	**Language:**	Hungarian
Email:	koppany@sze.hu	**Term:**	spring
Pre-study requirements:	Building Constructions V	**Assessment:**	exam

Description of the subject

Finishing and claddings of facade walls, aspects of choice of materials and constructions; finishing and claddings of interior walls; paintings; wallpapers; waterproof information; effects of moistures; prevention; user and factory moistures and prevention; coating and layer waterproof membranes; steel plate waterproof membrane; post-waterproof systems in walls; dilatations; post-insulation of facade walls; chimneys and design of chimneys; gravity air-ventilation; independent and shared ventilation shafts; building with spatial elements variations and area of their application.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Building Diagnostics**	**Subject code:**	**NGB_EP012_1**
Credits:	2	**Lessons per week:**	2
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	spring
Pre-study requirements:	Building Constructions IV	**Assessment:**	exam
Description of the subject			
Demands on main building constructions, effects on construction and their consequences. Diagnostic methods, analyses of case studies - presenting the typical building failures and their analyses. Classification of failures, prevention.			
Compulsory material			
József Bajza: Visual Examination in Building Diagnostics (book), Budapest, 2003 - Hungarian			
Recommended material			
Dr. Attila Koppány: Building Diagnostics - Building Failures - Building Pathology, Magyar Építőipar, Budapest, 2000. vol. 11-12. (Hungarian Journal) Dr. György Fátrai: Building Failures and their Causes, Magyar Építőipar, Budapest, 2000. vol. 11-12.(Hungarian Journal) Ágostháziné (ed.) : Building Diagnostics, Műszaki Könyvkiadó, Budapest, 2000. (Hungarian Book)			

ECTS Course description

Subject:	**Building Materials I**	**Subject code:**	**NGB_EP002_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Viktor Molnár, Dr.	**Language:**	Hungarian
Email:	molnarv@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject beside the knowledge of general gnosis of materials (chemical, physical and mechanical attributes) involves the specific areas of building stones and aggregates, anorganic binding materials (hydraulic and non-hydraulic); (freshly set and consolidated) concretes, building plastics, organic binding materials (resins, bitumen), asphalts, ceramics, glasses, building metals and building wood. The interpretation and evaluation of their testing, the use of their standards (primary materials, mixtures, finished products).

Compulsory material

Építőanyagok I. (HEFOP 3.3.1-P.-2004-09-0101/1.0)

Recommended material

dr. Balázs György: Építőanyagok és kémia

ECTS Course description

Subject:	**Building Materials II**	**Subject code:**	**NGB_EP002_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Viktor Molnár, Dr.	**Language:**	Hungarian
Email:	molnarv@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Materials I	**Assessment:**	exam

Description of the subject

In this subject the acquirement of the specific areas of the school-work goes on calculating and experiential level, those are: qualification and amelioration of aggregates, statistics (evaluation of the results of analyses), concrete engineering, strength tests of consolidated concrete (tests with Schmidt-hammer and ultrasonic surveys; and their evaluation), mechanical analyses of building metals and wood, the basic of calculation of asphalt cladding, surveys on asphalts, on plastics, quality management. It introduces the examination and qualification methods of physical and mechanical features, the Hungarian and European engineering regulation system. Students learn to select proper materials for serving different purposes.

Compulsory material

Építőanyagok I. (HEFOP 3.3.1-P.-2004-09-0101/1.0)

Recommended material

dr. Balázs György: Építőanyagok és kémia

ECTS Course description

Subject:	**Building Physics**	**Subject code:**	**NGB_EP008_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Building Physics is closely related to Physics, Building Materials, Building Constructions, Design and Building Engineering. Students should have master knowledge of building energetics, namely thermal physics, heat conductivity, heat transfer, heat radiation, and stationary one-dimensional heat transmission. Students should also acquire calculation of building energetics and the energy certification of buildings, as well as the basics of building acoustics and fire protection of buildings.

Compulsory material

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Recommended material

Dr. Zöld András: Energiatudatos építészet. Műszaki Könyvkiadó, 1999. ISBN 9631630196

ECTS Course description

Subject:	**Building Service Engineering I**	**Subject code:**	**NGB_EP005_1**
Credits:	2	**Lessons per week:**	2
Teacher:	László Petrikó	**Language:**	Hungarian
Email:	l.petriko@kondicad.hu	**Term:**	spring
Pre-study requirements:	Building Physics I	**Assessment:**	exam

Description of the subject

Water supply, sewage. Sanitary equipments. Fire fighting equipments. Local and central domestic hot water supply systems. Natural gas supply, equipments. Exhaust gas elimination. Electrical energy supply. Electrical network, equipments. Lightning protection. Electric shock protection.

Compulsory material

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Recommended material

Dr. Hant László: Épületgépészeti Alapismeretek, SZIF-Universitas Kft., 2002
Hugo Feurich: Szanitertechnika 1.-2. kötet, Dialóg-Campus Kiadó, Budapest-Pécs, 2001
9/2008 (II.22.) ÖTM rendelet (Országos Tűzvédelmi Szabályzat), Magyar Közlöny, 2008/28/I. szám
Dr. Vida Miklós: Gáztechnikai Kézikönyv, Műszaki Könyvkiadó, Budapest, 1984

ECTS Course description

Subject:	**Building Service Engineering II**	**Subject code:**	**NGB_EP005_2**
Credits:	2	**Lessons per week:**	2
Teacher:	László Petrikó	**Language:**	Hungarian
Email:	l.petriko@kondicad.hu	**Term:**	autumn
Pre-study requirements:	Building Service Engineering I	**Assessment:**	exam

Description of the subject

Thermal comfort parameters. Weather, Climate. Central heating systems. Boiler houses, chimneys. Thermal substations. Heat pumps. Solar systems. Mollier-diagram. Mechanical ventilation systems. Heat recovery equipments. Supply and exhaust air diffusers. Mechanical shafts, suspended ceilings, ventilation plant rooms. Local and central air conditioning equipments. Ventilation systems for industrial and fire fighting use. Refrigeration, central chiller units.

Compulsory material

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Recommended material

Dr. Hant László: Épületgépészeti Alapismeretek, SZIF-Universitas Kft., 2002
Recknagel-Sprenger-Schramek: Fűtés- és Klímatechnika 2000 I.-II. kötet, Dialóg Campus Kiadó, Budapest-Pécs, 2000
Dr. Zöld András szerk.: Épületgépészet 2000, I. kötet: Alapismeretek, Épületgépészet Kiadó Kft. Budapest, 2000
Homonnay Györgyné, Dr. szerk.: Épületgépészet 2000, II. kötet: Fűtéstechnika, Épületgépészet Kiadó Kft. Budapest, 2000

ECTS Course description

Subject:	**Building Technology I**	**Subject code:**	**NGB_EP009_1**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr., Ferdinánd Szabó	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
The concrete technology, auxiliary building constructions, heavy modular prefabricated constructions, mounting technology and dry wall construction, maintenance, organization and quality assurance.			
Compulsory material			
Dr György Fátrai: Building Technology (printed and digital material) - Hungarian			
Recommended material			
Dr László Széll: Building Technology I. (book) - Hungarian			

ECTS Course description

Subject:	**Building Technology II**	**Subject code:**	**NGB_EP009_2**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr., Ferdinánd Szabó	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	spring
Pre-study requirements:	Building Technology I	**Assessment:**	exam
Description of the subject			
Analysis of basic, mortar and traditional building technologies; building, maintenance, organization and quality assurance.			
Compulsory material			
Dr György Fátrai: Building Technology (printed and digital material) - Hungarian			
Recommended material			
Dr László Széll: Building Technology I. (book) - Hungarian			

ECTS Course description

Subject:	**Building Technology III**	**Subject code:**	**NGB_EP009_3**
Credits:	2	**Lessons per week:**	2
Teacher:	György Fátrai, Dr., Ferdinánd Szabó	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Technology II	**Assessment:**	exam
Description of the subject			
Time and spatial organization of building and maintenance process, design of building site, temporary auxiliary buildings, time and cost designing softwares, programming.			
Compulsory material			
Dr György Fátrai: Building Technology (printed and digital material) - Hungarian			
Recommended material			
Dr László Széll: Building Technology I. (book) - Hungarian			

ECTS Course description

Subject:	**Buildings I**	**Subject code:**	**NGB_EP003_1**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:		**Assessment:**	exam

Description of the subject

Tasks and importance of building constructions in building; subjects and divisions of building construction; main information of building systems; fundaments of loadbearing, demarcating and mounting systems: design of walls, slabs, roofs, tiling, stairs, frames, foundations; chimneys, air ventilation; rings and lintels; opening constructions; claddings, principles of waterproof system – examples.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Buildings II**	**Subject code:**	**NGB_EP003_2**
Credits:	4	**Lessons per week:**	4
Teacher:	György Fátrai, Dr.	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	spring
Pre-study requirements:	Buildings I	**Assessment:**	exam

Description of the subject

Requirements on foundations; foundation types, shallow foundation; strip and pier foundation, horizontal grillage foundation. Deep foundation; pile and cylinder foundation, cut-off wall foundation. Load bearing wall systems - construction and material; masonry block walls, cast-in-situ walls building; monolithic wall systems; prefabricated wall systems; block and panel walls, lightweight wall systems; partition walls; claddings and surface finishing. Stairs; principles of designing; variations; interior stairways; hand-rails. Steel stairs, steel ladders.

Compulsory material

Dr. László Gábor: Building Construction vol. I-IV. Tankönyvkiadó, Budapest. (book) - Hungarian
Dr. Attila Koppány: Building Construction vol. I-II., Novadat Kiadó, Győr, 1994. (lecture notes) - Hungarian

Recommended material

Dr. László Széll: Building Construction vol. I-II. Tankönyvkiadó, Budapest (book) - Hungarian
Dr. Bálint Petró: Design of Building Constructions. ÉTK, Budapest. 1991. (book) - Hungarian
Martin Mittag: Building Constructions. Dialóg Campus Kiadó, Pécs, Budapest, 2004. (book) - Hungarian

ECTS Course description

Subject:	**Buildings III**	**Subject code:**	**NGB_EP003_3**
Credits:	3	**Lessons per week:**	4
Teacher:	György Fátrai, Dr., Gábor Szalánczi	**Language:**	Hungarian
Email:	fatrai@sze.hu	**Term:**	autumn
Pre-study requirements:	Building Materials I	**Assessment:**	exam

Description of the subject

Basics of building design; principles of architecture, peculiarities of building design process, relation between architecture and environment; relation among building-construction and form, basic regulation of design; in practice: a simple dwelling house design for understanding these relations and the logic fundamentals.

Compulsory material

Dr. Antal Reischl: Design of Dwelling Houses. Tankönyvkiadó, Budapest. 1983. (book) - Hungarian
Lajos Gádoros: Design of Public Buildings. Tankönyvkiadó, Budapest. 1981. (book) - Hungarian

Recommended material

Ernst Neufert: Principles of Building and Design. Dialóg Campus kiadó, Pécs, Budapest. 1998. (book) - Hungarian
Antal Lázár: Munkahelyek építészete. B+V Lap- és Könyvkiadó Kft. Budapest, 2000. (book) - Hungarian

ECTS Course description

Subject:	**Business Law and Protection of Industrial Property**	**Subject code:**	**NGB_KA001_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Csaba Vándor	**Language:**	Hungarian
Email:	vandor@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	Legal Studies	**Assessment:**	exam
Description of the subject			
Main topics are the following: Company Law, Law of Commercial Contracts, Introduction into Competition Law, Labour Law, Protection of Industrial Property.			
Recommended material			
Gyula Szalay (edited by): Introduction into Business Law. Győr, Universitas-Győr, 2007.			

ECTS Course description

Subject:	**Career Planning, Labour Market Studies**	**Subject code:**	**NGB_SV050_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Bálint Filep, Zsolt Kovács	**Language:**	Hungarian
Email:	filep.balint@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	none	**Assessment:**	continuous assessment

Description of the subject

Bologna Process, BSc-MSc, lifelong learning. Opportunities after graduation, unemployment, trends. Expectations of the labour market. Successful business management. Job hunting and the psychological background of its preparation. Curriculum vitae, letter of motivation, job hunting techniques. Self-employment, starting up and managing an enterprise. Business protocol, etiquette, negotiation techniques. Labour law in Hungary and the European Union.

Recommended material

1. Filep Bálint, Kovács Zsolt, Kővári Luca, Tamándl László, Winkler Csaba: Útravaló a Széchenyi István Egyetem hallgatói számára. Győri Egyetemért Közhasznú Egyesület, Győr, 2007.
2. Ágosházy Szabolcs, Henn Péter, Papp András, Puskás Krisztina: Karriertájoló. HÖOK a Hallgatókért Alapítvány, Budapest, 2006.
3. Carnegie, D.: Sikerkalauz. Minerva Kiadó, Bp. 1994.
4. Szilágyi István: Önismeret és személyiségfejlesztés. Közgazdasági és Jogi Kiadó, Budapest, 1995.
5. Lénkemer, B.: A jó fellépés titka. Park Kiadó, Budapest, 1987.
6. Weiss, D.: Az életszervezés művészete. Park Kiadó, Budapest, 1996.

ECTS Course description

Subject:	**Design of structures with finite element method (CASD I)**	**Subject code:**	**NGB_SE013_1**
Credits:	3	**Lessons per week:**	3
Teacher:	János Szép	**Language:**	Hungarian
Email:	szepj@sze.hu	**Term:**	spring
Pre-study requirements:	Mechanics II	**Assessment:**	continuous assessment
Description of the subject			
Structural analyses with finite element method. (computer aided design)			
Recommended material			

ECTS Course description

Subject:	**Computer aided design of structures (CASD II)**	**Subject code:**	**NGB_SE013_2**
Credits:	3	**Lessons per week:**	3
Teacher:	János Szép	**Language:**	Hungarian
Email:	szepj@sze.hu	**Term:**	autumn
Pre-study requirements:	Structures II	**Assessment:**	continuous assessment
Description of the subject			
Computer aided design of steel- and reinforced concrete structures.			
Recommended material			

ECTS Course description

Subject:	**Chemistry I**	**Subject code:**	**NGB_KM005_1**
Credits:	6	**Lessons per week:**	6
Teacher:	Juraj Lesny, Dr., Andrea Szabó Nagyné, Dr., Gábor Simon	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	Technical Chemistry	**Assessment:**	exam

Description of the subject

Solutions for calculation exercises. Basics of electrochemistry, specific and molar conductivity. Electrode potential, Nerst-equation, galvanic cells. Electrolysis, electrode polarization, adaption of electro-chemistry in praxis. Basics of inorganic chemistry, classification of elements and their compounds, general features. Physical and chemical features of non-metallic elements, their compounds and occurrence in the nature, adaption in practice. Physical and chemical features of metallic elements, their compounds and occurrence in the nature, adaption in practice. Chemical balances, ionic product, pH, hydrolysis, puffer effect, solvability product. Definition of material scale, inert and non-inert systems in balance. Inert and non-inert systems in non-balance, material scale calculations. Laboratory exercises.

Recommended material

Lesny-Simon-Végh: Speciális kémia. Novadat, 1996.
Lecture notes

ECTS Course description

Subject:	**Chemistry II**	**Subject code:**	**NGB_KM005_2**
Credits:	6	**Lessons per week:**	6
Teacher:	Juraj Lesny, Dr., Andrea Szabó Nagyné, Dr., Gábor Simon	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	Chemistry I	**Assessment:**	exam

Description of the subject

Air chemistry I. Structure of atmosphere. Basics of photochemistry. Air chemistry II. Roles of green house gases, freons, nomenclature. Air chemistry III. Chemical reactions in the atmosphere. Water chemistry I. Basic of hydrochemistry. Structure and attributes of water. Water chemistry II. Chemical procedures in the hydrosphere. Degrading harmful materials. Water chemistry III. Quality of waters, physical and chemical qualification. Effects of aggressive waters. Soil chemistry I. Structure and features of lithosphere. The solid phase of soil. Soil chemistry II. The liquid and gaseous phase of the soil. Chemistry of crumbling procedures. Soil chemistry III. Cation exchange in the soil. Retaining anions and molecules. Laboratory exercises.

Recommended material

Lesny-Simon-Végh:Speciális kémia. Novadat, 1996.
Nagy-Vass-Erdős-Szalay: Környezetvédelmi mérések. SZIF-Univ.Kft. 2000.
Lecture notes

ECTS Course description

Subject:	**Civil Engineer in the Society**	**Subject code:**	**NGB_SE002_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Peter Scharle, Dr.	**Language:**	Hungarian
Email:	scharle@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

Professional knowledge, public administration and politics – interaction and co-operation. Playing fields and roles. Assertion of the engineering competency. Jobs, positions and careers of the civil engineeer. Roles of the engineer in the formulation and implementation of conceptions, policies, strategies, programs and projects. Case studies (renaissance of the railways, motorway network extension). Civil engineering aspects of the socio-economic problems connected with the EU-integration. Levels of the engineer's performance (mastership, science, art). Roles of the engineer in mediation and in accomplishment and operation of public services. The Chamber of Engineers. Societal significance of technology development, its trends and limits. Roles of civil engineers in the world of enterprises and money. Case studies (urban infrastructure development).

Recommended material

A Magyar Mérnöki Kamara havilapja (MÉRNÖKÚJSÁG) évfolyamai (1990-)

ECTS Course description

Subject:	**Communal Works I**	**Subject code:**	**NGB_ET014_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Mária Petőcz, Dr.	**Language:**	Hungarian
Email:	petocz@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Definition and contents of communal engineering tasks, interrelations with other fields, availability of theoretical and practical issues. Hungarian and European situation of infrastructure, characteristics, organisations, financing issues. Asset management of local governments. Possibilities, responsibilities, theoretical and practical considerations. Professional issues of certain fields: environmental protection, communal waste treatment, recycling. Theoretical knowledge, practical implementation with field trip.			
Recommended material			
Kontra – Petőcz - Schváb: Kommunális mérnöki feladatok. SZIF, Győr, 1997. Petőcz - Schváb: Útüzemeltetés és útfenntartás. SZIF, Győr, 1998.			

ECTS Course description

Subject:	**Communal Works II**	**Subject code:**	**NGB_ET014_2**
Credits:	3	**Lessons per week:**	2
Teacher:	Mária Petőcz, Dr.	**Language:**	Hungarian
Email:	petocz@sze.hu	**Term:**	autumn
Pre-study requirements:	Communal Works I	**Assessment:**	exam

Description of the subject

Professional issues of certain fields: public utilities, transport. Characteristics of road and other transport modes. Road traffic issues affecting local governments. Transport in the hierarchy of local governments, responsibilities and decision-making points. Characteristics of operation and maintenance of local infrastructures, interrelations. Noise protection. Causes, tolerance limits, protection. Professional issues of certain fields: air pollution. Causes, tolerance limits, protection. Other fields. Parks, cemeteries, monuments, protected values. Catastrophe defence. Organisational matters. Vis major and emergency measures, preparation, protection, recovery. Linking local governmental work to quality control system.

Recommended material

Kontra – Petőcz - Schváb: Kommunális mérnöki feladatok. SZIF, Győr, 1997.
Petőcz - Schváb: Útüzemeltetés és útfenntartás. SZIF, Győr, 1998.

ECTS Course description

Subject:	**Company Economics**	**Subject code:**	**NGB_SV001_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Zoltánné Polyák, Dr.	**Language:**	Hungarian
Email:	polyakz@sze.hu	**Term:**	spring
Pre-study requirements:	Economics	**Assessment:**	exam

Description of the subject

Business principles. Company and its environment. Company as an organisation and business unit. Business processes and their characteristics. Planning, leading and managing functions of a manager. Types of business organisations. Company groups, buying and selling companies. Company planning and strategy. Methods of strategic planning. Life stages of a company. Functional and innovative strategies. Relationship between strategic and business plans. Marketing functions. Market research. Product policy, pricing. Competitive strategies. Supply, production, logistics, selling. Human resources. Costs, profitability. Rate of return calculations. Investment policy, credits. Risks, risk management. Crisis management, liquidation. Taxing, social security.

Recommended material

ECTS Course description

Subject:	**Computer Aided Architectural Design I**	**Subject code:**	**NGB_EP010_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Attila Somfai, dr., Gergely Molnárka	**Language:**	Hungarian
Email:	somfai@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
In computer-aided graphic design our students can be familiar with the technology and methodology of planning with ArchiCAD software. The aim of the subject is to get to know the wide possibilities and to get the ability of choosing a suitable software.			
Compulsory material			
Lecturer's presentations			
Recommended material			
Software reference books and specific professional webpages			

ECTS Course description

Subject:	**Computer Aided Architectural Design II**	**Subject code:**	**NGB_EP010_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Attila Somfai, dr., Sándor Balázs	**Language:**	Hungarian
Email:	somfai@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
In computer-aided graphic design our students can be familiar with the technology and methodology of planning with Nemetschek CAD software. The aim of the subject is to get to know the wide possibilities and to get the ability of choosing a suitable software.			
Compulsory material			
Lecturer's presentations			
Recommended material			
Software reference books and specific professional webpages			

ECTS Course description

Subject:	**Computer Graphics**	**Subject code:**	**NGB_ET001_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Péter Kovács	**Language:**	Hungarian
Email:	kovacsp@sze.hu	**Term:**	autumn
Pre-study requirements:	Informatics I	**Assessment:**	continuous assessment

Description of the subject

Information society, importance of information and information technology, elements of computer systems. Working principle of computers. Neumann's principle, recent technologies, characteristics of hardware (independent computer systems, networks), software (operation systems, graphic surfaces, network protocols etc.), role of word wide networks, search algorithms, communication, mobile and electronic message delivery, on-line applications, portal design, development and management of informatics systems, safety of informatics systems, application groups: integrated business systems, branch informatics systems, technical design systems, other software supports, role and possibilities of multimedia.

Recommended material

Pintér Miklós: Számítógéppel segített rajzolás, 2000.
Dr. Varga Tibor: AUTOCAD 2000 és Release 14 kezdőknek, haladóknak.
Lynn Allen - Scott Onstott: AutoCAD: Professional Tips and Techniques.

ECTS Course description

Subject:	**Conservation Biology**	**Subject code:**	**NGB_KM013_1**
Credits:	6	**Lessons per week:**	3
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Ecology	**Assessment:**	exam / project work
Description of the subject			
History of conservation. Principles of conservation biology. Protection of species. Protection of areas. Management of conservation in Hungary and in the EU. Treatment and restoration. Main causes of biodiversity lost: habitat lost, degradation, invasive species. Protected areas of Hungary, EU, and the Earth.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**Conservation of Historical Buildings**	**Subject code:**	**NGB_EV009_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Gábor Winkler, Dr., Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	spring
Pre-study requirements:		**Assessment:**	exam

Description of the subject

Definition of architectural heritage and monuments. Aspects in the preservation of monuments: history and interdisciplinary links. Relationship between natural environment, historic landscape and architectural heritage. Levels and special aspects in the preservation of monuments and sites. Tasks and goals of monument preservation. Organizations of national and international monuments and sites. Theory and practice in Hungarian monument preservation. Practice of the Hungarian monument preservation. Visit and analysis of important historic sites, renewal of monuments in the last century.

Recommended material

Gerő László: Műemlékvédelemről mindenkinek.
Román András: Karták könyve.
Szentkirályi Zoltán: Az építészet világtörténete.
Harrach Erzsébet: Hitelesség, módszer, kivitel a magyarországi gyakorlatban.
Román András: 487 bekezdés és 617 kép a műemlékvédelemről.

ECTS Course description

Subject:	**Construction Management I**	**Subject code:**	**NGB_ET004_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Ferenc Kiss, Jenő Bizzer, Dr.	**Language:**	Hungarian
Email:	kissf@sze.hu	**Term:**	spring
Pre-study requirements:	Engineering Methods II	**Assessment:**	exam

Description of the subject

Preparation of constructions, competitive bidding. Construction organisation: timing, spatial organisation. Cost calculation, additional cost factors, construction budget. Contracting and legal issues. Process of construction management. Implementation, documents of taking-over. Factors influencing quality and economic efficiency.

Recommended material

Tanácsadó Mérnökök Magyarországi Szövetsége (TMSz) kiadványai. (eredetileg FIDIC kiadványok).
Dr. Takács László: Építésszervezés (Távoktatási kézirat, 1996).

ECTS Course description

Subject:	**Construction Management II**	**Subject code:**	**NGB_ET004_2**
Credits:	4	**Lessons per week:**	3
Teacher:	Ferenc Kiss, Dr., Jenő Bizzer	**Language:**	Hungarian
Email:	kissf@sze.hu	**Term:**	Autumn
Pre-study requirements:	Construction Management I	**Assessment:**	exam
Description of the subject			
Competitive bidding after joining the EU, international competitive bidding. Concession tendering. Financing construction projects. Competitive edges and handicaps, risks. Steering tasks of the management during the project implementation. Organisation plans, business plan. Computer aided construction organisation. Setting up quality management system in construction enterprises.			
Recommended material			

ECTS Course description

Subject:	**Construction of machines**	**Subject code:**	**NGB_AG003_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Gáborné Kovács	**Language:**	Hungarian
Email:	kgaborne@sze.hu	**Term:**	autumn
Pre-study requirements:	none	**Assessment:**	continuous assessment

Description of the subject

The aim of the subject is the development of the three dimensional approach by descriptive geometry fundamentals, which is the base of the engineering drawing of objects. The subject includes drawing technique knowledge, international rules of the engineering drawing, preparing and using of technical documentation, required to uniform interpretation. Practice by drawing simple parts and assembling.

Compulsory material

Háromi F.- Mrs. Kovács G.:Three dimensional geometry, Universitas-Győr Kht. 2007. (in Hungarian)
Háromi F.- Mrs. Kovács G.: Engineering drawing, Universitas-Győr Kht. 2007.(in Hungarian)

Recommended material

Háromi F.- Mrs. Kovács G: Construction of Machines I, HEFOP electronic lecture notes.
Suggested current MSZ ISO standards.

ECTS Course description

Subject:	**Construction of Structures I**	**Subject code:**	**NGB_SE008_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Zoltán Tóth, Dr.	**Language:**	Hungarian
Email:	tothz@sze.hu	**Term:**	spring
Pre-study requirements:	Structures I	**Assessment:**	exam

Description of the subject

Stress states of the stressed reinforced concrete beam. Pre-stressed and post-stressed systems. Stress losses of the pre- and post-stressed beams. Determination of the effective tensile force, calculation of extreme fibre stresses, determination of crushing moment. Analysis of beam-ends, determination of the failure moment. Design of precast beams. Building of monolith reinforced structures. Classical methods: beam, column and wall moulding and scaffoldings. Loads acting on mouldings and on scaffoldings. Modern methods: boarded, sliding mouldings and mobile systems. Applied concrete technology; properties, analysis and qualification of the fresh and solid concrete. Set-up construction and placing of the concrete; transport concrete. Documents of the construction of reinforced concrete structures. Precast reinforced structures. Connections of precast beams: column-beam, column-footing, junctions of column-wall cells. Structural systems, static frame and function of the multilevel building frames.

Recommended material

Dr Klatsmányi Tibor: Feszített vasbetonszerkezetek (főiskolai jegyzet)
Dr Balázs-Fogarasi: Vasbton elemek kapcsolatai (Műszaki könyvkiadó)
MSZ EN 206-1 Magyar szabvány 2004 június
Massányi-Dulácska: Statikusok könyve. Magasépítés (Műszaki könyvkiadó 1989)

ECTS Course description

Subject:	**Construction of Structures II**	**Subject code:**	**NGB_SE008_2**
Credits:	3	**Lessons per week:**	3
Teacher:	György Németh, Dr.	**Language:**	Hungarian
Email:	nemethgy@sze.hu	**Term:**	spring
Pre-study requirements:	Structures III	**Assessment:**	exam

Description of the subject

Construction, building and assembling of steel structures. Riveted and bolted joints. Establishing of high strength stretched screwed joints. Weldability of steels. Method of welding, technology of welding. Welding strains and internal stress. Tests and qualification of welds. Construction and assembly of structural elements. Assembling methods of steel constructions, technology of assembling. Fire and corrosion protection of steel structures.

Recommended material

Halász Ottó-Platthy Pál: Acélszerkezetek (Egyetemi tankönyv)
Palotás László: Mérnöki kézikönyv (2. kötetre vonatkozó fejezetei)
Zokóczy Béla: Hegesztési kézikönyv

ECTS Course description

Subject:	**Construction of Structures III**	**Subject code:**	**NGB_SE008_3**
Credits:	3	**Lessons per week:**	3
Teacher:	János Guzmics	**Language:**	Hungarian
Email:	guzmics.janos@gyor.net	**Term:**	spring
Pre-study requirements:	Structures V	**Assessment:**	exam

Description of the subject

Analysis and construction of wooden structures and their nodes. Comparison with similar structures made of other materials. Lattice girder. Structural analysis of roof frames and standard timber joints. Design and construction of RR beams. The effect of design upon the frame behaviour. Standard wooden structures, scaffoldings, loads on standard mouldings, construction and design. Dimensioning of contemporary moulding systems.

Recommended material

dr. Horváth Sándor: Faanyagú szerkezetek alkalmazása a magas és mélyépítésben (J9-1274, Kézirat, Tankönyvkiadó, Budapest 1992)
Rónai-Somfalvi: Fa tartószerkezetek. Tervezés, méretezés (Műszaki könyvkiadó, Budapest, 1982)
Molnár-Szücs-Dr Szabó L.né: Tartószerkezetek II. Fa és acélszerkezetek (YMMF, J15-554 Kézirat, Tankönyvkiadó, Budapest 1989)
Wittmann-Szarka-Kajli: Fa tartószerkezetek gyártása (Műszaki Könyvkiadó, Budapest, 1981)

ECTS Course description

Subject:	**Construction Project I**	**Subject code:**	**NGB_SE009_1**
Credits:	2	**Lessons per week:**	1
Teacher:	Ádám Bukovics	**Language:**	Hungarian
Email:	bukovics@sze.hu	**Term:**	spring
Pre-study requirements:	Structures II	**Assessment:**	continuous assessment

Description of the subject

Getting practice in preparation of realisation of a real engineering project is the aim of the subject, mainly in the phase of tendering. In order to develop their ability of decision-making, "real" problems are to be solved with simulation of real circumstances, practising tasks of project management. The types of tasks are taken from the area of civil engineering construction and have complex nature.

Recommended material

Dulácska Endre: Statikus tervek kidolgozása (BME szilárdságtan és Tartószerkezetek tanszék, 1993)
Gyulai-Hollay-Száva-Wéber: Az építész-és építőmérnöki tevékenység és beruházás folyamatában (Műegyetemi kiadó, 1996)

ECTS Course description

Subject:	**Construction Project II**	**Subject code:**	**NGB_SE009_2**
Credits:	2	**Lessons per week:**	1
Teacher:	Ádám Bukovics	**Language:**	Hungarian
Email:	bukovics@sze.hu	**Term:**	autumn
Pre-study requirements:	Construction Project I	**Assessment:**	continuous assessment

Description of the subject

Students practice engineering activity of technology and quality management, planning and inspection, in the phase of execution. In order to develop their ability of decision-making, “real” problems are to be solved with simulation of real circumstances, practising tasks of project management. The types of tasks are taken from the area of civil engineering construction and have complex nature.

Recommended material

Dulácska Endre: Statikus tervek kidolgozása (BME szilárdságtan és Tartószerkezetek tanszék, 1993)
Gyulai-Hollay-Száva-Wéber: Az építész-és építőmérnöki tevékenység és beruházás folyamatában (Műegyetemi kiadó, 1996)

ECTS Course description

Subject:	**Descriptive Geometry I**	**Subject code:**	**NGB_EP001_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Attila Radosza, DLA, István Major, Ferdinánd Szabó	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject gets the students acquainted with those projection methods and systems, which will be necessary during their studies and engineering praxis. Goals: skills for proportion, drawing skills, comprehension of drawings, development of spatial eyesight. Parallel and index-numbered projection systems, basic of spatial geometry, construction, attributes of three-dimensional objects. Parallelism, perpendicularity, intersection, fitting, dimensional tasks, rotation in the system of Monge projection. Axonometric projection, general and engineering axis. The basic of index-numbered projection, basic construction, tasks with terrains and slopes.

Compulsory material

Dr. Szente Béla: Műszaki rajz, J 19-364

Recommended material

Hant-Háromi: Ábrázoló geometria feladatlapok
Dr. Szente Béla: Műszaki rajz, J 19-365 Tanulmányi segédlet
Katona Zoltán: Ábrázoló geometria, Tankönyvkiadó, 1973
Dr. Petrich Géza: Ábrázoló geometria, Tankönyvkiadó, 1969

ECTS Course description

Subject:	**Descriptive Geometry II**	**Subject code:**	**NGB_EP001_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Attila Radosza, DLA, István Major, Ferdinánd Szabó	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	Descriptive Geometry I	**Assessment:**	exam

Description of the subject

Getting acquainted with the geometrical properties of all the complex second-order surfaces and learning how to construct their contours, shadow and sections not only improves students' space perception and construction skills but also helps them understand the aspects of architectural application. Investigation, representation and architectural application of nonsecond-order surfaces prepare students to apply these skills at buildings (instead of surfaces) in their further studies: they will be able to construct views, sections, contours and shades of objects of their own design. Students need well-founded knowledge of descriptive geometry so that they can represent their spatial concept in drawing, develop the skill of reconstructing objects from projections, learn the methods of preparing engineering drawings and the related conventions in their further studies.

Compulsory material

Dr. Szente Béla: Műszaki rajz, J 19-364

Recommended material

Hant-Háromi: Ábrázoló geometria feladatlapok
Dr. Szente Béla: Műszaki rajz, J 19-365 Tanulmányi segédlet
Katona Zoltán: Ábrázoló geometria, Tankönyvkiadó, 1973
Dr. Petrich Géza: Ábrázoló geometria, Tankönyvkiadó, 1969

ECTS Course description

Subject:	**Design of Engineering Structures**	**Subject code:**	**NGB_SE052_1**
Credits:	2	**Lessons per week:**	2
Teacher:	János Szép	**Language:**	Hungarian
Email:	szepj@sze.hu	**Term:**	autumn
Pre-study requirements:	Mechanics II	**Assessment:**	exam
Description of the subject			
Basic design concepts of engineering structures for architects.			
Recommended material			

ECTS Course description

Subject:	**Development of Settlement and Region I**	**Subject code:**	**NGB_RT001_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Ádám Páthy	**Language:**	Hungarian
Email:	pathya@rkk.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The aim of the course is to give an introduction into examination concerning settlement network, space structure and settlement-society procedures with the help of social science methodology of settlement geography, settlement sociology, and settlement research.
1. Scientific nature of settlement research, basic principles of settlement geography, settlement sociology, and demographic connections.
2. Structural setting-up, revision of the settlement network in Hungary and basic line of spatial development policy.
3. Examination of inner social structure of settlements with the means of settlement sociology.
4. Empirical method of settlement research, state evaluation.

Recommended material

Beluszky Pál: Magyarország településföldrajza. Osiris, 2003.
Letenyei László: Településkutatás. L'Harmattan, 2006.

ECTS Course description

Subject:	**Development of Settlement and Region II**	**Subject code:**	**NGB_RT001_2**
Credits:	3	**Lessons per week:**	2
Teacher:	András Grosz, Dr.	**Language:**	Hungarian
Email:	grosza@sze.hu	**Term:**	autumn
Pre-study requirements:	Economics	**Assessment:**	exam
Description of the subject			
Appearance of space in the social sciences. Content and aim of regional science. Revaluing of spatiality, globalization and spatial organisation The connection of economics with spatiality, a regional economics. Basic question of regional microeconomics. The stages of premise-theories, selection of premise as an issue. The micro and macro factors of selection of premise. Reduction of transport costs. Spatial market structures. The local extern effects, local concentration of advantages of industrial competition. The Porter-sort rhombus model. The regional clusters.			
Recommended material			
Lengyel I.–Rechnitzer J.: Regionális gazdaságtan. Dialóg Campus Kiadó, 2004, Budapest-Pécs. (Chapters 1-6)			

ECTS Course description

Subject:	**Development of Settlement and Region III**	**Subject code:**	**NGB_RT001_3**
Credits:	3	**Lessons per week:**	2
Teacher:	András Grosz, Dr.	**Language:**	Hungarian
Email:	grosza@sze.hu	**Term:**	autumn
Pre-study requirements:	Economics	**Assessment:**	exam
Description of the subject			
Regional competitiveness. Spatial division of labour and spatial structure. The regional model of economic development and growth. Mobility of labour force, its influencing effects. Mobility of capital, its influencing effects. Connection between production factors and trade between regions. The neoclassical growing model. Improvement of the neoclassical growing model. The technical progress and the innovation, spatial spreading of innovations. Theories of regional development, its models. Evaluation methods of regional macro-economics.			
Recommended material			
Lengyel I.–Rechnitzer J.: Regionális gazdaságtan. Dialóg Campus Kiadó, 2004, Budapest-Pécs.			

ECTS Course description

Subject:	**Development of Settlement and Region IV**	**Subject code:**	**NGB_RT001_4**
Credits:	3	**Lessons per week:**	3
Teacher:	András Grosz, Dr.	**Language:**	Hungarian
Email:	grosza@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	project work and exam

Description of the subject

Introduction to spatial development and regional policy. Content, subject and aim of spatial development. Features of modern and postmodern regional policy. Central regulation of regional policy. Development of EU's common regional policy, and its reforms. Basic principles, operation and practice of EU's common regional policy. The European level spatial strategies and multiregional cooperation. History of Hungarian regional policy until 1990. The regional policy of the transition. Institutions of spatial development. Means of spatial development. Spatial development, programming and monitoring. The regional management. Factors affecting regional policy in the future.

Recommended material

Rechnitzer J.–Smahó M.: Regionális politika. Győr, Széchenyi István Egyetem, 2006. (university textbook, http://jegyzet.sze.hu)
1996. évi XXI. törvény a területfejlesztésről és területrendezésről.
National Spatial Development Concept. Budapest, Országos Területfejlesztési Hivatal, 2005.
Lecture notes

ECTS Course description

Subject:	**Diploma Thesis**	**Subject code:**	**NGB_EP013_1**
Credits:	15	**Lessons per week:**	4
Teacher:	Éva Kőrössi	**Language:**	Hungarian
Email:	korossi@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Students select a department and a consultant until the end of the registration week. Students prepare a chosen task with details and drawings from the topics of Building Constructions, Building Technology, or Conservation of Built Heritage, after studying the technical literature.			
Compulsory material			
-			
Recommended material			
-			

ECTS Course description

Subject:	**Diploma thesis**	**Subject code:**	**NGB_ET099_1**
Credits:	15	**Lessons per week:**	2
Teacher:	optional	**Language:**	Hungarian
Email:	-	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
The diploma thesis is a solution of a civil engineering project in the particular specialization or the elaboration of a research theme which can be completed in one semester on the basis of the student's knowledge, through further investigation of additional literature and under the supervisor's guidance. The candidate shall verify through his/her diploma thesis that he/she has proper expertise in the practical application of his/her knowledge, he/she is able to perform design or analytical tasks of a civil engineer. He/she is well up in further literature over the course material too and he/she can create new values through applying this knowledge in the civil engineer profession.			
Recommended material			
Standards, conference presentations and literature with regard to the subject of diploma thesis. Literature with regard to the subject of diploma thesis.			

ECTS Course description

Subject:	**Diploma thesis**	**Subject code:**	**NGB_KM099_1**
Credits:	15	**Lessons per week:**	2
Teacher:	optional	**Language:**	Hungarian
Email:	-	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The diploma thesis is a solution of an environmental engineering project in the particular specialization or the elaboration of a research theme which can be completed in one semester on the basis of the student's knowledge through further investigation of additional literature and under the supervisor's guidance. The candidate shall verify through his/her diploma thesis that he/she has proper expertise in the practical application of his/her knowledge, he/she is able to perform design or analytical tasks of an environmental engineer. He/she is well up in further literature over the course material too and he/she can create new values through applying this knowledge in the environmental engineer profession.

Recommended material

Standards, conference presentations and literature with regard to the subject of diploma thesis.
Literature with regard to the subject of diploma thesis.

ECTS Course description

Subject:	**Diploma thesis**	**Subject code:**	**NGB_KO099_1**
Credits:	15	**Lessons per week:**	2
Teacher:	optional	**Language:**	Hungarian
Email:	-	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The diploma thesis is a solution of a transport engineering project in the particular specialization or the elaboration of a research theme which can be completed in one semester on the basis of the student's knowledge through further investigation of additional literature and under the supervisor's guidance. The candidate shall verify through his/her diploma thesis that he/she has proper expertise in the practical application of his/her knowledge, he/she is able to perform tasks of a transport engineer. He/she is well up in further literature over the course material too and he/she can create new values through applying this knowledge in the transport engineer profession.

Recommended material

Standards, conference presentations and literature with regard to the subject of diploma thesis.
Literature with regard to the subject of diploma thesis.

ECTS Course description

Subject:	**Diploma thesis**	**Subject code:**	**NGB_LO099_1**
Credits:	15	**Lessons per week:**	2
Teacher:	optional	**Language:**	Hungarian
Email:	-	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The diploma thesis is a solution of a logistics project in the particular specialization or the elaboration of a research theme which can be completed in one semester on the basis of the student's knowledge through further investigation of additional literature and under the supervisor's guidance. The candidate shall verify through his/her diploma thesis that he/she has proper expertise in the practical application of his/her knowledge, he/she is able to perform tasks of a transport engineer. He/she is well up in further literature over the course material too and he/she can create new values through applying this knowledge in the transport engineer profession.

Recommended material

Standards, conference presentations and literature with regard to the subject of diploma thesis.
Literature with regard to the subject of diploma thesis.

ECTS Course description

Subject:	**Diploma thesis**	**Subject code:**	**NGB_SE099_1**
Credits:	15	**Lessons per week:**	2
Teacher:	optional	**Language:**	Hungarian
Email:	-	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
The diploma thesis is a solution of a civil engineering project in the particular specialization or the elaboration of a research theme which can be completed in one semester on the basis of the student's knowledge, through further investigation of additional literature and under the supervisor's guidance. The candidate shall verify through his/her diploma thesis that he/she has proper expertise in the practical application of his/her knowledge, he/she is able to perform design or analytical tasks of a civil engineer. He/she is well up in further literature over the course material too and he/she can create new values through applying this knowledge in the civil engineer profession.			
Recommended material			

ECTS Course description

Subject:	**Drawing and Composition I**	**Subject code:**	**NGB_EP007_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The objective of this subject is to introduce students to the fundamentals of perspective spatial representation based on geometrical solids (e.g. cube, cylinder, quadratic and triangular prisms). Drawing tasks range from simple arrangements to complex spatial and architectural constructions, while representation techniques range from constructive line drawing to tinted drawings (showing light-shadow effects), applying lead pencil. The application of graphical techniques they have not practised before (e.g. charcoal, pitt, pastel, acrylic etc.) to present the pictorial effects produced by these techniques.

Compulsory material

-

Recommended material

Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.

ECTS Course description

Subject:	**Drawing and Composition II**	**Subject code:**	**NGB_EP007_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	spring
Pre-study requirements:	Drawing and Composition I	**Assessment:**	continuous assessment
Description of the subject			
This subject intends to inspire students to think creatively via free-hand drawing tasks. Classes present the basics of the theory of colours and its architectural application. After a creative model building task, students acquire the representation of complex spatial forms (e.g. furniture, drapery, details of space, drawing studio etc.), apply and practise a wide range of drawing techniques (e.g. pencil, crayon, ink, washed drawing).			
Compulsory material			
-			
Recommended material			
Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.			

ECTS Course description

Subject:	**Drawing and Composition III**	**Subject code:**	**NGB_EP007_3**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	autumn
Pre-study requirements:	Drawing and Composition II	**Assessment:**	continuous assessment
Description of the subject			
This subject introduces professional special applications of the drawing skills they acquired so far. Classes present drawing methods for the representation of reality irrespective of the given point of view, from any other one. Students practise the drawing of simple architectural spaces and ornaments, draperies, still lives. Geometrical and organic forms, two-dimensional representation of regular and irregular models, typographical rules. Numerals as graphic elements, the art of letters, construction method of block letters. Composition of letters and numerals, initials.			
Compulsory material			
-			
Recommended material			
Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.			

ECTS Course description

Subject:	**Drawing and Composition IV**	**Subject code:**	**NGB_EP007_4**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	spring
Pre-study requirements:	Drawing and Composition III	**Assessment:**	continuous assessment
Description of the subject			
Agents of composition: the concept of balance, repetition, contrast, and rhythm. The characteristic of relationship between form and space, unique impressions in space perception. Colour techniques: water-colour, colour pencils, chalks, crayon, ink. Technical background of colour pigments, their behaviour during mixing, professional skills in painting. Concept and conditions of colour harmony, various theories of harmony. Current colour design tasks, e.g. authentic colouring of historical buildings and aesthetic rehabilitation of city centres and the panel programme. Colour design process of interiors and exteriors.			
Compulsory material			
-			
Recommended material			
Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.			

ECTS Course description

Subject:	**Drawing and Composition V**	**Subject code:**	**NGB_EP007_5**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	autumn
Pre-study requirements:	Drawing and Composition IV	**Assessment:**	continuous assessment

Description of the subject

The main topic in this semester is the intuitive representation of internal and external spaces. Drawing the streets and squares of the historical centre of Győr, the internal spaces of some atmospheric local old public buildings. Students investigate the architectural features of the period from medieval times to modernism, invisible geometrical-structural relations and improve their drawing skills by pencil, ink and crayon techniques.

Compulsory material

-

Recommended material

Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.

ECTS Course description

Subject:	**Drawing and Composition VI**	**Subject code:**	**NGB_EP007_6**
Credits:	2	**Lessons per week:**	2
Teacher:	Kinga Énzsöly, Attila Radosza, Imre Tolnay	**Language:**	Hungarian
Email:	enzsoly@freemail.hu, radoszatta@gmail.com, itolnay@gmail.com	**Term:**	spring
Pre-study requirements:	Drawing and Composition V	**Assessment:**	continuous assessment

Description of the subject

Students develop various graphic skills by practising the architectural graphic representation of masonry, stone, wooden and glass surfaces and those of other materials. It focuses on the relations of material and volume, internal space and the phenomenon of transparency. Solving the problems of space and form. Structural arrangement is investigated, especially light-shadow relations. Fluency in perspective drawing and abstraction. Representation of interiors and exteriors using the human figure as a unit, since it provides the drawing with a scale, which will be useful at the preparation of further drawings and at presentation views.

Compulsory material

-

Recommended material

Dobó-Molnár-Peity-Répás: Valóság, gondolat, rajz / építészeti grafika, Műszaki Könyvkiadó, Budapest. 1999.

ECTS Course description

Subject:	**Ecological Fieldwork**	**Subject code:**	**NGB_KM031_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Ecology	**Assessment:**	project work
Description of the subject			
Field work, species lists, species density. Data collection and processing.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**Ecology**	**Subject code:**	**NGB_KM007_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	Biology II	**Assessment:**	exam / project work
Description of the subject			
History of Ecology. Basic definitions. Abiotic environment of the populations. Biotic interactions and population models. Ecological communities. Ecosystems: the flux of energy and matter. Climate and life on Earth, bioms.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**NGB_AK002_1**	**Subject code:**	**NGB_AK002_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Péter Farkas	**Language:**	Hungarian
Email:	farkasp@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Principle of business behaviour. Society and economy. Definition of business economy. Environment of business behaviour. Institutions of value and income production. General characterisation of business organisations. Company-like business organisations. Outer and inner environment of business activity. Managing outer contacts of companies. Inner environment of companies. System of value and income production. Role of products and services in managing business processes. Production management systems. Market policy, marketing and marketing communication. Innovations and investments. Resource management. Logistics of business facilities. Evaluation of economic activity.			
Compulsory material			
Farkas Péter – Koppány Krisztián: Közgazdaságtan. Universitas-Győr Kht. 2006.			
Recommended material			

ECTS Course description

Subject:	**Energetics Auditing**	**Subject code:**	**NGB_KM026_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	autumn
Pre-study requirements:	Energy and Environment II.	**Assessment:**	exam
Description of the subject			
Methodology of energetics auditing. Energy management, energy measure units. Mapping of energy consumption in the business sector. Energy consumption of buildings. Building energetics softwares. Energy economy.			
Recommended material			
Instruction material demonstrated on lecture.			

ECTS Course description

Subject:	**Energy and Environment I**	**Subject code:**	**NGB_KM022_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	autumn
Pre-study requirements:	Chemistry II, Physics	**Assessment:**	exam

Description of the subject

Energetics and environment in the 21st century. Energy supply of the world and Europe. Energy sources, primer fossil stocks. The new Hungarian energy policy concept. Energy transformation. Energy efficiency. Renewable energy sources.

Recommended material

Dr. Tóth, P. - Dr. Bulla, M. Energy and environment. Lecture notes, Győr, 1999.
Dr. Büki, G. Energetics. Budapest, 1997.

ECTS Course description

Subject:	**Energy and Environment II**	**Subject code:**	**NGB_KM022_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	spring
Pre-study requirements:	Energy and Environment I	**Assessment:**	exam

Description of the subject

Use of renewable energy resources. Solar energy (passive use, solar architecture, active use, solar building enginering). Wind energy. Biomass.

Recommended material

Dr. Tóth, P. - Dr. Bulla, M. Energy and environment. Lecture notes, Győr, 1999.
Dr. Scheer, H. Sonnen-Strategie, München, 2004.

ECTS Course description

Subject:	**Engineering Communication**	**Subject code:**	**NGB_KM034_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Attila Borsos	**Language:**	Hungarian
Email:	borsosa@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	assignments
Description of the subject			
The subject aims to introduce the methods of self-instruction, provide an opportunity for improvement of its practical ability. It deals with the conventional methods of information gaining, selection, attachment, the possibilities of using of library and computing devices. Introduction of individual learning abilities, pelmanism exercises. Practice of knowing ourselves and our fellow-creatures, recognition and usage of meta-communication and communication devices. Active application of verbal and written communication forms. Text generation, editing, publication, advertisement, minutes, application, practicing of preparation of CV.			
Recommended material			

ECTS Course description

Subject:	**Engineering Communication**	**Subject code:**	**NGB_KM003_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Borsos	**Language:**	Hungarian
Email:	borsosa@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	assignments
Description of the subject			
The subject aims to introduce the methods of self-instruction, provide an opportunity for improvement of its practical ability. It deals with the conventional methods of information gaining, selection, attachment, the possibilities of using of library and computing devices. Introduction of individual learning abilities, pelmanism exercises. Practice of knowing ourselves and our fellow-creatures, recognition and usage of meta-communication and communication devices. Active application of verbal and written communication forms. Text generation, editing, publication, advertisement, minutes, application, practicing of preparation of CV.			
Recommended material			

ECTS Course description

Subject:	**Engineering Materials**	**Subject code:**	**NGB_AJ002_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Gábor Dogossy	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Classification and properties of structural materials, their investigation. Tensile, compressive and bending tests. Hardness measuring. Behaviour under dynamic and repetitive stress. Thermic, electrical, optical and magnetic properties. Production of metallic structural materials. Definition and types of alloy, crystallization. Balance diagrams and transformation diagrams. Basics of heat treatment, surface heat treating. Cast iron, non-iron metals, ceramics. Polymers and composites. Fuels and lubricants. Material tests, damages, non-destructive testing.

Compulsory material

Csizmazia Ferencné dr.: Anyagismeret. SZIF-UNIVERSITAS Kft., Győr, 1999.

Recommended material

Dr. Bagyinszki Gyula-Dr. Kovács Mihály: Gépipari alapanyagok és félkészgyártmányok. Anyagismeret. Tankönyvmester Kiadó, Budapest, 2002.
Komócsin Mihály: Gépipari anyagismeret. COCOM Kiadó Kft., Miskolc, 2002.

ECTS Course description

Subject:	**Engineering Methods I**	**Subject code:**	**NGB_SE003_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Péter Scharle, Dr.	**Language:**	Hungarian
Email:	scharle@sze.hu	**Term:**	autumn
Pre-study requirements:	Mathematics I	**Assessment:**	continuous assessment

Description of the subject

Aims, goals, content and order of the planning, design and construction. Institutional, legal and administrative environment of planning. Dimensions and requirements of designing. Functional and formal design of the engineering projects. Structural design. Safety, risk, responsibility. Creation of decision alternatives. Investigation of environmental impact, cost-benefit analysis. Feasibility, implementation. Decision preparation, reconciliation and conflict management in the design. Information technology applied in the engineering planning. Corporate responsibility and ethics. Role of the designers chambers. Trends of technology development.

Recommended material

Sharle Péter: Mérnöki tervezési módszerek.
A Magyar Mérnöki Kamara havilapja (MÉRNÖKÚJSÁG) évfolyamai (1990-)
Kollár L.(szerk): Mérnöki tervezés (jegyzet 2003)
Babcock, D.L., Morse, L.C.: Managing enginering and technology, Prentice Hall, 2002.

ECTS Course description

Subject:	**Engineering methods II**	**Subject code:**	**NGB_SE003_2**
Credits:	4	**Lessons per week:**	3
Teacher:	Ferenc Kiss, Dr.	**Language:**	Hungarian
Email:	kissf@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics I	**Assessment:**	continuous assessment

Description of the subject

Concept, conditions, preparation, main steps and participants of the building process. Organization principles and skills. Main technologies, machines and controlling of demolition, excavation, deposit and disposition of materials, transportation, mixing technologies, compaction etc. Basic methods of building: precast and monolithic concrete technologies. Steel, timber and light-weight structures, building phases of lengthy constructions (roads, dykes). Quality assurance of the construction, labour safety. Take-over of constructions, technical and administrational procedures of putting into use.

Recommended material

Nagy P.: Építéstechnológia I. TK Bp. J 8-348
Fátrai Gy.: Építéskivitelezés; SZE hálózat
Palotás L.: Mérnöki kézikönyv IV. kötet
Magyar építéstechnika, Magyar Építőipar folyóirat számai

ECTS Course description

Subject:	**Engineering methods III**	**Subject code:**	**NGB_SE003_3**
Credits:	4	**Lessons per week:**	3
Teacher:	Ferenc Horvát, Dr.	**Language:**	Hungarian
Email:	horvat@sze.hu	**Term:**	autumn
Pre-study requirements:	Engineering Methods I, Transport Infrastructure I	**Assessment:**	exam

Description of the subject

Maintenance of engineering structures, its constructional and economic significance. Characteristic data describing the technical state and their measurement. Change of state, parameters of its description. Ageing, degradation and failure processes. Observation and control of buildings and structures. Decision making methods and procedures of intervention. Maintenance strategies. Features of road, railway and bridge maintenance.

Recommended material

Dr. Gáspár L.- Dr. Horvát F.: Fenntartási módszerek, kézirat, Győr, 2000.
W.R. Hudson-R.Haas-W. Uddin: Infastructure Management.
W.R. Hudson-R.Haas-J.Zaniewski: Pavement Managment System.

ECTS Course description

Subject:	**Engineering Physics**	**Subject code:**	**NGB_FI002_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Ottó Zsebők, PhD	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Basics of mechanics. Definition of kinematics. Types of movements, acts of Newton. Perseverance of buoyancy and energy. Vibration and wave precept. Harmonious oscillating movement. Addition of vibration. Optics, geometrical optics. Light spread. Light reflection and light fraction. Lens, optical means. Physical optics. Huygens-Fresnel principle. Interference and deviation. The physical barriers of optical decomposition. Material structure. Waves and particles. Attitude of photon and electron. Concept of quantum mechanics. State of electrons in the atomic shell. Basic principles of semiconductors. Basics of optoelectronics. Lasers and masers. Holography. Principles of optical data storages. Light conductors.

Recommended material

Berta, Farzan, Giczi, Horváth: Mérnöki fizika (Universitas-Győr, 2006)
R. P. Feynman: Mai fizika (Műszaki Könyvkiadó, 1990.)
Budó Ágoston: Kísérleti Fizika I., II., III. (Tankönyvkiadó, 1975.)
Mojzes Imre: Mikroelektronika és elektronikai technológia, (Műszaki Könyvkiadó)
Dér, Radnai, Soós: Fizikai feladatok I. II. (Tankönyvkiadó)

ECTS Course description

Subject:	**Environmental Analytics and Measurements**	**Subject code:**	**NGB_KM009_1**
Credits:	8	**Lessons per week:**	8
Teacher:	Juraj Lesny, Dr., Andrea Szabó Nagyné, Dr., Gábor Simon	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	Chemistry II	**Assessment:**	continuous assessment
Description of the subject			
Requirements of environmental sampling and measurement (water, waste, air measurements), basics of theory. In the course of laboratory exercises, introduction to different types of analytical chemical procedures, measurements, eco-toxicological examinations.			
Recommended material			
Vass István-Erdős József: Környezetvédelmi mérések			

ECTS Course description

Subject:	**Environmental Assessment I**	**Subject code:**	**NGB_KM004_1**
Credits:	6	**Lessons per week:**	4
Teacher:	Miklós Bulla, Dr., Zoltán Szalay, Dr.	**Language:**	Hungarian
Email:	bulla@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Environmental assessment in environmental management. Sustainable development (importance, criteria, pronciples). Environmental management models I and II. Aspects of assessment. Environmental impact assessment (structure and process).			
Recommended material			
Dr. Bulla, M. Environmental policy, Budapest, 2004.			

ECTS Course description

Subject:	**Environmental Assessment II**	**Subject code:**	**NGB_KM004_2**
Credits:	6	**Lessons per week:**	4
Teacher:	Zoltán Szalay, Dr., Adrienn Buruzs	**Language:**	Hungarian
Email:	szalayz@sze.hu	**Term:**	autumn
Pre-study requirements:	Environmental Assessment I	**Assessment:**	exam

Description of the subject

Environmental protection in the regional spatial structure. Planning and spatial development. Legal background. Regional developments and their sustainability. Indicators. Environmental conflict handling on regional level. Connections between settlement planning and development. Environmental planning of local governments. Environmental programmes of settlements. Steps of the planning process. Setting up the programme. Approval and review of the programme.

Recommended material

Környezetállapot-értékelés, környezeti monitoring, Magyarország környezeti állapota (szerk.: Dr. Bulla M.)
Dr. Bulla M.: Környezetpolitika, ELTE, Mobil Kiadó, Budapest, 2004.
Lecture notes

ECTS Course description

Subject:	**Environmental Chemistry**	**Subject code:**	**NGB_FI011_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Juraj Lesny, PhD; Gábor Simon	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	Chemistry II.	**Assessment:**	exam

Description of the subject

Concentration calculation of the troposphere's components. The stability of the atmosphere. The formation mechanism and types of temperature inversions. The dispersion of material contaminating the troposphere. Dispersion factors. Surface contamination calculation of contaminating gases. Line and surface models and their adaption in practice. Indoor air quality. Tobacco smoke, asbestos and radon in the indoor environment. Infiltration and ventilation. Indoor air quality model. The importance of radioactivity and environmental consequences. Units and quantities. Kinetics in radioactive decomposition. Types of radioactive decomposition. Natural and antropogene radioactivity. Fundamentals of protection against radioactive contamination. Effects of human activities on biogeochemical cycles. Antropogene contaminants in the atmosphere. Dusts and aerosols. Gaseous contaminants. Effect mechanisms of contaminants. Greenhouse effects, acid rain and smog. Antropogene contaminats in the hydrosphere. Types of plant nutriments and mode of actions. Oxygen consumption contaminants.

Recommended material

Tölgyessy, J. – Lesný, J. – Szakál, P.: Radionuklidák a mezőgazdaságban és az élelmezésiparban. Nyugat-Magyarországi Egyetem, Mosonmagyaróvár, 2000.
Nagy Lajos Gy. - Nagyné László K.: Radiokémia és izotóptechnika. Egyetemi tankönyv, Műegyetemi Kiadó, 1997.
Choppin, G. - Liljenzin, N, J. O. - Rydberg, J.: Radiochemistry and Nuclear Chemistry. 3rd Ed., PDF Format, Butterwort-Heinemann, Tallahassee, Göteborg, 2001.
Papp S. – R. Kümmel: Környezeti kémia. Tankönyvkiadó, Budapest, 1992.
Moser M. – Pálmai Gy.: A környezetvédelem alapjai. Tankönyvkiadó, Budapest, 1992.

ECTS Course description

Subject:	**Enviromental Hygiene**	**Subject code:**	**NGB_KM030_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Borbála Lőrincz, Dr.	**Language:**	Hungarian
Email:	borcsa@indamail.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
The students are listening to and also referring and discussing in the topics of microbiology, epidemiology, environmental hygiene, food hygiene, work hygiene.			
Recommended material			
Ádány Róza: Megelőző orvostan és népegészségtan. Medicina, 2006. Dr. Kertai Pál: Közegészségtan. Medicina, 1989. Dr. Dési Illés: Népegészségtan. Semmelweis Kiadó, 1995.			

ECTS Course description

Subject:	**Environmental Information Systems I**	**Subject code:**	**NGB_KM019_1**
Credits:	4	**Lessons per week:**	4
Teacher:	István Gyulai, Dr.	**Language:**	Hungarian
Email:	gyulai@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Reference systems, maps, use of digital maps, database building, querry. Thematic mapping. Maps and informations on the WEB. Land Environmental Information System, Soil-information and Monitoring System, Nature Conservation Information System, GEMS, GRID.			
Recommended material			

ECTS Course description

Subject:	**Environmental Information Systems II**	**Subject code:**	**NGB_KM019_2**
Credits:	4	**Lessons per week:**	4
Teacher:	István Gyulai, Dr.	**Language:**	Hungarian
Email:	gyulai@sze.hu	**Term:**	spring
Pre-study requirements:	Environmental Information Systems I	**Assessment:**	exam

Description of the subject

Basic knowledge of Remote Sensing. Cameras, sensor systems. Use and planning of air photographs. Satellite images, space missions. Assessment, image processing. Applications and projects.

Recommended material

Gyulai I - Bulla M.: Távérzékelés, 2002, (Remote Sensing)

ECTS Course description

Subject:	**Environmental Management I**	**Subject code:**	**NGB_KM016_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Cecília Szigeti, Dr.	**Language:**	Hungarian
Email:	szigetic@sze.hu	**Term:**	spring
Pre-study requirements:	Economics	**Assessment:**	written exam

Description of the subject

Environmental regulations, size and role-playing of the state. Environmental innovations, cleaner production, industrial ecology, eco-efficiency. Concept and obstacle of cleaner production. Environmental controlling and accounting. Measurement of the value of the environment by economic means. Environmental financial issues, financial evaluation of projects. Saving through reduction of waste. Standardization of environmental management, ISO 14000 and EMAS. Opportunities for introduction, obstacles and effects. Environmental reports, communication of environmental activities. Environmental risks and their handling on company level. Environmental conflicts and their handling. Green marketing, labelling, slogans and eco-labelling. Environmental market, consumption patterns and awareness of consumers. Corporate Social Responsibility.

Recommended material

Csutora Mária- Kerekes Sándor: A környezetbarát vállalatirányítás eszközei. KJK, 2004.
Kósi Kálmán-Valkó László: Környezetmenedzsment. Typotex, 2006.
Tóth Gergely: A valóban felelős vállalat. KÖVET, 2007.

ECTS Course description

Subject:	**Environmental Management II**	**Subject code:**	**NGB_KM016_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Cecília Szigeti, Dr.	**Language:**	Hungarian
Email:	szigetic@sze.hu	**Term:**	autumn
Pre-study requirements:	Environmental Management I	**Assessment:**	written exam

Description of the subject

Environmental regulations, size and role playing of the state. Environmental innovations, cleaner production, industrial ecology, eco-efficiency. Concept and barrier of cleaner production. Environmental controlling and accounting. Measurement of the value of the environment by economic means. Environmental financial issues, financial evaluation of projects. Saving through reduction of waste. Standardization of environmental management, ISO 14000 and EMAS. Opportunities for introduction, barriers and effects. Environmental reports, communication of environmental activities. Environmental risks and their handling on company level. Environmental conflicts and their handling. Green marketing, labelling, slogans and eco-labelling. Environmental market, consumption patterns and awareness of consumers. Corporate Social Responsibility.

Recommended material

Csutora Mária- Kerekes Sándor: A környezetbarát vállalatirányítás eszközei. KJK, 2004.
Kósi Kálmán-Valkó László: Környezetmenedzsment. Typotex, 2006.
Tóth Gergely: A valóban felelős vállalat. KÖVET, 2007.

ECTS Course description

Subject:	**Environmental Performance Evaluation**	**Subject code:**	**NGB_KM025_1**
Credits:	4	**Lessons per week:**	4
Teacher:	András Torma, Dr.	**Language:**	Hungarian
Email:	andras.torma@audi.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam + project work

Description of the subject

The main goal of this subject is to show up the necessity of the evaluation of the environmental performance. Within the frame of it the main characteristics of an environmental management system are displayed. The students can get information about the applied methods of the environmental performance evaluation and get a look into the field of auditing of an environmental management system.

Recommended material

Nagy G. - Torma A. - Vagdalt L.: A környezeti teljesítmény javítása és értékelése. Universitas Győr Kht., Győr, 2006.
Kósi K. - Valkó L.: Környezetmenedzsment. Typotex, Budapest, 2006.

ECTS Course description

Subject:	**Environmental Policy I**	**Subject code:**	**NGB_KM017_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Szalay, Dr.	**Language:**	Hungarian
Email:	szalayz@sze.hu	**Term:**	autumn
Pre-study requirements:	Legal Studies	**Assessment:**	exam
Description of the subject			
History and theoretical basics of environmental law. System and principles of environmental law. Institution of environmental law. The operative environmental law. The legal regulation of the protection of environmental elements. Environmental impact assessment. Important international environmental agreements.			
Recommended material			
Dr. Bándi, Gy. Environmental law. Budapest, 2000.			

ECTS Course description

Subject:	**Environmental Policy II**	**Subject code:**	**NGB_KM017_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Szalay, Dr.	**Language:**	Hungarian
Email:	szalayz@sze.hu	**Term:**	spring
Pre-study requirements:	Environmental Policy I	**Assessment:**	exam
Description of the subject			
General overview. The subject of environmental policy. Principles and goals. History of environmental regulation. Reactive and preventive environmental policy. Environmental policy of the EU. Environmental sociology. Environmental conflict management.			
Recommended material			
Dr. Bulla, M. Environmental policy, 2004.			

ECTS Course description

Subject:	**Environmental Protection**	**Subject code:**	**NGB_KM002_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Szalay, Dr.	**Language:**	Hungarian
Email:	szalayz@sze.hu	**Term:**	autumn /spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

General introduction of the problems of environmental protection, principles, determinant procedures, goals. Ecological fundamentals of environmental protection. Review of environmental elements, characteristics of environmental status of our country. Aim of nature conservation, its causes and necessity. Relationship between environmental protection and nature conservation, landscape protection. Waste management, principles, goals, priorities, waste prevention, waste reduction. Electricity supply of the world, global problems, environmental questions. Features of renewing resources, international and national potentialities. Noise, vibration and radiation protection. Justification and necessity of the environmental regulation. Goals, tools and possibilities of the regulation. Definition of sustainable dvelopment, connection between the economical growth and sustainability.

Recommended material

Dr. Bulla, M. Környezetvédelem. Széchenyi István Egyetem, Győr, 2006.

ECTS Course description

Subject:	**Environmental Radiation and Its Effects**	**Subject code:**	**NGB_FI008_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Andrea Szabó Nagyné, PhD	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	Technical Chemistry, Physics	**Assessment:**	exam

Description of the subject

Types, sources and features of environmental radiations. The concept of radioactivity, radioactive decompositions and radiations. Concept of dose, units of dose in case of ionizing radiation. Physical, chemical and biological effects of radioactive radiation. Movements and accumulation of radio nuclids in the ecological chain and the environment. Components of natural radiation loads (cosmic, terrestrial, radon etc.). Components of artificial radiation loads (atomic weapons, nuclear plant, sanitary waste, etc.). The experiments on radiation and nuclear accidents accompanying environmental contamination I. (classification of accidents, nuclear plant accidents). The experiments on radiation and nuclear accidents accompanying environmental contamination II. (armament accidents, industrial and medical accidents). Dose reduction interventions in the environment (environmental control, nuclear accident prevention, recultivation). Dosimetry of non-ionizing radiation.

Recommended material

Kanyár B., Somlai J., Szabó D. L.: Környezeti sugárzások, radioökológia, Veszprémi Egyetemi Kiadó, 1996.
Kanyár B., Béres Cs., Somlai J., Szabó S. A.: Radioökológia és környezeti sugárvédelem, Veszprémi Egyetemi Kiadó, 2000.
Kanyár B., Somlai J., Szabó D. L.: A sugárzások elleni védelem dozimetriai és hatástani alapjai, Veszprémi Egyetemi Kiadó, 1996.
Németh Z.: Radiokémia és izotóptechnikai alapismeretek, Veszprémi Egyetemi Kiadó, 1996.

ECTS Course description

Subject:	**Environmental Safety Technology**	**Subject code:**	**NGB_KM024_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Péter Tóth, Dr.	**Language:**	Hungarian
Email:	tothp@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Definition of environmental safety. Environmental safety as a strategy. Present and future of environmental safety in Hungary. Risk assessment. Definition of chemical safety. Assessment methodology. Seveso II. directive. Hazardous mills in Hungary. Types of natural disasters. Global climate change.

Recommended material

Instruction material demonstrated on lecture.
Dr. Vajda, Gy. Risk and safety. Budapest, 1998.

ECTS Course description

Subject:	**Environmental State Evaluation I**	**Subject code:**	**NGB_KM018_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Anikó Zseni, Dr.	**Language:**	Hungarian
Email:	zseniani@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Environmetal data and database. Registering of the quantity of agricultural land. Soil database. Quantity and quality database of surface and under surface water and data of water pollution. Database of air pollution and quantity of the air. Databases of living world, nature conservation, human and artifical environment. GEMS, GRID, OKIR. Waste data system.			
Recommended material			
Chapter 3 in Környezetállapot-értékelés, Magyarország környezeti állapota, monitorozás (ed. M. Bulla, 2008) HEFOP e-textbook, http://www.mk.uni-pannon.hu/hefop33			

ECTS Course description

Subject:	**Environmental State Evaluation II**	**Subject code:**	**NGB_KM018_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Anikó Zseni, Dr.	**Language:**	Hungarian
Email:	zseniani@sze.hu	**Term:**	spring
Pre-study requirements:	Environmental State Evaluation I	**Assessment:**	exam

Description of the subject

Evaluation of the environmental state of the World: growth of population, fresh-water, energy, soil and agriculture, biodiversity, global warming and its effects, stratospheric ozone depletion, acid rain and its effects. Evaluation of the environmental state of Europe and Hungary: the main economic driving forces, prominent environmetal problems (air and water pollution, soil degradation and pollution, chemicals, waste, biological diversity).

Recommended material

Zseni A.: Chapter 4.1., 4.2., 4.3. in Környezetállapot-értékelés, Magyarország környezeti állapota, monitorozás (ed. M. Bulla, 2008) HEFOP e-textbook, http://www.mk.uni-pannon.hu/hefop33

Europe's environment: the fourth assessment. European Environment Agency, Copenhagen, 2007.

HEFOP e-textbooks (2008): Környezettan; Földünk állapota: http://www.mk.uni-pannon.hu/hefop33

ECTS Course description

Subject:	**Environmental State Evaluation III**	**Subject code:**	**NGB_KM018_3**
Credits:	4	**Lessons per week:**	4
Teacher:	Miklós Bulla, Dr., András Torma, Dr.	**Language:**	Hungarian
Email:	bulla@sze.hu, andras.torma@audi.hu	**Term:**	autumn
Pre-study requirements:	Environmental State Evaluation II	**Assessment:**	exam + project work

Description of the subject

Within the frame of this subject the complex methods of environmental state assessment are covered. The students can get information about the methods of identification of the parameters and indicators of the environmental state, learn about the methods applied for the evaluation of the elementary effects and also get a look into the applied (and higher) methods of the environmental performance evaluation at micro level.

Recommended material

Dr. Bulla Miklós (szerk): Környezetállapot-értékelés, környezeti monitoring, Magyarország környezeti állapota. HEFOP elektronikus jegyzet.
Dr. Nagy Géza - Torma András - Vagdalt László (szerk.): A környezeti teljesítmény javítása és értékelése, Universitas-Győr Kht., Győr, 2006.
Kósi K. - Valkó L.: Környezetmenedzsment, Typotex, Budapest, 2006.

ECTS Course description

Subject:	**EU Studies**	**Subject code:**	**NGB_NJ001_1**
Credits:	2	**Lessons per week:**	2
Teacher:	György Márk Ponácz	**Language:**	Hungarian
Email:	pmark@sze.hu	**Term:**	autumn
Pre-study requirements:	Legal Studies	**Assessment:**	exam
Description of the subject			
Main topics are the following: Customs Law, VAT Rules, Tendering Operation Competition Rules, Consumer Protection, Environment Protecion, Electronic Commerce, Electronic Administration.			
Recommended material			
Practical Knowledge about the European Union for Small and Medium Enterprises. Budapest, Ministry of Economy and Transport, 2003. Dick Leonard: European Union - History, Organization, Functioning. Bp. Geomédia Books, 2002.			

ECTS Course description

Subject:	**Fluid Mechanics**	**Subject code:**	**NGB_AG015_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Melinda Baracskai	**Language:**	Hungarian
Email:	baramel@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The students obtain knowledge of the fluid stream and heat transfer. The students learn the fluids technician parameters. The statics of the steady densities medium. Fluids poise in universal field of force, potential, surface tension. They can understand the dynamics of steady densities medium, motion and energy equations. The subject presents the real fluids stream, the laminar stream, and turbulent stream, and the equipments of the stream engineering. Review of the statics of the variable densities mediums, the transformations alters of the ideal gases. Lay the thermodynamics height theorem and their use, and the cycles. The students learn to apply the weater-vapor-, the wet air-, and the ammonia diagram. The subject presents the convections, conductions, and radiations equations and this concept.

Compulsory material

Dr. Író B.: Hő- és Áramlástan (HEFOP)
Dr. Író Béla: Nyugvó kontínuumok (book of examples), Dr. Író Béla: Áramló ideális kontínuumok (book of examples)
Dr. Író Béla: Áramló valóságos kontínuumok (book of examples)
Dr. Író Béla: Hőtan - termodinamika (book of examples), Dr. Író Béla: Hőtan - hőközlés (book of examples)

Recommended material

Közlekedésmérnöki Kar, Aero- és Termotechnika Tanszéki Munkaközösség: Műszaki hő- és áramlástan. BME, Műegyetemi Kiadó, Bp. 1995.

ECTS Course description

Subject:	**Forwarding I**	**Subject code:**	**NGB_LO008_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Judit Tátrai Nyakasné, D.	**Language:**	Hungarian
Email:	nyakasne@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Trade Technology I	**Assessment:**	exam

Description of the subject

Concepts with regards to forwarding, the place of the activity in the distribution system. Organizations of forwarders. The Hungarian General Forwarding Conditions. Role and task of forwarder in railway forwarding. Factors of vehicle selection. Railway border forwarding activity. Forwarding overweight, oversize and hazardous goods in railway transport. Shipping documents of international and domestic railway forwarding. Role of transporter in road forwarding. Aspects of selecting the vehicle. Forwarding overweight, oversize and hazardous goods in road transport. Shipping documents of international road forwarding. Speciality, conditions and practice of collecting transportation.

Recommended material

Nyakasné dr. Tátrai Judit: Szállítmányozás I.
Specified technical articles

ECTS Course description

Subject:	**Forwarding II**	**Subject code:**	**NGB_LO008_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Ferenc Suhai, Dr., Ákos Mojzes	**Language:**	Hungarian
Email:	mojzesa@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

General evaluation of natural environment with relation to transport opportunity and efficiency. Territorial distribution of mining products, industrial raw materials, energy resources as privilege of transportation needs Transportation tasks related to agricultural zonality. Spatial appearance forms, mobility and migration of manpower. Maritime, main shipping routes. Major seaports. Major traffic routes in Europe. Geography of air transport. Major traffic routes and railway transport network of Hungary and its characters. All border stations (route and railway) of Hungary and their features. The Helsinki corridors and their sections in Hungary.

Recommended material

Dr. Suhai Ferenc: Közlekedés földrajz. Győr, 1996. (textbook)
Bernáth Tivadar: Világgazdaság földrajza
Dr. Suhai Ferenc: Magyarország logisztikai földrajza

ECTS Course description

Subject:	**Forwarding III**	**Subject code:**	**NGB_LO008_3**
Credits:	5	**Lessons per week:**	4
Teacher:	Judit Tátrai Nyakasné, Dr.	**Language:**	Hungarian
Email:	nyakasne@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Concepts with regards to forwarding, the place of the activity in the distribution system. Organizations of forwarders. The Hungarian General Forwarding Conditions. Role and task of forwarder in the railway transport. Aspects of selecting the vehicle. Forwarding overweight, oversize and hazardous goods in railway transport. Railways shipping documents in the domestic and international traffic. Role of transporter in road forwarding. Aspects of selecting the vehicle. Forwarding overweight, oversize and hazardous goods in road transport. Shipping documents of international road forwarding. Speciality, conditions and practice of collecting transportation. Role of transporter in air, river, sea and combined goods forwarding.

Recommended material

Nyakasné dr. Tátrai Judit Szállítmányozás I., Szállítmányozás II.

ECTS Course description

Subject:	**Forwarding IV**	**Subject code:**	**NGB_LO008_4**
Credits:	2	**Lessons per week:**	2
Teacher:	Pál Monori, Dr.	**Language:**	Hungarian
Email:	monorip@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Trade Technology II	**Assessment:**	exam
Description of the subject			
Road, river, sea, air and railway forwarding, collecting transportation and other special forwarding tasks (forwarding of overweight and oversize goods), pricing and special conditions affecting price.			
Recommended material			
Dr. Monori: Tarifák a szállítmányozásban			

ECTS Course description

Subject:	Geoinformatics I	Subject code:	NGB_ET005_1
Credits:	4	Lessons per week:	4
Teacher:	Rudolf Ottófi, Dr., András Tóvári, Magdolna Zotter Tóváriné, István Gyulai	Language:	Hungarian
Email:	tovari@sze.hu, zotter@sze.hu	Term:	spring
Pre-study requirements:	Mathematics I, Descriptive Geometry I	Assessment:	exam

Description of the subject

Global geodesic knowledge, networks, error-theoretic elements. Traditional, horizontal and vertical networks, combined networks used for new positioning techniques. Essential geodesic calculations. Horizontal measuring, measuring instruments, methods: measuring exercises and theoretical issues. Vertical measuring, measuring instruments, methods: levelling, tachymetric measuring instruments. Electronic tachymetry. Electronic measuring instruments as geoinformatic input data providers. Recent methods of electronic angle and distance measurement, instruments of data input and transfer. Global positioning in geoinformatics.

Recommended material

Dr. Ottófi Rudolf: Geodézia. UNIVERSITAS-Győr Kht, 1999.
Dr. László Sándor - Dr. Ottófi Rudolf: Geodézia Mérési és Számítási gyakorlatok.
http://www.ncdot.org/doh/PRECONSTRUCT/HIGHWAY/location/support/support_files/library_doc/Precise_Trig_Leveling_PPT_Rev010731.pdf

ECTS Course description

Subject:	**Geoinformatics II**	**Subject code:**	**NGB_ET005_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Rudolf Ottófi, Dr., András Tóvári, Zotter Magdolna Tóváriné	**Language:**	Hungarian
Email:	tovari@sze.hu, zotter@sze.hu	**Term:**	autumn
Pre-study requirements:	Geoinformatics I	**Assessment:**	exam

Description of the subject

Error theory of horizontal and vertical measurements, managing errors. Geodesic activities associated with urban planning. Setting out. Architectural surveys (castles, other monuments). Industrial exercises. Continuing electronic measuring methods.

Recommended material

Dr. Ottófi Rudolf: Geodézia UNIVERSITAS-Győr Kht. 1999.
Dr. László Sándor: Geodézia II. Nemzeti Tankönyvkiadó.
Dr. László Sándor - Dr. Ottófi Rudolf: Geodézia Mérési és Számításai gyakorlatok.
http://luna.csrs.nrcan.gc.ca/GPS_Guide_e/GPS_Guide_e.pdf; http://www.uni-stuttgart.de/gi/geoengine/sat_geod/satgeodesy.pdf

ECTS Course description

Subject:	**Geoinformatics III**	**Subject code:**	**NGB_ET005_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Rudolf Ottófi, Dr., András Tóvári	**Language:**	Hungarian
Email:	tovari@sze.hu	**Term:**	spring
Pre-study requirements:	Informatics I, Geoinformatics I	**Assessment:**	exam

Description of the subject

Data in recent database concept are alphanumeric ones. These data can represent points, lines or areas (house number, perimeter etc.) above ground. 3D visualisation possibilities of graphic surfaces. GIS (Geographical Information System) is a tool of geoinformatics, with which information can be derived from the database containing geographically localisable data. Data can be visualised graphically or/and in text.

Recommended material

Dr. Ottófi Rudolf – Tóvári András: Térinformatika. UNIVERSITAS-Győr Kht., 1999.
Sárközi: Térinformatika.
http://152.66.5.65/tutor_h/terinfor/tbev.htm#tartalom

ECTS Course description

Subject:	**Geology and Geophysics I**	**Subject code:**	**NGB_KM008_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Papp, Dr.	**Language:**	Hungarian
Email:	pappz@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Geology as natural science. Cosmic environment of the earth. Geospheres. Minerals. Types of rocks. Basics of physical geology. Earthquakes and vulcanism.			
Recommended material			
Dr. Papp, Z. Basics of geology. Lecture notes, 1997.			

ECTS Course description

Subject:	**Geology and Geophysics II**	**Subject code:**	**NGB_KM008_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Papp, Dr.	**Language:**	Hungarian
Email:	pappz@sze.hu	**Term:**	spring
Pre-study requirements:	Geology and Geophysics I	**Assessment:**	exam
Description of the subject			
Stock of water on the earth (origin, distribution). Classification of underground waters. The groundwater (types, stream, databases, case-studies). The rock model in engineering geology. The phases of model setting up. Basics of rock physics. Activities of engineering geology. Complex evaluation of datas.			
Recommended material			
Dr. Papp, Z. Basics of geology. Lecture notes, 1997.			

ECTS Course description

Subject:	**Geotechnics I**	**Subject code:**	**NGB_SE012_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Szepesházi, Dr.	**Language:**	Hungarian
Email:	szepesr@sze.hu	**Term:**	spring
Pre-study requirements:	Mechanics I	**Assessment:**	exam
Description of the subject			
Properties of the soil components, soil structure and composition. Design of foundations. Types and applications of retaining structures, earth works, underground buildings.			
Recommended material			
Szepesházi Róbert: Geotechnika, SZIF-Universitas jegyzet			

ECTS Course description

Subject:	**Geotechnics I**	**Subject code:**	**NGB_SE005_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Róbert Szepesházi, Dr.	**Language:**	Hungarian
Email:	szepesr@sze.hu	**Term:**	spring
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

Structure and materials of the Earth. Rock classification. Processes and their effects on the Earth crust. Fundamentals of hydrology and hydrogeology. History of the Earth. Owerview of the geology of Hungary. Properties of the soil components, soil structure and composition. Soil classification. Water flow in soils and their effects. Fundamentals of hydraulics. Hydraulic properties of soils. Darcy law. Modelling and solution of seepage problems. Capillarity, thermoosmosis, electroosmosis. Soil freezing. Volume change due to water moving. Rudiments of strength of materials applied in soil mechanics. Characteristics of the mechanical behaviour of soils. The interpretation of soil stresses. Initial soil stresses and the memory of soils. The importance of the water movements due to soil loading. The effects of the stress and strain conditions on soil behaviour. Analysis and testing of soil failure and plasticity. Shear strength characteristics of soils. Testing of the soil shear strength. Modelling of soil deformability: compression and consolidation. Testing of deformability. Advanced models for complex description of mechanical behaviour of soils.

Recommended material

Szepesházi R.: Geotechnika. SZIF-UNIVERSITAS, Győr, 2000.
Szepesházi R.: Geotechnikai példatár. Tankönyvkiadó, Budapest, 1996.
Kézdi Á.: Talajmechanika I. Tankönyvkiadó, Budapest, 1977.
MSZ ENV 1997-1 Geotechnikai tervezés. 1. rész: Általános szabályok
MSZ ENV 1997-2 Geotechnikai tervezés. 2. rész: Tervezés laboratoriumi vizsgálatok alapján
MSZ ENV 1997-3 Geotechnikai tervezés. 3. rész: Tervezés helyszíni vizsgálatok alapján

ECTS Course description

Subject:	**Geotechnics II**	**Subject code:**	**NGB_SE005_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Szepesházi, Dr.	**Language:**	Hungarian
Email:	szepesr@sze.hu	**Term:**	autumn
Pre-study requirements:	Geotechnics I	**Assessment:**	exam

Description of the subject

Earth pressure: types, calculation principles and methods. Earth pressure theory of Coulomb and Rankine. Principles and methods of slope stability analysis. Bearing capacity of shallow foundations. Basic methods of settlement calculation. Methods for consolidation assesment. Estimation of other soil movements. Elastic bedding calculation according to Winkler. Solution of general earth static problems using FEM computation programs. Principles, considerations, requirements and methods of foundation design. Shallow foundation types and selection. The design requirements and methods of shallow foundations. Earth static design: bearing capacity and settlement. Static design: structural suitability and stability. Execution and monitoring of shallow foundations. Functions, types and classification of pile foundations. Elements and typical examples of piling technologies. Design of pile foundations. Pile bearing capacity estimation.

Recommended material

Szepesházi R.: Geotechnika. SZIF-UNIVERSITAS, Győr, 2000.
Szepesházi R.: Geotechnikai példatár. Tankönyvkiadó, Budapest, 1996.
MSZ ENV 1997-1 Geotechnikai tervezés. 1. rész: Általános szabályok
MSZ EN 1536 Speciális mélyépítési munkák. Fúrt cölöpök
MSZ EN 12699 Speciális mélyépítési munkák. Talajkiszorításos cölöpök
MSZ EN 14199 Speciális mélyépítési munkák. Mikrocölöpök

ECTS Course description

Subject:	**Geotechnics III**	**Subject code:**	**NGB_SE005_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Szepesházi, Dr.	**Language:**	Hungarian
Email:	szepesr@sze.hu	**Term:**	spring
Pre-study requirements:	Geotechnics II	**Assessment:**	exam

Description of the subject

Types and applications of retaining structures. Supporting systems, sheet pile walls, diaphragm walls, concrete pile walls. Anchors. Gravity, butress, crib, gabion, reinforced earth walls, soil nailings: structures and construction technologies. Design requirements and methods of retaining structures. Functions, types and characteristics of earth structures. Elements, tools and technologies of earth works. Materials, quality and volume of earth works. Design of earth constructions. Aims, applications and methods of soil improvement technics. Injections, dewaterings and reinforcement of soils. Use of geosynthetics: products, properties, functions and applications. Functions, structures and execution of underground buildings. “Cut and cover” methods. Protection against ground water. Tunneling methods: NATM and TBM. Preparing of geotechnical design and construction. Soil exploration and field tests. Geotechnical services and documents: soil investigation and testings, reports, expertises, design draws and reports, monitoring. The regulation of the geotechnical activities.

Recommended material

Szepesházi R.: Geotechnika. SZIF-UNIVERSITAS, Győr, 2000.
Szepesházi R.: Geotechnikai példatár. Tankönyvkiadó, Budapest, 1996.
MSZ ENV 1997-1 Geotechnikai tervezés. 1. rész: Általános szabályok
ÚT 2-1.222 Utak geotechnikai tervezésének általános szabályai
MSZ EN 1537 Speciális mélyépítési munkák. Talajhorgonyok
MSZ EN 1538 Speciális mélyépítési munkák. Résfalak
MSZ EN 12715 Speciális mélyépítési munkák. Talajszilárdítás

ECTS Course description

Subject:	**Geotechnics IV**	**Subject code:**	**NGB_SE005_4**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Szepesházi, Dr.	**Language:**	Hungarian
Email:	szepesr@sze.hu	**Term:**	autumn
Pre-study requirements:	Geotechnics III	**Assessment:**	exam

Description of the subject

Geology of Hungary. Special field and laboratory soil tests. Design of beam and plate foundations. Special problems of pile foundations design. Static and dynamic pile load tests. Design of embedded and anchored retaining structures. Analysis and increase of slope stabilty. Design and execution of dam foundation: dangers, design, execution and monitoring. Special soil improvement technologies: deep vibration, stone columns, dynamic consolidation, dynamic replacement, jet grouting, deep mixing, micropiling, vacuum consolidation. Design of soil reinforcement: slopes, retaining structures, dam foundations, reinforcing of subgrades, erosion protection. Special problems of earth structures; design and execution. Dewatering. Waste disposals. Soil pollution problems. Special problems of bridge foundations. Abutment structures. Supports in water. Special methods in tunneling and construction of other underground structures. Damages originated from subsoil: measuring and assement of movements. Standardisation in geotechnics.

Recommended material

Szepesházi R.: Geotechnikai példatár. Tankönyvkiadó, Budapest, 1996.
ÚT 2-1.222 Utak geotechnikai tervezésének általános szabályai
MSZ EN 1536 Speciális mélyépítési munkák. Fúrt cölöpök
MSZ EN 12699 Speciális mélyépítési munkák. Talajkiszorításos cölöpök
MSZ EN 12716 Speciális mélyépítési munkák. Jet-habarcsosítás

ECTS Course description

Subject:	**History of Architecture I**	**Subject code:**	**NGB_EV003_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Themes of interdisciplinary architecture. Survey of buildings and surroundings. The message of architecture. Connection between time and architecture. World modelling and reflections. Systematic research: description and interpretation. History of ancient architecture in the East. Megalithic Architecture. Parallels between the ancient and contemporary architecture.

Recommended material

Pevsner, Nikolaus: Az európai építészet története.
Winkler Gábor: Építészettörténet I. (electronic textbook)
Szentkirályi Zoltán: Az építészet világtörténete.
Hajnóczi J. Gyula: Az építészet története, Ókor I.
Vitruvius: Tíz könyv az építészetről.
Moskovszky Éva: Sors és játék – A táblás játékok eredet és őstörténete

ECTS Course description

Subject:	**History of Architecture II**	**Subject code:**	**NGB_EV003_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	autumn
Pre-study requirements:	History of Architecture I	**Assessment:**	exam

Description of the subject

Architecture in the Ancient Greece: parallels and influences in the ancient Rome culture and in the provinces. Architecture and Christianity. New types of buildings, importance of functionalism and construction. Homes and common buildings. The rule and importance of the Byzantine architecture.

Recommended material

Pevsner, Nikolaus: Az európai építészet története.
Winkler Gábor: Építészettörténet I. (electronic textbook)
Szentkirályi Zoltán: Az építészet világtörténete.
Hajnóczi J. Gyula: Az építészet története, Ókor II.
Vitruvius: Tíz könyv az építészetről.

ECTS Course description

Subject:	**History of Architecture III**	**Subject code:**	**NGB_EV003_3**
Credits:	2	**Lessons per week:**	2
Teacher:	Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	spring
Pre-study requirements:	History of Architecture II	**Assessment:**	exam

Description of the subject

Early Christian architecture: relationship between ancient Roman and Byzantine architecture. The rule of Ravenna. Basilica: space and covering. Gothic constructions and decorations. Local styles. Court architecture – surviving of the architecture of towns. Characterizing and analyzing of historic buildings: masses, elevations. Parallelism in the architecture history

Recommended material

Pevsner, Nikolaus: Az európai építészet története.
Winkler Gábor: Építészettörténet I. (electronic textbook)
Szentkirályi Zoltán: Az építészet világtörténete.
Koch, Wilfried: Építészeti stílusok.

ECTS Course description

Subject:	**History of Architecture IV**	**Subject code:**	**NGB_EV003_4**
Credits:	2	**Lessons per week:**	2
Teacher:	Gábor Winkler, Dr., Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	autumn
Pre-study requirements:	History of Architecture III	**Assessment:**	exam

Description of the subject

Renaissance. The model of ideal town. Regular central structures. Late Renaissance and Mannerism. Links between Gothic and Baroque. Comeback in the landscape. Axis and moving in the space. Connection between constructing and composition. Start of Historism.

Recommended material

Pevsner, Nikolaus: Az európai építészet története.
Winkler Gábor: Építészettörténet I. (electronic textbook)
Sisa József - Wiebenson, Dora: Magyarország építészetének története.
Szentkirályi Zoltán: Az építészet világtörténete.
Koch, Wilfried: Építészeti stílusok.
Palladio, Andrea: Négy könyv az építészetről.

ECTS Course description

Subject:	**History of Architecture V**	**Subject code:**	**NGB_EV003_5**
Credits:	2	**Lessons per week:**	2
Teacher:	Gábor Winkler, Dr., Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	spring
Pre-study requirements:	History of Architecture IV	**Assessment:**	exam

Description of the subject

The periods of Historism. Architecture in the late 19th and early 20th century. Alternative efforts: Expressionism and Rationalism. Art Nouveau, Jugendstil, Secession and Art Deco. The Early Modern Movement. Architecture of Dictatorships: Fascism, Socialist Realism, Concrete-Classicism. Continuity of Historism: romantic, national and vernacular movements.

Recommended material

Pevsner, Nikolaus: Az európai építészet története.
Winkler Gábor: Építészettörténet I. (electronic textbook)
Sisa József - Wiebenson, Dora: Magyarország építészetének története.
Szentkirályi Zoltán: Az építészet világtörténete.
Kalmár Miklós: Historizmus, századforduló.

ECTS Course description

Subject:	**History of Architecture VI**	**Subject code:**	**NGB_EV003_6**
Credits:	2	**Lessons per week:**	2
Teacher:	Gábor Winkler, Dr., Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	autumn
Pre-study requirements:	History of Architecture V	**Assessment:**	exam

Description of the subject

Architecture in the first decade of the 20th century. Regulation in the Architecture and Urbanism. Architecture at the end of the 20th century and at the beginning of the 21st century. Industrialization in architecture. Devaluation of modern ideas. Revolution of building constructors: "concrete sculptors", rebirth of Expressionism. Philosophy and directions of the Post-modern period. Historic citations, organic shapes, high-tech architecture. Influence of globalization in contemporary architecture. Perspectives of the architectural development.

Recommended material

Vámossy Ferenc: A modern mozgalom és a későmodern.
Winkler Gábor: Építészettörténet.
Sisa József - Wiebenson, Dora: Magyarország építészetének története.
Szentkirályi Zoltán: Az építészet világtörténete.
Bonta János: A modern építészet 1911-2000.

ECTS Course description

Subject:	**History of Art**	**Subject code:**	**NGB_EP006_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Imre Tolnay, DLA	**Language:**	Hungarian
Email:	itolnay@gmail.com	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The main objective is to teach students to adopt their profession to visual culture, getting acquainted with its connections, forming their styles and general knowledge. The subject introduces students to the system of arts, presenting the classes of arts and testing methods. The main periods of art history, significant characteristics and works. It examines the changes in the relations of different art branches and visual expression forms, connections and remarkable products.

Compulsory material

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Recommended material

Szabó Attila: Művészettörténet vázlatokban, Művészettörténet képekben.
Tolnay Imre DLA: Művészettörténet HEFOP elektronikus jegyzet.

ECTS Course description

Subject:	**History of Education and Pedagogy**	**Subject code:**	**NGB_MT001_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Attila Mészáros, Dr.	**Language:**	Hungarian
Email:	meszaros@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

General description of education in ancient and medieval times. Ecclesiastical and secular education. Pedagogical aims of the renaissance period, child image and educational principles. The pioneer of civil pedagogy: Comenius. The prominent figure of Hungarian pedagogical history: János Apáczai Cs. Main pedagogical trends in the age of enlightenment, pedagogical ideas: Locke, Rousseau, Pestalozzi. The establishment of public education. The roots of Hungarian vocational training. The reforms of Sámuel Tessedik. The educational law of 1868 and its effects on the development of pedagogy. Contemporary alternative pedagogical schools and their representatives. Improvement of the Hungarian educational system, regulations, legal frames. The educational culture of the European Union.

Recommended material

1. Sipőcz László : Neveléstörténet (főiskolai jegyzet). Universitas-Győr Kht, Győr, 2006.
2. Mészáros István-Németh András-Pukánszky Béla: Bevezetés a pedagógia és az iskoláztatás történetébe. Osiris Kiadó, Bp., 2000.
3. Benedek András: Változó szakképzés. OKKER, Bp, 2003.
4. Pukánszky Béla-Németh András: Neveléstörténet. Nemzeti Tankönyvkiadó, Bp., 1996.
5. Czike Bernadett : Bevezetés a pedagógiába (Szöveggyűjtemény). Eötvös J. Könyvkiadó, Bp., 1996.
6. Orosz Lajos: Magyarországi ipari, mezőgazdasági és kereskedelmi szakoktatás vázlatos története. OPKM, Bp., 2001.

ECTS Course description

Subject:	**History of Engineering**	**Subject code:**	**NGB_KO016_1**
Credits:	2	**Lessons per week:**	2
Teacher:	András Katona, Dr., István Szily, Dr.	**Language:**	Hungarian
Email:	szily@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
The subject provides students with an overview of the history of different engineering fields in order to improve their technological culture knowledge.			
Recommended material			
Katona András (ed.): Válogatott fejezetek a technika történetéből. Books and journals suggested by the teacher.			

ECTS Course description

Subject:	**History of Physics**	**Subject code:**	**NGB_FI005_1**
Credits:	2	**Lessons per week:**	2
Teacher:	András Horváth, PhD	**Language:**	Hungarian
Email:	horvatha@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The place of nature sciences in ancient thinking (mathematics, mechanics). Mechanics before Newton. Main results of astronomy in the ancient and medieval times. Mechanics of Newton. The birth of special and general relativity theory and its main results, interpretation problems. Development of classic electrodynamics, evolution of adaption. Development of quantum mechanics, basics of experiments, its effect on nature philosophy. The history of utilisation of atomic energy and radioactivity. The cognition of the state of the Universe (ancient theories, models of development of the solar system, universe models).

Recommended material

Simonyi István: A fizika kultúrtörténete (Gondolat kiadó, 1985).
Roger Penrose: A császár új elméje.
George Gamow: Tompkins úr kalandjai a fizikával.

ECTS Course description

Subject:	**History of Transport**	**Subject code:**	**NGB_KO015_1**
Credits:	2	**Lessons per week:**	2
Teacher:	András Katona, Dr., István Szily, Dr.	**Language:**	Hungarian
Email:	szily@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
The subject provides students with an overview of the history of different transport sectors in order to improve their transport culture knowledge.			
Recommended material			
Katona András (ed.): Válogatott fejezetek a közlekedés történetéből. Books and journals suggested by the teacher.			

ECTS Course description

Subject:	**Hydraulic Engineering I**	**Subject code:**	**NGB_ET008_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Koch	**Language:**	Hungarian
Email:	koch@sze.hu	**Term:**	Spring
Pre-study requirements:	Mathematics II	**Assessment:**	exam

Description of the subject

Overview of basic characteristics of water. Hydro meteorological phenomena. Elements of hydrological cycle (rainfall, evaporation etc.) and their examination. Water flows, classification of water systems, characterisation of water movements in courses. Deposit movements, course evolution. Dead-waters. Subsurface waters. Hydrological measurements. Examinations of hydrological data rows and their characteristics. Hydrological definition of water supply management. Water demand, water use, water balance. Ideology of water supply management, its role in natural resource management (quantity, quality). Tasks and sub-branches of water supply management. History and recent policies of water supply management. Water administration. Water supply policy. Water collector management design. Effect of human intervention on natural water balance. Water quality protection.

Recommended material

Petróczky F.: Hidrológia SZIF, Győr, 2002.
Petróczky F.: Hidraulika (elektronikus jegyzet) SZE, Győr, 2006.
Víz-keretirányelv, 2000/60/EK.
Chin, David A.: Water-resources Engineering.

ECTS Course description

Subject:	**Hydraulic Engineering II**	**Subject code:**	**NGB_ET008_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Koch	**Language:**	Hungarian
Email:	koch@sze.hu	**Term:**	autumn
Pre-study requirements:	Mathematics II, Physics	**Assessment:**	exam

Description of the subject

Physical characteristics of water. Basic equation of hydrostatics and its application. Determination of water pressures. Types of liquid movements, principle of continuity. Euler's law. Bernoulli's law and its practices. Speed distribution and energy losses. Channel dimensioning, surface curves. Water movement in pipeline, pipeline dimensioning. Dimensioning of water engineering structures. Hydraulics of leakage. Numeric methods in hydraulics. Application of hydraulic programs. Branches of practical water supply management. Hydraulic engineering tasks. River and lake regulations, river management. Flood control. Water management in highlands. Stream regulation. Water management in flatlands: excess water control, inland water drainage. Artificial lakes. Water power utilisation. Water barrages. Water routes and their facilities.

Recommended material

Petróczky F.: Vízépítés. SZIF-UNIVERSITAS Kft. Győr, 2001.
Chin, David A.: Water-resources Engineering.

ECTS Course description

Subject:	**Hydraulic Engineering III**	**Subject code:**	**NGB_ET008_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Róbert Koch	**Language:**	Hungarian
Email:	koch@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics II	**Assessment:**	exam

Description of the subject

Public utility types and systems. Public utility demands and their satisfaction. Possible location of public utilities. Water supply system and its technical equipment. Water gaining, water treatment, operation. Sewage and placement, engineering structures. Sewage treatment. Other public utilities and their equipment: gas supply, heat supply, electric and information cables, special services. General methods of public utility construction. Overview of public utility construction. Pipe laying in open ditch. Public utility construction without excavation. Public utility tunnels. Operational issues of public utilities. Protection, repair and renewal of public utilities. Administration and approval issues of public utilities.

Recommended material

Petróczky F.: Közműépítés. UNIVERSITAS−Győr KHT, Győr, 2004.
Chin, David A.: Water-resources Engineering.

ECTS Course description

Subject:	**Immission Mapping - Noise**	**Subject code:**	**NGB_KM020_1**
Credits:	6	**Lessons per week:**	6
Teacher:	Bedő Anett	**Language:**	Hungarian
Email:	bedoa@sze.hu	**Term:**	autumn
Pre-study requirements:	Noise, Vibration and Radiation Protection	**Assessment:**	continuous assessment

Description of the subject

The mapping work is completed in small groups through project tasks. The work starts with the preparation of the digital map of a given area for noise mapping (on-site measurements, controls). In the next phase the data collection of noise sources is carried out (traffic count, noise measurement, noise emission calculations). Then students get to know the IMMI noise mapping software, and finally on the basis of their own data the noise maps are prepared.

Recommended material

Bedő Anett: Zajtérképek készítése. Oktatási segédlet, 2009.
Bite Pálné dr.-Bite Pál: Zajtérkép-készítési tapasztalatok Budapest XI. kerületére. Közúti és mélyépítési szemle, 54. Évfolyam, 4. Szám, Bp.
Bite Pálné dr.-Bite Pál: Az EU zajvédelmi irányelveinek érvényesítése a hazai közúti gyakorlatban. Közúti és mélyépítési szemle, 53. Évfolyam, 11. Szám, Bp. 2003.

ECTS Course description

Subject:	**Industrial and Agricultural Building Design**	**Subject code:**	**NGB_ED006_1**
Credits:	2	**Lessons per week:**	2
Teacher:	József Fodróczy	**Language:**	Hungarian
Email:	fodroczy@dimenzio.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The purpose of this subject is to introduce students to industrial and agricultural architecture and to improve their professional skills. Principles are illustrated with practical examples, existing buildings and structures. The topics of the lectures are Hungarian and foreign examples as illustration. The role and significance of industrial architecture. The process of design, technology. Site selection, transportation and communication. Size coordination. Development plan of a small industrial plant. Environmental protection. The significance of constructions in industrial architecture. Loads, foundation, waterproofing. Halls with/without crane. Skeleton system, topmost floors, skylights. External walls, special doors and windows. Crane-track, floors. Multi-storey buildings, frames, floor structures. Fire-protection problems. History of agriculture and ethnography in Hungary until 1960. Architectural relics of Hungarian villages and farmsteads. Forms of agricultural production. Rural house. Smallscale agricultural production in residential and suburban areas. Design of agricultural settlements. Establishment of farms within a settlement and in the outskirts, construction methods, Hungarian and foreign examples. Environmental protection in agriculture, ecological approach in agricultural architecture. Problems of the site plan, materials and constructions of agricultural plants. Buildings of cultivation, storage and processing of plants. Buildings of animal husbandry: design of buildings for cattle, hog and horse raising, for the breeding of sheep and small animals and for the rearing of poultry. Modernisation and re-utilisation of agricultural plants. The role of architects in shaping villages and agricultural architecture.

Compulsory material

Munkahelyek építészete (szerk.: Lázár Antal)
Reischl Gábor: Gazdálkodó építészet

Recommended material

Bachman és szerzőtársai: Könyv az építészetről – A tervezés gyakorlata I. JPTE University Press, Pécs.

ECTS Course description

Subject:	**Informatics I**	**Subject code:**	**NGB_SZ003_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Gábor Kallós, Dr., Antal Pukler	**Language:**	Hungarian
Email:	kallos@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The structure of personal computers, hardware elements. Operation systems, directories and files organization, file manager programmes. Networks, network operating systems. Internet, application softwares. History, requirements and operations of word processing. The raw text input and correction. Removing and exchange of unnecessary and wrong characters, spelling check. Format levels, formatting. Elements of the document, advanced options: sorting, calculations and fields. Conversion, macros in Word. Image-editing programs, basic image correction. Advanced image editing. The professional desktop publishing concepts, tools. Preparing presentations, concepts. The use of Power Point, the structure of slides, projection. The process of creating presentation, special effects, images, videos.

Recommended material

Fehérvári-Kallós-Kuti: Informatika II – Irodai modul. HEFOP jegyzet, SZE.

ECTS Course description

Subject:	**Informatics II**	**Subject code:**	**NGB_SZ003_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Miklós Szörényi, Dr.	**Language:**	Hungarian
Email:	szorenyi@sze.hu	**Term:**	spring
Pre-study requirements:	Informatics I, Mathematics I	**Assessment:**	exam

Description of the subject

Basics of spreadsheets: move, select, copy. Data entry, editing, formatting. Title references: absolute, relative, attachment. Data types, storage accuracy and presentation formats, conversions, operations, functions. The use of functions. Mathematical, logical, text editing, conversional, statistical functions. Formatting (also conditional), diagrams, function display. Use of query functions. Table as a database. Sorting, filter and database management. Database entry forms, controls. Equation results: target search, fix point iteration. Non-linear equation systems, recursive sequences. Linear algebraic problems. Matrices, vectors. Regression tasks. Statistical data procesing: experimental characteristics, display, histogram, hypothesis. Getting to know the symbolic mathematical tools. Introduction to MATLAB, variables and expressions. Basics of programming, graphics.

Recommended material

Fehérvári-Kallós-Kuti: Informatika II – Irodai modul. HEFOP-os jegyzet, SZE.
Stoyan Gisbert: Matlab. Typotex, 2008.

ECTS Course description

Subject:	**Information Society**	**Subject code:**	**NGB_TT007_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Bugovics, Dr.	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Information society. Mediated world. Information inequality, the gossip. The social stratification of information. The process of cultural conditioning. Data in Hungary and in the European Union. Postmodern society. Information in the point of view of communication theory. Information society and Internet.

Recommended material

Bugovics Zoltán: A Torz(ító)szülött, Gondolat Kiadó Bp., 2004.
Manuel Castells: A hálózati társadalom kialakulása (Az információs korszak I.) Bp., Gondolat, 2005.
Z. Karvalics László: Az információs társadalom keresése. Bp., Aula, 2002.
Castells, Manuel: The information age: economy, society and culture Malden, Oxford, Blackwell Publishers, 1999.
William, Martin J.: The global information society, Aldershot, 1995.

ECTS Course description

Subject:	**Information Systems in Passenger Transport**	**Subject code:**	**NGB_KO030_1**
Credits:	6	**Lessons per week:**	4
Teacher:	Balázs Horváth, Dr.	**Language:**	Hungarian
Email:	hbalazs@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Informatics	**Assessment:**	continuous assessment

Description of the subject

The aim of the subject is tho show the general and complex information systems helping the work of passenger transport. It deals with the structure, operation and development of these kinds of systems. It focuses on existing, well working information systems

Recommended material

Oláh F. – Horváth B. – Horváth R.: Közúti információs rendszerek, SzIF Universitas Győr, 2001.
Current papers from the literature
Articles from journals: Városi közlekedés, Közlekedéstudományi Szemle

ECTS Course description

Subject:	**Intermediate Exam Preparatory Course I**	**Subject code:**	**NGB_IT001_1**
Credits:	0	**Lessons per week:**	4
Teacher:	Katalin Varga	**Language:**	English
Email:	kathykis@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The aim of the course is to prepare students for the intermediate general English exam. To help students acquire the ability to speak effectively in English in real-life situations. To help them understand written texts and interpret their content. To enable students to write letters in formal and informal situations. The course focuses on the major grammatical categories and prepares students to identify them in exam exercises.

Recommended material

Péter Dohár: Kis Angol Nyelvtan – Internet.
Authentic exam materials

ECTS Course description

Subject:	**Intermediate Exam Preparatory Course II**	**Subject code:**	**NGB_IT001_2**
Credits:	0	**Lessons per week:**	4
Teacher:	Katalin Gibicsár	**Language:**	English
Email:	gibicsark@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Intermediate Exam Prep. Course I	**Assessment:**	continuous assessment
Description of the subject			
The aim of the course is to prepare students for the intermediate general English exam. To help students acquire the ability to speak effectively in English in real-life situations. To help them understand written texts and interpret their content. To enable students to write letters in formal and informal situations. The course focuses on the major grammatical categories and prepares students to identify them in exam exercises.			
Recommended material			
Péter Dohár: Kis Angol Nyelvtan – Internet. Authentic exam materials			

ECTS Course description

Subject:	**Labour Safety**	**Subject code:**	**NGB_AG008_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Dr Bukoveczky György	**Language:**	Hungarian
Email:	buky@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Some economical aspects of labour safety. Development and conceptual class of labour safety. Labour security, labour public health, ergonomics. Labour safety in European Union. Law harmonization in Hungary. Regulations of non health endangering and safe work. Handling of workplace risks. Labour safety related obligations of employer. Means of labour safety. Accident, work accident, occupational disease, compensation. Prevention of work accidents.			
Compulsory material			
Dr Kósa Csaba: A munkavédelem alapjai. BDMF, Bp. 1994.			
Recommended material			
Related domestic and EU regulations			

ECTS Course description

Subject:	**Legal Studies**	**Subject code:**	**NGB_JE002_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Edit Vigh, Csaba Vándor	**Language:**	Hungarian
Email:	vandor@sze.hu, vighe@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Introduction into Legal Theory, Hungarian Constitutional System, International Law, Civil Law, Labour Law. Students get acquainted with the Hungarian legal system. They get an insight view of public law, they study the structure of Hungarian state institutions. In the other half of the semester the students learn about the Hungarian civil law and its institutions.			
Recommended material			
Gábor Halmai, László Szalay: Legal Studies 1. Fundamentals of Public Law. Bp. Rejtjel, 2002. Barnabás Lenkovics: Legal Studies 2. Fundamentals of Private Law. Bp. Rejtjel, 2003.			

ECTS Course description

Subject:	**Logistics I**	**Subject code:**	**NGB_LO001_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Péter Németh, Zoltán Nagy	**Language:**	Hungarian
Email:	nemethp@sze.hu	**Term:**	autumn
Pre-study requirements:	Mathematics III	**Assessment:**	exam

Description of the subject

Concept, subject, history and development of logistics. Today's approach of logistics, its relation to other functions, its subplots and tools. Basics and tasks of purchasing logistics. Relationship between purchasing logistics and other activities of the company. Basics of inventory management. Conflicts in inventory management. Definition of economical order quantity, inventory systems. Estimation and determination of consumer needs. Basics of production logistics, product design, production design. Production control, BOM (Bill of Materials), MRP I. (Material Requirement Planning) and MRP II. (Manufacturing Resource Planning). JIT (Just in Time) and other production methods. Basics of distribution logistics, distributional channel network. Basics of material handling and transport, route types, global indicators. Quality indicators of material handling and transport, measuring efficiency.

Recommended material

Logisztika I–II. Edited by Földesi Péter (Units 1-4)
Logisztika I. Editor: dr. Prezenszki József. BME Mérnöktovábbképző Intézet
Szegedi Zoltán, Prezenszki József: Logisztika-menedzsment. Kossuth Kiadó, 2008

ECTS Course description

Subject:	**Logistics II**	**Subject code:**	**NGB_LO001_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Zoltán Nagy	**Language:**	Hungarian
Email:	nagyz@sze.hu	**Term:**	spring
Pre-study requirements:	Logistics I	**Assessment:**	exam

Description of the subject

Waste treatment logistics, relationship between waste treatment and distribution. Logistics trade-offs, strategies, searching for compromises in logistics. Major strategic problems of logistical management. Assessment of client needs. Length of transportation time. Production design. Measurement of efficiency of logistical strategies. Inventory management. Types and aims of stocks. Unwanted stocks. Stock types, ordering cycles, stock supplement. Stock supplement systems. Versions of stock supplement systems. Costs of stocks system. Calculation of ordering item. Goods transporting systems. Transporting chains. Vehicular division of labour in goods transport. Load units in goods transport. Traditional goods transport systems. The road goods transport. Types and features of loads. Water and air freight. Combined freight systems. International traffic, vehicular division of labour. Storage and material, definitions and aims. Assessment of material handling and storage systems. Elaborate possible versions. implementation. Operation of storage systems. Centralization or decentralization.. Procedure of commission. Importance and role of packaging. Practical transportation packaging. Informatics of logistical systems.

Recommended material

Logisztika I–II. Edited by Földesi Péter (Units 5-11)
Logisztika I. Editor: dr. Prezenszki József. BME Mérnöktovábbképző Intézet
Szegedi Zoltán, Prezenszki József: Logisztika-menedzsment. Kossuth Kiadó, 2008

ECTS Course description

Subject:	**Logistics Project**	**Subject code:**	**NGB_LO010_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Csaba Tápler, Tamás Hartványi, Dr., Péter Németh	**Language:**	Hungarian
Email:	tapler@sze.hu	**Term:**	spring
Pre-study requirements:	Transport Economics I, Material Handling and Storage I	**Assessment:**	project work

Description of the subject

In the key areas of logistics, such as packaging investigation, packaging design, distribution network, store establishment, store design, supply chain technology, etc. students will receive a personalized task, which is to be developed independently with training support.

Recommended material

Bodnár István: Adatbázis-kezelés. Kiskapu Kiadó, 2003.
Bártfai Barnabás: Access 2003 zsebkönyv. BBS-INFO Kiadó, 2007.
Czenky Márta: Access programozás. Computer Books, 2007.

ECTS Course description

Subject:	**Machine Elements of Vehicles**	**Subject code:**	**NGB_AG005_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Gáborné Kovács	**Language:**	Hungarian
Email:	kgaborne@sze.hu	**Term:**	spring
Pre-study requirements:	NGB_AG003_1	**Assessment:**	exam

Description of the subject

The aim of the subject is to give an adequate knowledge in field of design, function, assembling and dimensioning of specific elements of machine constructions used in transportation. Based on the project work to acquire the ability and skill in working up of part tasks of design process.

Compulsory material

Zsáry Árpád: Machine Elements I. House of coursebook publishing, 1989.(in Hungarian)
Zsáry Árpád: Machine Elements II. House of coursebook publishing, 1991. (in Hungarian)

Recommended material

Suggested current MSZ ISO standards.
Wilhelm Matek-Dieter Muhs-Herbert Wittel-Manfred Becker: Roloff/Matek Maschinenelemente. Vieweg Fachbücher der Technik 1994.

ECTS Course description

Subject:	**Management of Customer Services**	**Subject code:**	**NGB_KO014_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Attila Rixer, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The subject presents how to build, maintain and develop long-term quality supplier-customer relations by presenting the professional management of customer service tasks.

Recommended material

Rixer Attila, Veres Zoltán: Szolgáltatások minőségbiztosítása (KO0071).
Veres Zoltán: Szolgáltatásmarketing, Műszaki Könyvkiadó, Budapest, 2001.
Materials provided by the teacher and available on the homepage of the department.
Selected volumes and articles of Minőség és megbízhatóság, Közlekedéstudományi Szemle, Városi Közlekedés, Magyar Minőség, Minőségirányítás, műszaki ellenőrzés, Vállalatirányítás, Nemzetközi marketing (OMIKK MIMGI).

ECTS Course description

Subject:	**Material Handling and Storage I**	**Subject code:**	**NGB_LO006_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Péter Böröcz	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Main concepts related to material handling, basic relationships. Description of materials to be moved. Basics of packaging. Stresses on the materials, material handling equipment and machinery, main types. Material handling process analysis and planning, workplace layout methods. Rail and road transfer sites, construction and equipment. Main variants of combined transit, container freight. Concepts of storage technology, stock classification. Warehouse and storage installation, storage methods, technology of transport stocks. Bulk material storage and loading.

Recommended material

Pánczél - Böröcz: Anyagmozgatás, raktározás. Universitas-Győr Kht., Győr, 2008.
Dr. Felföldi László (fôszerk.): Anyagmozgatás kézikönyv. Műszaki Könyvkiadó, Bp. 1975
Hans-Jürgen Zebisch: Anyagmozgatás (röviden és tömören). Műszaki Könyvkiadó, Bp. 1975

ECTS Course description

Subject:	**Material Handling and Storage II**	**Subject code:**	**NGB_LO006_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Zoltán Pánczél, Dr.	**Language:**	Hungarian
Email:	panczelz@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The role of warehousing in logistics. Storage systems (in particular the pieces-stores, aisle). Storage process, warehouse management. Design stores.

Recommended material

Pánczél - Böröcz: Anyagmozgatás, raktározás. Universitas-Győr Kht., Győr, 2008.
Dr. Felföldi László (fôszerk.): Anyagmozgatás kézikönyv. Műszaki Könyvkiadó, Bp. 1975
Hans-Jürgen Zebisch: Anyagmozgatás (röviden és tömören). Műszaki Könyvkiadó, Bp. 1975

ECTS Course description

Subject:	**Mathematics I. Analysis**	**Subject code:**	**NGB_MA002_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Csaba Gáspár, Dr.	**Language:**	Hungarian
Email:	gasparcs@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Basic definitions of fucntsion, further definitions. Elementary functions and tehir properties. Sequences and series. Limit and continuity of real functions. Differential quotient and its geometrical meaning. Application of differentiation: tangent lines, approximation of functions, analysis of functions with respect to monotonicity, convexity. Applications to real life and engineering problems: finding extremal values. Taylor polynomials and series. Integration: motivation, definitions. Methods of integration, Newton-Leibniz rule. Approximate integration. Applications: area, volume, surface, arc length calculation.

Recommended material

Ács László, Gáspár Csaba: Analízis I. Széchenyi István Egyetem, 2004. (electronic textbook)
Császár Ákos: Valós analízis I. Nemzeti Tankönyvkiadó, 1999.
Kovács József, Takács Gábor, Takács Miklós: Analízis. Nemzeti Tankönyvkiadó, 2001.

ECTS Course description

Subject:	**Mathematics II. Linear Algebra**	**Subject code:**	**NGB_MA002_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Klára Szabó Simonné	**Language:**	Hungarian
Email:	simonne@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics I	**Assessment:**	exam

Description of the subject

Geometrical vectors in plane and space. Operations and their properties. Basis and coordinates. Computation of vector operations using coordinates. Applications: area, volume, distance, angle computations. Linear vector spaces: generalizations of geometrical vectors. Base, generator and independent system of vectors. Rank, dimension. Matrices, tensors: operations, Eigen values and eigencvectors. Definite matrices. Basic definitions of functions with several real variables. Graphs, elementary functions and their graphs. Partial differentiation: gradient, divergence and curl operators. Application of differentiation: the role of the gradient direction, function approximation, extremal values. Integration of scalar-vector functions.

Recommended material

Gáspár Csaba, Molnárka Győző: Lineáris algebra és többváltozós valós függvények. Széchenyi István Egyetem, 2005.
Scharnitzky Viktor: Vektorgeometria és lineáris algebra. Nemzeti Tankönyvkiadó Rt. 1999.

ECTS Course description

Subject:	**Mathematics III. Probability and Statistics**	**Subject code:**	**NGB_MA002_3**
Credits:	4	**Lessons per week:**	4
Teacher:	István Harmati	**Language:**	Hungarian
Email:	harmati@sze.hu	**Term:**	autumn
Pre-study requirements:	Mathematics II	**Assessment:**	exam

Description of the subject

Motivations. Basic definitions (event, probability). Properties and basic theorems of probability. Classical and geometrical computation of probability. Combinatorics. Conditional probability, independent events. Further theorems (Bayes). Random variables and their characterization: mean, deviation, distribution and density function. Independent variables. Special random variables and their appearance in practice. Motivations of statistics. Samples, data display, histograms. Summary statistics. Confidence intervals. Tests, correlation and regression.

Recommended material

Kiss Béla, Krebsz Anna: Valószínűségszámítás és matematikai statisztika. Széchenyi István Egyetem, Győr, 2005.

ECTS Course description

Subject:	**Mechanics I - Statics**	**Subject code:**	**NGB_SE001_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Gyula Agárdy	**Language:**	Hungarian
Email:	agardy@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Forces, force systems, substitution and balance problems. Reactions on simple structures. Reactions and connecting forces in compound structures. Solution methods of trusses. Trusses loaded on bar elements. Internal forces in cross sections. Diagrams of internal forces on straight-, broken-lined and complex frameworks. Internal force distributions under moving loads. Maximum internal force diagrams. Spatial forces, structures.

Recommended material

Göde F.-Lublóy L. Németh Gy.: Mechanika I. Statika (SZE jegyzet J 19336)
Agárdy Gy.-Molnár V.: Mechanikai példatár I. Statika (SZE jegyzet J 19 472)
Agárdy Gy.-Molnár V.: Mechanikai példatár I. Statika (SZE jegyzet J 19 472)

ECTS Course description

Subject:	**Mechanics II - Analysis of stress and strain**	**Subject code:**	**NGB_SE001_2**
Credits:	5	**Lessons per week:**	4
Teacher:	Gyula Agárdy	**Language:**	Hungarian
Email:	agardy@sze.hu	**Term:**	spring
Pre-study requirements:	Mechanics I	**Assessment:**	exam

Description of the subject

Characteristic properties of areas: centroid, first and second moments (inertial moments). Definition of the stress. Stress state, stress tensor. Principal stresses and axes. Cross-sectional stresses caused by simple loads: tension, compression, shear, bending, torsion. Definition of the strains. Strain state in a point, strain tensor. Principal strains. Constitutive equations, linearly elastic and materials. Elastic and plastic bearing capacity. Cross-sectional stresses caused by compound loads: biaxial bending, eccentric normal force, shear and bending. Linear theory of small displacements. Work and energy theorems. Deformation of frameworks.

Recommended material

Göde F.-Lublóy L. Németh Gy.: Mechanika II. Szilárdságtan, Kinematika, Kinetika (SZE jegyzet J 19 476)
Göde F.- Szécsi L.: M.: Mechanika példatár II.Szilárdságtan (SZE jegyzet J 19 477)
dr. Kalinszky S. - Kurutzné dr. Kovács M.: Mchanika. Elemi szilárdságtan (BME jegyzet)

ECTS Course description

Subject:	**Mechanics III - Indeterminate structures. Dynamics**	**Subject code:**	**NGB_SE001_3**
Credits:	5	**Lessons per week:**	4
Teacher:	Gyula Agárdy	**Language:**	Hungarian
Email:	agardy@sze.hu	**Term:**	autumn
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

Statically indeterminate structures. Concepts and methods of the solution. Force (flexibility) and displacement (stiffness) method. Application of the moment distribution (Cross) method for the solution of low-degree-of freedom structures with fixed and displaced nodes. Stability phenomena of bars and frameworks, Buckling of bars. Friction, the friction cone. Kinematics of particles. Kinetics of particles. The energy of particles. Kinematics and kinetics of rigid bodies. Single-degree-of-freedom undamped and damped vibration. Free and forced vibration of single-degree-of-freedom systems. Earthquake phenomena. Properties of earthquake effects to the structures. Dinamic properties of structures. Damages on steel frameworks and reinforced concrete buildings. Designing principles and construction rules for earthquake resistant buildings.

Recommended material

Vértes Gy._Györgyi J.: Mechanika.Kinematika-Kinetika (BME jegyzet)
Vértes Gy._Györgyi J-Wolf K..: Kinematika-Kinetika példatár (BME jegyzet)
Roller B._Árvai K.: Tartók statikája. Statikailag határozatlan tartók (BME jegyzet)
Göde F.-Lublóy L. Németh Gy.: Mechanika II. Szilárdságtan, Kinematika, Kinetika (SZE jegyzet J 19 476)
Vértes György: Építmények dinamikája (Műszaki könyvkiadó)

ECTS Course description

Subject:	**Mechanics - Dynamics**	**Subject code:**	**NGB_AG002_3**
Credits:	4	**Lessons per week:**	4
Teacher:	Zoltán Molnár, PhD	**Language:**	English
Email:	molnarz@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	NGB_AG002_1 Statics	**Assessment:**	exam

Description of the subject

Kinematics of particles. Displacement, velocity and acceleration. Motions of particles: linear and two-dimensional motions. Kinematics of circular motion and harmonical vibration. Inclined and vertical throw of particles. Kinematics of rigid bodies: velocity and acceleration. Compound pendulum and roling motion of a cylindrical body. Kinematics of relative motions of particles: velocity and acceleration relationships. Linear and angular momentums, kinetic energy, power and work of forces. Newton laws, D 'Alemebert principle of angular momentums, principle of energy and work. Free and constrained motions of particles, the Coulomb's friction law. Kinetics of relative motion of particles. The static moments and the moment of inertia of a body. Linear and angular momentums of rigid bodies, kinetic energy. Newton Euler equations, principle of work and energy for rigid bodies. Balancing of rotating bodies, impact of bodies.

Compulsory material

handouts

Recommended material

Beer, F.P.- Johnston, E.R.: Vector Mechanics for Engineers - Dinamics, McGraw-Hill, New York,1992.

ECTS Course description

Subject:	**Mechanics - Statics**	**Subject code:**	**NGB_AG002_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Zoltán Molnár, PhD	**Language:**	English
Email:	molnarz@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Statics of particles. Mechanical modeling, basic axioms. The definition of force, the resultant of the forces, equilibrium conditions. Moment of system of forces. Equilibrium of two-dimensional and three-dimensional system of forces. The principle of statics. Centre of gravity of lines, surfaces and volumes. Diagrams of internal forces of beams. Statically definite structures: structure of beams with three joints, Gerber's beam structure. Structure of trusses. The Coulomb's friction law. Problems involving dry frictions. Stability of equilibrium.

Compulsory material

handouts

Recommended material

Beer, F.P.- Johnston, E.R.: Vector Mechanics for Engineers - Statics, McGraw-Hill, New York,1992.

ECTS Course description

Subject:	**Microbiology**	**Subject code:**	**NGB_KM027_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Éva Rácz Pestiné, PhD	**Language:**	English, Hungarian
Email:	raczev@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Biology II	**Assessment:**	exam
Description of the subject			
The History and Scope of Microbiology. The Study of Microbial Structure: Microscopy and Specimen Preparation. Microbial Growth. The Viruses. Diseases Caused by Viruses. Microbial Taxonomy. Bacteria. Introduction to Bacteriology. Bacterial Diseases. Fungi. Algae. Microbial Ecology. Microbiology of Food. Industrial Microbiology and Biotechnology.			
Recommended material			
Slides, handouts			

ECTS Course description

Subject:	**Modelling in Transport Planning**	**Subject code:**	**NGB_KO017_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Balázs Horváth, Dr.	**Language:**	Hungarian
Email:	hbalazs@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Transport Planning	**Assessment:**	continuous assessment

Description of the subject

After a short theoretical introduction, students meet modern, computer-based transport planning systems and use them for modelling and solving actual transport problems. The subject presents at least two different purpose transport planning systems.

Recommended material

PTV AG: Visum User's Manual.
Actual issues of Városi Közlekedés and Közlekedéstudományi Szemle.

ECTS Course description

Subject:	**Modern Societies**	**Subject code:**	**NGB_TT006_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Gyula Szakál, Dr.	**Language:**	Hungarian
Email:	szakgy@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Community, society and people. Descriptive history of theories of modernity. Twentieth century vision of society. The foundation of modern societies in Europe. Historical regions of Europe, economic and social differences. The development of Hungarian society after the regime change. Economic policy actors. Historical roots of thinking and value change. Relationship of economy, society and values. Conflicts of modern societies. Social roles and patterns, the organizational forms of modern societies. The emergence of network society. The history and impact of cultural patterns today. National and regional societies, global society.

Recommended material

Anthony Giddens: Szociológia. Osiris, Budapest, 1995.
S.Nagy Katalin: Szociológia. Typotex, Budapest, 2006.
Szakál Gyula-A. Gergely András: Társadalmi tőke, karrieresélyek, viselkedésminták. MTA PTI, Budapest, 2004.

ECTS Course description

Subject:	**Noise, Vibration and Radiation Protection**	**Subject code:**	**NGB_KM015_1**
Credits:	6	**Lessons per week:**	6
Teacher:	Anett Bedő	**Language:**	Hungarian
Email:	bedoa@sze.hu	**Term:**	spring
Pre-study requirements:	Physics	**Assessment:**	exam

Description of the subject

Introduction to the physical features of sound waves, the most important definitions of acoustics, types of noise resources, noise spreading, evaluation and effects of noise. The process of hearing, the set-up of ear, physiological effect of noise. Resources and speciality of environmental noise, Hungarian and European legislation. Introduction to noise mapping. Measurement and calculation of noise. Protection against noise. Environmental vibration, sources of vibration, intensity of vibration, effects of environmental vibration (on humans and on buildings). Regulation. Measurement of vibration. Vibration spreading. Vibration insulation. Physical basics of radiation protection, X-ray and radiaoctive radiation, biological effects.

Recommended material

Dr. Kováss Attila: Zaj- és rezgésvédelem. Veszprémi Egyetemi Kiadó, Veszprém, 1995.
Horváth Béla (szerk.): Zaj- és rezgésvédelem. HEFOP, 2007.
Walz Géza: Zaj- és rezgésvédelem. CompLex Kiadó, Budapest, 2008.
Kanyár B., Béres Cs., Somlai J., Szabó S. A.: Radioökológia és Környezeti Sugárvédelem. Veszprémi Egyetemi Kiadó, Veszprém, 2004.

ECTS Course description

Subject:	**Operation and Maintenance I**	**Subject code:**	**NGB_KO009_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Sándor Zvikli, Dr.	**Language:**	Hungarian
Email:	zvikli@sze.hu	**Term:**	spring
Pre-study requirements:	Transport Technology I, Transport Technology II	**Assessment:**	continuous assessment

Description of the subject

The subject presents the general laws and the applied methods of operation and maintenance of simple and complex systems. It shows the possible reliability theory descriptions of processes and it deals with the general, strategical and technological questions of usage structures.

Recommended material

Gaál Z., Kovács Z.: Meghízhatóság, karbantartás, Veszprémi Egyetem Kiadói Iroda, 1994.
Lettner, Lipovszky, Sólyomvári: Gépgyártás és javítás, Műgyetemi Kiadó, 1995.
B. S. Dhillon, Chanan Singh: Engineering reliability, J. Wiley and Sons, New York - Toronto, 1981.
Zvikli Sándor: Rendszerelemzés I., SZE, 2004.
Zvikli Sándor: Üzemeltetés, fenntartás I., SZE-Universitas Kiadó, 2008.

ECTS Course description

Subject:	**Operation and Maintenance II**	**Subject code:**	**NGB_KO009_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Sándor Zvikli, Dr., Béla Döme, Dr.	**Language:**	Hungarian
Email:	zvikli@sze.hu	**Term:**	autumn
Pre-study requirements:	Operation and Maintenance I	**Assessment:**	exam

Description of the subject

The subject presents the basic process and operation technological properties of the maintenance of different transport vehicles. It shows the properties of transport maintenance institutions and their important technological processes.

Recommended material

Zvikli Sándor: Üzemeltetés, fenntartás I. SZE, 2008.
Lakatos I., Németh K.: Márkakereskedések és szervizek. Minerva-Sop, Győr, 1998.

ECTS Course description

Subject:	**Operational Research in Transport**	**Subject code:**	**NGB_KO005_1**
Credits:	3	**Lessons per week:**	3
Teacher:	István Szily, Dr.	**Language:**	Hungarian
Email:	szily@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics III	**Assessment:**	continuous assessment

Description of the subject

The subject presents decision support and operational research methods and models in order to practice model building and using resolving methods. It is related to the subjects Mathematics, Informatics, Statistics, Logistics and Transport processes.

Recommended material

Szily István: Döntéselőkészítés I-II., Universitas-Győr Kht.
Szily István: Alkalmazott operációkutatás (J 19-379).
Raffai Mária (ed.): Döntéselőkészítés, NOVADAT Bt., Győr, 1999.
Rozgonyi László: Matematikai módszerek a közlekedési rendszerekben.
Gáspár, Temesi: Lineáris programozási gyakorlatok, Nemzeti Tankönyvkiadó, 1999.

ECTS Course description

Subject:	**Packaging I**	**Subject code:**	**NGB_LO007_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Ákos Mojzes	**Language:**	Hungarian
Email:	mojzesa@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Determination of impacts and their use acting on the logistics and packaging systems, their modeling, laboratory simulation. In the light of transport logistics optimizing the mass and geometric size of transport logistics units. The behaviour of different types of goods to protect against environmental influences.			
Recommended material			
Dr. Pánczél – Böröcz: Anyagmozgatás – Raktározás (I., II. rész) Kerekes Titusz: Bevezetés a csomagolástechnikába I –II.			

ECTS Course description

Subject:	**Packaging II**	**Subject code:**	**NGB_LO007_2**
Credits:	4	**Lessons per week:**	3
Teacher:	Ákos Mojzes	**Language:**	Hungarian
Email:	mojzesa@sze.hu	**Term:**	spring
Pre-study requirements:	Packaging I	**Assessment:**	exam
Description of the subject			
Loading characteristics of freight transport vehicles in various branches. Types and typical size of transport containers and unit loading devices. Packaging materials and containers. Packaging for corrosion protection. Microbiological design of food packaging.			
Recommended material			
ADR, Transpack folyóirat (Veszélyes áruk csomagolása I. – VII.)			

ECTS Course description

Subject:	**Physical Education I**	**Subject code:**	**NGB_TS001_1**
Credits:	0	**Lessons per week:**	2
Teacher:	Géza Zakariás PhD	**Language:**	Hungarian/English
Email:	tsk@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Swimming: learn to swim / conditioning swimming			
Recommended material			

ECTS Course description

Subject:	**Physical Education II**	**Subject code:**	**NGB_TS001_2**
Credits:	0	**Lessons per week:**	2
Teacher:	András Várnagy, Jozsef Simon, Anita Gyenesei Kovácsné, Nikolett Gyimes	**Language:**	Hungarian/English
Email:	tsk@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Power requirement: wall climbing, rowing, kayaking, canoeing, martial arts			
Recommended material			

ECTS Course description

Subject:	**Physical Education III**	**Subject code:**	**NGB_TS001_3**
Credits:	0	**Lessons per week:**	2
Teacher:	Géza Zakariás PhD, Tamás Gasztonyi	**Language:**	Hungarian/English
Email:	tsk@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Stamina: running, cardiovascular trainng (indoor/outdoor), physiological laboratory tests			
Recommended material			

ECTS Course description

Subject:	**Physical Education IV**	**Subject code:**	**NGB_TS001_4**
Credits:	0	**Lessons per week:**	2
Teacher:	Géza Zakariás PhD, Tamás Gasztonyi	**Language:**	Hungarian/English
Email:	tsk@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Basics of sport arts: basic rules, movements and tactics of aerobics, sportgames, wall climbing, rowing, kayaking, canoeing, martial arts, nordic walking			
Recommended material			

ECTS Course description

Subject:	**Physics**	**Subject code:**	**NGB_FI004_1**
Credits:	4	**Lessons per week:**	4
Teacher:	András Horváth, Dr.	**Language:**	Hungarian
Email:	horvatha@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics I. Analysis	**Assessment:**	exam

Description of the subject

Basic concepts of classical physics. Dynamics of mass points. Oscillation, basic concepts of waves. Acoustics (intensity, physics of wave propagation, damping in continuous medium and layers). Optics (wave optics, diffraction in gaps and grids, geometrical optics, lenses, mirrors and telescopes). Heat conduction, heat radiation. Principles of atomic and nuclear physics (structure of atoms, radioactivity, and nuclear energy production). Physics of molecules and solid bodies (primary and secondary bounds, structure of energy levels). Principles and applications of lasers.

Recommended material

Berta Miklós, Horváth András: Fejezetek a fizikából. Novadat, 1994.
Berta Miklós, Horváth András, Tolnai László: Újabb fejezetek a fizikából. Novadat, 1995.

ECTS Course description

Subject:	**Preservation of Built Heritage**	**Subject code:**	**NGB_EV001_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Gábor Winkler, Dr., Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Development of historic settlements. Landscape and built heritage. History of Urbanism. The rule of architecture heritage in the development of settlements and sites: maintaining, treatment, motoring. Survey of architecture history: typical periods of architecture. Demonstration of existing monuments.

Recommended material

Gerő László: Műemlékvédelemről mindenkinek.
Winkler Gábor: Építészettörténet.
Szentkirályi Zoltán: Az építészet világtörténete.
Román András: Karták könyve.

ECTS Course description

Subject:	**Production Management**	**Subject code:**	**NGB_SV002_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Ida Ercsey, Dr. József Szabó	**Language:**	Hungarian
Email:	ercsey@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Business and production strategy, demand management. Product supply and product policy. Innovation in production, product development. Location and arrangement of facilities. The problem and methods of site selection. Analysis of production planning strategies. The methodology of production planning. Requirement planning systems, their content and planning mechanism. The role of human resources in production. The problem of purchasing, its relationship with business activities. Stock management, the expenses of stockpiling. Scheduling and operational control. Logistics, distribution, the elements of marketing. Forwarding and storage management.

Recommended material

Szente Béla: Termelés- és szolgáltatásmenedzsment. Universitas – Győr KHT. 2003.
Chikán A.-Demeter K.: Az értékteremtő folyamatok menedzsmentje. AULA, 1999.
Kovács Zoltán: Termelésmenedzsment. Veszprémi Egyetemi Kiadó, 2001.

ECTS Course description

Subject:	**Project Teamwork in Passenger Transport**	**Subject code:**	**NGB_KO032_1**
Credits:	6	**Lessons per week:**	4
Teacher:	Gábor Horváth	**Language:**	Hungarian
Email:	gabhor@sze.hu	**Term:**	spring
Pre-study requirements:	Public Transport I	**Assessment:**	project work

Description of the subject

The aim of the subject is to develop the ability of autonomous work, problem solving, team work and cooperation. Through the subject the students have to compose small teams to finish a complex problem taken from the real life. This includes several steps, like project management, budget calculation, timing, reporting, presentation.

Recommended material

Articles related to the topic of the project work
Current papers from the literature

ECTS Course description

Subject:	**Project Teamwork in Railway Topics**	**Subject code:**	**NGB_KO025_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Gábor Horváth	**Language:**	Hungarian
Email:	gabhor@sze.hu	**Term:**	spring
Pre-study requirements:	Railway System Technology, Railway Economics	**Assessment:**	project work

Description of the subject

The aim of the subject is to develop the ability of autonomous work, problem solving, team work and cooperation. Through the subject the students have to compose small teams to finish a complex problem taken from the real life. This includes several steps, like project management, budget calculation, timing, reporting, presentation.

Recommended material

Articles related to the topic of the project work
Current papers from the literature

ECTS Course description

Subject:	**Psychology and Personality Development I**	**Subject code:**	**NGB_MT002_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Zsuzsa Vásárhelyi, Dr.	**Language:**	Hungarian
Email:	vasarhel@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Definition of psychology, its position in the system of sciences. Significant psychological tendencies. The importance of the recognition of psychological laws in the aim of teacher training. Connections between spiritual development and nervous system. Cognition processes, the role of perception and attention. Features of memory and its relationship with learning. Imagination and thinking, creativity and intelligence. Definition of motivation, the system of elementary motives. Emotion, motivation and willpower. The basics of character psychology. Important character theories and examination methods. Self-knowledge and self-evaluation. The role of self-knowledge groups and psycho-therapies.

Recommended material

1. Atkinson: Pszichológia. Osiris, Bp., 2000.
2. Geréb György: Pszichológia. Nemzeti Tankönyvkiadó, Bp., 1999.
3. Fehér Irén (szerk.): Pedagógiai és pszichológiai szöveggyűjtemény. Comenius Bt., Pécs, 2001.
4. Hegedűs T. András: Pszichológia I-II. Aula Kiadó, 1991.
5. Keményné Pállfy Katalin: Bevezetés a pszichológiába. Nemzeti Tankönyvkiadó, Bp., 1989.

ECTS Course description

Subject:	**Psychology and Personality Development II**	**Subject code:**	**NGB_MT002_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Zsuzsa Vásárhelyi, Dr.	**Language:**	Hungarian
Email:	vasarhel@sze.hu	**Term:**	spring
Pre-study requirements:	Psychology and Personality Development I	**Assessment:**	continuous assessment

Description of the subject

Factors and conditions of cognitive and emotional development of personality. The role of early experience in character development. Importance of the recognition of age properties in education. Psychological specialities of puberty, youth and adulthood. Description of the teaching profession, dimensions of teacher role. Psychological analysis of the personal effects of the teacher. Educator attitudes, behaviour models, leader styles. The psychological analysis of educational process. Specialities of teaching adults. Mental and emotive factors determining the efficiency of learning. Role of motivation in learning. Control and evaluation as instruments of character development. General socio-psychological properties of learning groups and teaching staff. Conflict management, the Gordon method.

Recommended material

1. Cole M.-Cole, S.R.: Fejlődéslélektan. Osiris-Századvég, Bp., 1999.
2. N. Kollár Katalin – Szabó Éva (szerk.): Pszichológia pedagógusoknak. Osiris Kiadó, Bp., 2004.
3. Gordon, T. : Vezetői eredményesség, tréning. Studium, E.K. 1993.
4. Kelemen László: Pedagógiai pszichológia. Tankönyvkiadó, Bp., 1992.
5. Hunyadi György (szerk.): Szociálpszichológia. Osiris Kiadó, Bp., 2001.
6. Szabó István: Bevezetés a szociálpszichológiába. Nemzeti Tankönyvkiadó, Bp., 1998.

ECTS Course description

Subject:	**Public Building Design I**	**Subject code:**	**NGB_ED004_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Attila Bodrossy, DLA	**Language:**	Hungarian
Email:	bodrossy@dimenzio.hu	**Term:**	spring
Pre-study requirements:	Residential Building Design II	**Assessment:**	exam

Description of the subject

In the history of architecture, generally and primarily public buildings represented the artistic aspect of architecture, therefore the presence of public buildings is of great importance in the evolution of architecture as an art. This subject intends to focus on this feature of designing and constructing public buildings, i.e. it analyses the artistic nature of architecture.
The main topics: the fundamentals of modern architecture, administration buildings, offices, banks, sport and cultural institutions, libraries, hotels, commercial buildings, educational and medical buildings, museums, sacred buildings. There is a written examination at the end of the semester, which includes both essay writing and a test.

Compulsory material

Cságoly Ferenc: Középülettervezés
Gádoros Lajos: Középületek tervezése

Recommended material

Robert Venturi: Összetettség és ellentmondás az építészetben

ECTS Course description

Subject:	**Public Building Design II**	**Subject code:**	**NGB_ED004_2**
Credits:	5	**Lessons per week:**	4
Teacher:	Zsolt Eke	**Language:**	Hungarian
Email:	ekezs@sze.hu	**Term:**	autumn
Pre-study requirements:	Public Building Design I	**Assessment:**	continuous assessment

Description of the subject

In this semester, students design a minor public building (of app. 600–1000 m^2 floor-space) under the supervision of teachers. The design programme is always related to a real building site. Preliminary plans are to be submitted to ensure that students steadily work on the design. The scale of design tasks is generally 1:100. In the assessment of plans, the following aspects are considered with the same weight: development concept, functionality, the standard of volume-forming and space composition, and architectural design. At the preparation of preliminary and final plans, only free-hand graphics is to be applied. The final plan includes a volume model of a chosen material as well.

Compulsory material

Cságoly Ferenc: Középülettervezés

Recommended material

Déry Attila: A forma visszaszerzése – építészettörténeti tanulmányok

ECTS Course description

Subject:	**Public Building Design III**	**Subject code:**	**NGB_ED004_3**
Credits:	5	**Lessons per week:**	4
Teacher:	Zsolt Eke	**Language:**	Hungarian
Email:	ekezs@sze.hu	**Term:**	spring
Pre-study requirements:	Public Building Design II	**Assessment:**	continuous assessment
Description of the subject			
During the semester, students complete the assigned design programme under the supervision of a design consultant in a local district. They prepare the plans of 5-6 mediumscale buildings of given function, working in groups of 5-6 students. They need to think over the piece of architecture to be created with a complex approach. During the design process, students have to learn how to map the architectural concept and render it into a plan, how to convert the architect's ideas into a realisable plan.			
Compulsory material			
Cságoly Ferenc: Középülettervezés			
Recommended material			
Déry Attila: A forma visszaszerzése – építészettörténeti tanulmányok			

ECTS Course description

Subject:	**Public Transport I**	**Subject code:**	**NGB_KO027_1**
Credits:	3	**Lessons per week:**	3
Teacher:	István Prileszky, Dr.	**Language:**	Hungarian
Email:	prile@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Processes I	**Assessment:**	exam

Description of the subject

The aim of the subject is to show the general issues related to public transport like network, operation, control. It focuses on the main correspondences and tasks.

Recommended material

Liszkay Krisztina-Molnár László: Város és közlekdése. Városfejlesztési célok, közlekedéshálózati feladatok. Városi közlekedés 1996/6.
Dr. Monigl János: A személyszállítás szabályozásának lehetséges alapelvei. Városi Közlekedés 2000/3.
Garda Zs.-Trepper E.-Dr. Zsirai I.: A tömegközlekedés –fejlesztés új megközelítése a fenntartható mobilitás jegyében. Közlekedéstudományi Szemle:1999/2.
Kovács Zoltán: Verseny-közszolgáltatási szerződés-minőség: körkép az EU helyi közforgalmú személyszállítási piacáról. Városi Közlekedés: 2002/6.
Molnár László: Várostervezés-forgalomtervezés-hálózattervezés Városi Közlekedés: 2001/1

ECTS Course description

Subject:	**Public Transport II**	**Subject code:**	**NGB_KO027_2**
Credits:	3	**Lessons per week:**	3
Teacher:	István Prileszky, Dr.	**Language:**	Hungarian
Email:	prile@sze.hu	**Term:**	spring
Pre-study requirements:	Public Transport I	**Assessment:**	exam

Description of the subject

The subject is the continuation of the subject Public transport I. It works with the knowledge from the predecessor and deals mainly with planning and operational questions.

Recommended material

Dr. Prileszky I.: A szolgáltatási színvonal és a hatékonyság meghatározó tényezői és összefüggései a közforgalmú közlekedésben. Városi Közlekedés 2002/6.
Vass Lajos: A helyi és helyközi tömegközlekedési forgalom keresztmetszeti felmérésének konverziója valószínűségi módszerrel. Közlekedéstudományi Szemle: 2001/1
Denke Zsolt: Járatkövetési idő és járműkihasználtság összefüggéseinek vizsgálata. Városi Közlekedés 1999/5.
Dr. Lányi Péter: A tömegközlekedés előnyét biztosító műszaki és forgalomtechnikai módszerek. Közlekedési Dokumentációs Vállalat, Bp. 1986.
Horváth Balázs: Szimuláció a közforgalmú közlekedés tervezésében. Városi Közlekedés 2001/5

ECTS Course description

Subject:	**Quality Management of Services**	**Subject code:**	**NGB_KO007_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Attila Rixer, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The subject presents the quality management of services and service systems, the quality approach and quality technologies.

Recommended material

Rixer Attila, Veres Zoltán: Szolgáltatások minőségbiztosítása (KO0071).
Selected volumes and articles of Minőség és megbízhatóság, Közlekedéstudományi Szemle, Városi Közlekedés, Magyar Minőség, Minőségirányítás, műszaki ellenőrzés, Vállalatirányítás, Nemzetközi marketing (OMIKK MIMGI).

ECTS Course description

Subject:	**Quality Management of Transport Systems**	**Subject code:**	**NGB_KO013_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Rixer Attila, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The subject presents the quality management of transport systems and services, the quality approach and quality technologies.

Recommended material

Veres Zoltán: Szolgáltatásmarketing, Műszaki Könyvkiadó, Budapest, 2001.
Materials provided by the teacher and available on the homepage of the department.
ISO 9000 and 45000 quality standards.
Selected volumes and articles of Minőség és megbízhatóság, Közlekedéstudományi Szemle, Városi Közlekedés, Magyar Minőség, Minőségirányítás, műszaki ellenőrzés, Vállalatirányítás, Nemzetközi marketing (OMIKK MIMGI).

ECTS Course description

Subject:	**Quality Management**	**Subject code:**	**NGB_ET003_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Mária Petőcz, Dr.	**Language:**	Hungarian
Email:	petocz@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Importance of quality, development of quality, overview of approaches and changes in the organisational solutions. Meanings of quality, quality levels. Elements associated with quality, importance of standardisation, standard types. Quality management systems based on ISO-standards. Contents of standards, definition and application of standard requirements. Practical satisfying of some standard requirements in case studies. Rules and practice of audit, system construction and operation. Connecting and sister systems: environment-conscious steering, overview of ISO-based and other quality management systems.

Recommended material

Petőcz–Szabó: Minőségirányítás – Minőségmenedzsment. PMS, Budapest, 2003.
Bálint Julianna: Minőség – Tanuljuk és tanítsuk. Műszaki Könyvkiadó, Budapest, 2003.
ISO 9001:2000 szabványsorozat www.eoq.hu

ECTS Course description

Subject:	**Rail System Management**	**Subject code:**	**NGB_KO026_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Rixer, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The subject shows how to manage, operate, control a company or other enterprise dealing with railroad transport. It focuses on the EU-conform methods and processes in the field of small and medium enterprises as well as multinational level. It deals with not only service providers but infrastructure operators.

Recommended material

Teacher's handouts and papers on the Department's webpage (http://kozlekedes.sze.hu)
Molnár Mihályné: Szervezéstan, SZIF 1980
Dr. Rixer Attila: Munkaszervezés, SZIF 1983
Dobák Miklós: Szervezeti formák és vezetés, KJK 1997
Bakacsi Gyula: Szervezeti magatartás és vezetés, KJK 1997
Dr. Csath Magdolna: Stratégiai menedzsment
Dr. Ladó László: Szervezéselmélet és módszertan, KJK 1986
Current papers from the literature

ECTS Course description

Subject:	**Rail Systems in Passenger Transport**	**Subject code:**	**NGB_KO029_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Lajos Szabó	**Language:**	Hungarian
Email:	szala@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Processes II	**Assessment:**	exam

Description of the subject

The aim of the subject is to show the operation and work of rail systems and infrastructures. It focuses on operational and management issues

Recommended material

Teacher's handouts
Current papers from the literature
Articles from journals: Városi közlekedés, Közlekedéstudományi Szemle

ECTS Course description

Subject:	**Rail Transport Service Planning**	**Subject code:**	**NGB_KO022_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Attila Rixer, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The subject presents the value, performance and quality design and realization of railway transport services as products. It provides students with a complex service, performance and quality approach.

Recommended material

Materials provided by the teacher and available on the homepage of the department.
Veres Zoltán: Szolgáltatásmarketing, Műszaki Könyvkiadó, Budapest, 2001.
Philip Kotler: Marketingmenedzsment, Műszaki Könyvkiadó, Budapest, 1999.
Selected volumes and articles of Minőség és megbízhatóság, Közlekedéstudományi Szemle, Városi Közlekedés, Magyar Minőség, Minőségirányítás, műszaki ellenőrzés, Vállalatirányítás, Nemzetközi marketing (OMIKK MIMGI).

ECTS Course description

Subject:	**Railway Economics**	**Subject code:**	**NGB_KO021_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Attila Rixer, Dr.	**Language:**	Hungarian
Email:	rixer@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Economics	**Assessment:**	continuous assessment

Description of the subject

The subject presents the basic economic definitions, principles, relations and methodologies of the railway sector and the specialities of railway companies, with the purpose of an EU conform application.

Recommended material

Materials provided by the teacher and available on the homepage of the department.
Selected articles of Közlekedéstudományi Szemle.

ECTS Course description

Subject:	**Railway Information Systems**	**Subject code:**	**NGB_KO020_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Lajos Szabó	**Language:**	Hungarian
Email:	szala@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Informatics	**Assessment:**	exam

Description of the subject

Based on the subjects Informatics and Transport informatics, this subject provides students with a comprehensive overview of the operation of railway information systems. During the practicals, it is possible to simulate the operation of railway subsystems.

Recommended material

Literature selected by the teacher.

ECTS Course description

Subject:	**Railway System Technology**	**Subject code:**	**NGB_KO019_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Károly Arató	**Language:**	Hungarian
Email:	arato@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Technology I, Transport Processes II	**Assessment:**	exam

Description of the subject

The subject presents the requirements against railway networks, the technological and transit properties, the structure and the devices of the networks. It describes the complex relation between user expectations and techological, transit opportunities. It shows the priorities of quality requirements of the services. It presents the security philosophy of railway systems and the results of the development of European railways.

Recommended material

Arató Károly, Mátyus János: Vasúti üzemszervezés I., Tankönyvkiadó, Budapest, 1982.
Materials selected by the teacher.

ECTS Course description

Subject:	**Railway Transport and Infrastructure I**	**Subject code:**	**NGB_KO023_1**
Credits:	5	**Lessons per week:**	4
Teacher:	Károly Arató	**Language:**	Hungarian
Email:	arato@sze.hu	**Term:**	spring
Pre-study requirements:	Railway System Technology	**Assessment:**	exam

Description of the subject

The subject presents special railway devices, railway operational technologies and the whole process of freight transport. It shows the bases of planning technological, transit and commercial subprocesses, and different calculation methods of the performance and utilization of fixed devices.

Recommended material

Arató Károly, Mátyus János: Vasúti üzemszervezés I-II., Tankönyvkiadó, Budapest, 1982.
Czére Béla: A vasúti technika kézikönyve I-II., Műszaki Könyvkiadó, Budapest, 1975.
Kisbakonyi József: Vasúti üzemszervezés III., Tankönyvkiadó, Budapest, 1985.

ECTS Course description

Subject:	**Railway Transport and Infrastructure II**	**Subject code:**	**NGB_KO023_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Lajos Szabó	**Language:**	Hungarian
Email:	szala@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Processes II	**Assessment:**	exam

Description of the subject

The subject presents the principles of organizing railway passenger transport (urban and interurban railways, special railways), considering their infrastructural conditions.

Recommended material

MÁV Zrt. Pályavasúti üzletág F. 1., F. 2. utasítások.
Szabó Lajos, Szily István: Vasúti üzemtan II., Universitas Kht. Győr, 2007.
Selected issues and articles of Közlekedéstudományi Szemle and Városi Közlekedés.

ECTS Course description

Subject:	**Railways I**	**Subject code:**	**NGB_ET012_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Ferenc Horvát, Dr.	**Language:**	Hungarian
Email:	horvat@sze.hu	**Term:**	spring
Pre-study requirements:	Transport Infrastructure II	**Assessment:**	exam

Description of the subject

Stress calculation of rail, sleeper, ballast and substructure. Turn out constructions. Calculation and setting out of standard and non-standard tack connections. Tasks of railway stations, basic data for their design. Types of railway stations. Technologies of railway track constructions and renewal works.

Recommended material

Gajári J.: Vasútépítés I. és II. Tankönyvkiadó, Budapest, 1983.
Korszerű vasút, korszerű vasúttechnika. Vasútépítés és pályafenntartás I. és II., MÁV Zrt., 1999.

ECTS Course description

Subject:	**Railways II**	**Subject code:**	**NGB_ET012_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Ferenc Kiss, Dr.	**Language:**	Hungarian
Email:	kissf@sze.hu	**Term:**	autumn
Pre-study requirements:	Railways I	**Assessment:**	exam

Description of the subject

Elements of railway maintenance activity, its organisational system. Railway track supervision. Geometrical and constructional track diagnostics. Track measurements by manual tools and measuring cars. Theoretical issues of track measurement tolerances. Tolerance system of Hungarian Railways. Interrelations of the tolerance system and the geometrical qualifications of the track. Deterioration of railway track and its causes. Designing of curve regulations. Measurements needed for planning of curve regulations. Curve regulations based on three-point-principle. Manual track regulations. Theory of mechanical regulation of track direction and level. Mechanical track regulation. Plasser 06, 07, 08 and 09 type regulatory machines. Rail defects and their examination. Rail management and rail renewal. Maintenance of the other parts of superstructure. Supervision of turn outs and their maintenance. Stability issues of railway track. Temperature limits for approved works in the railway track. Rail buckling. Running safety, accident investigation.

Recommended material

Gajári J.: Vasútépítés I. és II. Tankönyvkiadó, Budapest, 1983.
Korszerű vasút, korszerű vasúttechnika. Vasútépítés és pályafenntartás I. és II., MÁV Zrt., 1999.

ECTS Course description

Subject:	**Railways III**	**Subject code:**	**NGB_ET012_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Ferenc Horvát, Dr.	**Language:**	Hungarian
Email:	horvat@sze.hu	**Term:**	spring
Pre-study requirements:	Railways II	**Assessment:**	exam

Description of the subject

Special issues of establishment and operation of high speed tracks. Ballastless superstructures. Conformity tests of railway superstructures. Railway tunnels. Design directives of tramway tracks and most recent superstructure solutions. Planning directives of underground railways, track superstructures, construction technologies. Cogwheel railways. Cable-railways. Funiculars. Computer aided railway design. Technical based GIS for railway track operation. Track rehabilitation program of Hungarian Railways. The most important results, experiences of track renewal activity in the last decade in Hungary.

Recommended material

Gajári J.: Vasútépítés I. és II. Tankönyvkiadó, Budapest, 1983.
Korszerű vasút, korszerű vasúttechnika. Vasútépítés és pályafenntartás I. és II., MÁV Zrt., 1999.

ECTS Course description

Subject:	**Residential Building Design I**	**Subject code:**	**NGB_ED003_1**
Credits:	2	**Lessons per week:**	2
Teacher:	István Katona	**Language:**	Hungarian
Email:	katonai@fenyjel.hu	**Term:**	spring
Pre-study requirements:	Basics of Architecture I	**Assessment:**	exam

Description of the subject

The objective of this subject is to introduce students to the basics of home environment, design of residential buildings and the housing problem in general. Lectures cover general problems concerning the design of home environment, service and other requirements for living spaces, development methods and corresponding types of residential buildings, and related specific requirements. Lectures present the historical evolution of building types, and the problems of architectural design and aesthetic representation of residential buildings. They outline general relations in housing construction and analyse architectural solutions applied in practice.

Compulsory material

Resichl Antal: Lakóépületek tervezése

Recommended material

Kapsza Miklós: Otthontervezési Tanácsadó

ECTS Course description

Subject:	**Residential Building Design II**	**Subject code:**	**NGB_ED003_2**
Credits:	4	**Lessons per week:**	4
Teacher:	Nóra Géczy, PhD	**Language:**	Hungarian
Email:	nora@sze.hu	**Term:**	autumn
Pre-study requirements:	Residential Building Design I	**Assessment:**	continuous assessment

Description of the subject

The main objectives of practicals in this semester are to have students practice the basics of housing design, to develop their skills in problem identification and decision-making, to improve their architectural skills and to teach them how to get an overview of the whole range of housing designs. Students prepare several assignments in the course of the semester. The subject covers design problems of the main types of residential buildings (family houses, housing clusters, blocks of flats). Programmes involve common problems, which occur frequently in housing design. In this semester, students have to prepare some studio assignments individually, which test their knowledge.

Compulsory material

Resichl Antal: Lakóépületek tervezése

Recommended material

Bitó János: Lakóházak tervezése
Kapsza Miklós: Otthontervezési Tanácsadó

ECTS Course description

Subject:	**Residential Building Design III**	**Subject code:**	**NGB_ED003_3**
Credits:	4	**Lessons per week:**	4
Teacher:	Nóra Géczy, PhD	**Language:**	Hungarian
Email:	nora@sze.hu	**Term:**	spring
Pre-study requirements:	Residential Building Design II	**Assessment:**	continuous assessment

Description of the subject

The main objectives of practicals in this semester are to have students practice the basics of housing design, to develop their skills in problem identification and decision-making, to improve their architectural skills and to teach them how to get an overview of the whole range of housing designs. Students prepare several assignments in the course of the semester. The subject covers design problems of the main types of residential buildings (family houses, housing clusters, blocks of flats). Programmes involve common problems, which occur frequently in housing design. Students are divided into groups, led by consultant teachers. In practicals, students design the environment around the buildings (e.g. the pavement of roads and pedestrian zones, the gardens and the landscape).

Compulsory material

Resichl Antal: Lakóépületek tervezése

Recommended material

Neufert, Ernst: Építés és tervezéstan
Bitó János: Lakóházak tervezése

ECTS Course description

Subject:	**Roads I**	**Subject code:**	**NGB_ET011_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Kálmán Adorjányi, Dr.	**Language:**	Hungarian
Email:	adorjany@sze.hu	**Term:**	spring
Pre-study requirements:	Transport Infrastructure I, Geoinformatics II, Building Materials II	**Assessment:**	exam

Description of the subject

Types of pavement structures. Pavement structures of low volume roads. Pavement design models, effects and responses, traffic load classes, material parameters, stresses, strains, deflections, design criteria. Design of asphalt, concrete and stone block pavements. Unbound granular base and subbase courses. Frost protection courses. Technology and construction of hydraulically bounded base courses. Stabilized bases, lean concrete base courses. Constituent materials for bituminous mixtures, aggregates, bitumens, modified bitumens. Hot and cold bituminous mixtures: composition, characteristics, requirements and testing. Bituminous mixtures for base-, binder and wearing courses. Quality control system of road construction. Testing methods. Operation of asphalt plants, factory production control. Hauling, laying and compaction operations. Evaluation of conformity. PCC pavement structures and their materials. Construction and testing of concrete pavements. Construction of stone block pavements.

Recommended material

Guide Specifications for Highway Construction. AASHTO, 2008.
Asphalt Handbook MS_4 Asphalt Institute, 2009.
Related European Standards.
Fi István. Utak és környezetük tervezése, Műegyetemi kiadó, Budapest, 2000.
Gáspár László. Útgazdálkodás. Akadémiai kiadó, Budapest, 2003.

ECTS Course description

Subject:	**Roads II**	**Subject code:**	**NGB_ET011_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Kálmán Adorjányi, Dr.	**Language:**	Hungarian
Email:	adorjany@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Infrastructure I, Geoinformatics II, Building Materials II	**Assessment:**	exam

Description of the subject

Pavement Management System (PMS), it's subsystems, their function, network level project level. Structure of costs in PMS, optimisation. Survey and evaluation of pavement condition. Pavement outputs, performance curves. Evaluation of pavement structural capacity. Static and dynamic measurement methods. Pavement overlay design. Pavement widening. Evaluation and selection of design rehabilitation alternatives. Shoulder and approach maintenance. Maintenance of earthworks, the roadside and drainage system. Defects of PCC pavements. Maintenance and rehabilitation of PCC pavements and stone block pavements. Defects of asphalt pavements. Asphalt pavement maintenance and rehabilitation. Surface dressings, slurry seals. Bitumen emulsions. Cold asphalt mixes, foamed bitumen mixes in maintenance and rehabilitation. Application of stress absorbing membran interlayers, grids, textiles. Recycling technologies of pavements materials. Hot mix and cold mix recycling technologies at plants, in place.

Recommended material

Highway Maintenance Handbook. Ed. J. K. Atkinson, Thomas Telford Ltd, 1990.
Asphalt in Pavement Maintenance MS-16 Asphalt Institute, 1997.
Related European Standards.
Gáspár László . Útgazdálkodás. Akadémiai kiadó, Budapest, 2003.
Strassen - III. SZIF jegyzet, Győr, 1996.

ECTS Course description

Subject:	**Roads III**	**Subject code:**	**NGB_ET011_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Kálmán Adorjányi, Dr.	**Language:**	Hungarian
Email:	adorjany@sze.hu	**Term:**	spring
Pre-study requirements:	Roads I, Roads II	**Assessment:**	exam

Description of the subject

Organizations for road operations: local roads, state roads, motorways. General authority, administration and operational tasks, service classes. Road inspection tasks. Information system and services. Data collection, condition survey. Cleaning the road, street furniture. Road operation tasks in summer. Treatment of the vegetation, planting, right-of-way. Traffic engineering tools of ensuring continuous traffic flow. Winter road operation prewinter preparations. Winter information systems, weather monitoring. Ice control, effects of deicing materials. Snow removal, snow fencing. Environmental protection tasks. Noise protection, noise walls, noise calming vegetation. Protection of flora and fauna. Operation centers. Service facilities and their operation.

Recommended material

Highway Maintenance Handbook. Ed. J. K. Atkinson, Thomas Telford Ltd, 1990.
Guide for Snow and Ice control, AASHTO, 1999.
Fi István. Utak és környezetük tervezése. Műegyetemi kiadó, 2000.
Utak üzemeltetése és fenntartása. Tervezési útmutató. Magyar Útügyi Társaság, Bp. 1998.
Útellenőri kézikönyv. Szerk. dr. Krizsán Gyula, VIVA Média management, Bp., 1992.

ECTS Course description

Subject:	**Service Management**	**Subject code:**	**NGB_LO005_1**
Credits:	4	**Lessons per week:**	2
Teacher:	Zsolt Védenyi	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	Transport Trade Technology III	**Assessment:**	exam

Description of the subject

Concept and development of service. Speciality of service management. Design of service processes. Expectations of consumers, and their attitude at services. Structure of service market. Interpretation of consumer satisfaction. Ensuring the quality of services. Contact with consumers. Production of service product, product documentation. Calculation and pricing of services. Linkage between service efficiency and informatics. Advertising and sale of services. Development of service strategy.

Recommended material

Kenesei Zsófia – Kolos Krisztina: Szolgáltatás-marketing és menedzsment
Védenyi Zsolt (2009): Szolgáltatás marketing és irányítás 1.

ECTS Course description

Subject:	**Settlement Development Project I**	**Subject code:**	**NGB_ET015_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Csaba Koren, Dr., István Hausel	**Language:**	Hungarian
Email:	koren@sze.hu, hauseli@sze.hu	**Term:**	spring
Pre-study requirements:	Descriptive Geometry, Mathematics II	**Assessment:**	continuous assessment

Description of the subject

Preparation of settlement development concept. Use of strategic planning tools. Data and information collection. Analysis of social composition and settlement status quo, settlement economy and local governmental management, natural and artificial environment. Overview of international, national and regional interrelations. SWOT analysis. Definitions of goals and objectives. Action plan. Creating priority list. Cost estimation. Identification of financial resources.

Recommended material

Településfejlesztési füzetek 24. Útmutató a településfejlesztési koncepció készítéséhez. BM KIADÓ, 2002.

ECTS Course description

Subject:	**Settlement Development Project II**	**Subject code:**	**NGB_ET015_2**
Credits:	3	**Lessons per week:**	2
Teacher:	Csaba Koren, Dr., István Hausel	**Language:**	Hungarian
Email:	koren@sze.hu, hauseli@sze.hu	**Term:**	autumn
Pre-study requirements:	Settlement Development Project I	**Assessment:**	continuous assessment

Description of the subject

The scope of the subject is the same settlement for which a development concept was worked out. Preparation of settlement structure plan: environment (natural and artificial environment: water, air, earth, climate, flora, fauna, built environment, interrelations), transport (network, cross-sectional), public utilities (water, sewage, rainfall, energy). Preparation of regulatory plan. Sectoral plans: transport (network, cross-sectional), public utilities (water, sewage, rainfall, energy). Determination of built up conditions of a plot of land.

Recommended material

Országos Településrendezési és Építési Követelményrendszer (OTÉK)

ECTS Course description

Subject:	**Sociology**	**Subject code:**	**NGB_TT005_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Zoltán Bugovics, Dr.	**Language:**	Hungarian
Email:		**Term:**	autumn / spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
On one hand the students get acquainted with history, schools and methodology of sociology. On the other hand they study the principles of functioning and stratification of society as well as other sciences in relation to sociology (demography, social psychology). They analyse social institutions such as family, organisation and party.			
Recommended material			

ECTS Course description

Subject:	**Soil protection**	**Subject code:**	NGB_KM010_1
Credits:	6	**Lessons per week:**	4
Teacher:	Zoltán Papp, Dr.	**Language:**	Hungarian
Email:	pappz@sze.hu	**Term:**	autumn
Pre-study requirements:	Geology and Geophysics II	**Assessment:**	exam

Description of the subject

The concept of soil. Geological and biologial cycles and the soil. Structure of soil. Biotic and abiotik organic substances. Heat management. Factors of soil formation. Global functions of soil. Soil degradation. Antropogen soil contaminations.

Recommended material

Dr. Papp, Z. Soil protection. Lecture notes, 1997.

ECTS Course description

Subject:	**Strategic Planning**	**Subject code:**	**NGB_ET010_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Csaba Koren, Dr., Attila Borsos	**Language:**	Hungarian
Email:	koren@sze.hu, borsosa@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Process of strategic planning, analyses. SWOT analysis. Definition of goals and objectives. Action planning and timing. Strategy implementation. Students prepare strategic planning case studies of construction enterprises, public companies and local governments.			
Recommended material			
Marosán Gy. (ifj.): Stratégiai menedzsment. Calibra, Budapest, 1996.			

ECTS Course description

Subject:	**Structures I**	**Subject code:**	**NGB_SE004_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Zoltán Tóth, Dr.	**Language:**	Hungarian
Email:	tothz@sze.hu	**Term:**	autumn
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

Basic design concepts of reinforced concrete (RC) structures. Fields of application, determination of loads. Constitutive models of concrete and steel. Concepts and rules of reinforcement spacing. Construction rules. Behaviour of RC beams under static loads, characteristic stress states. Principles and concepts of RC standardization – Eurocodes. Dimensioning and checking of rectangular and T sections in I., II. and III. stress states. Design of reinforcement for shear forces. Limit bending moment and shear force distributions. Design, checking and reinforcement spacing of centrically and eccentrically loaded elements. Stiffness and deformation of RC elements. Limitation of crack-width.

Recommended material

Dr. Tóth Zolán: Tartószerkezetek I, Vasbeton szilárdságtan (SZE jegyzet)
Kollár László: Vasbetonszerkezetek I. (Vasbeton szilárdságtan az EUROCODE 2 szerint)

ECTS Course description

Subject:	**Structures II**	**Subject code:**	**NGB_SE004_2**
Credits:	3	**Lessons per week:**	3
Teacher:	János Szép	**Language:**	Hungarian
Email:	szepj@sze.hu	**Term:**	spring
Pre-study requirements:	Structures I	**Assessment:**	exam

Description of the subject

RC structural elements: slabs, beams, cantilevers, columns, stairs and foundations. Geometric forms, internal forces and design of structural elements. Construction rules of reinforcing in RC elements, nodes and joints. Relationship between construction rules and satisfaction of load bearing capacity, durability and crack-limitation requirements. Reinforcement for torsion. Types of cracks. Loads, mechanical models and structural analysis of RC framed buildings and industrial halls. Structural systems of framed buildings and industrial halls. Basic concepts of stressed RC structures. Stressing technologies, stress relaxation. Characteristic features of stressed cross sections.

Recommended material

Kollár László: Vasbeton szerkezetek, Műegyetemi kiadó, 1995.
Draskóczy András: Vasbeton ls falazott szerkezetek, I, II. Műegyetemi kiadó, 1998.
BMGE Szilárdságtan és Tartószerkezeti tanszék: Vasbeton szerkezetek Segédlt. 2003.
Szalay Kálmán: Vasbeton szerkezetek. Műegyetemi kiadó, 1995.
Tóth Zoltán: Vasbeton szilárdságtan. Főiskolai jegyzet. Novadat, 1996.
Kegyes Csaba: Útmutató vasbeton szerkezetek tervezéséhez. Wagner, 2001.

ECTS Course description

Subject:	**Structures III**	**Subject code:**	**NGB_SE004_3**
Credits:	3	**Lessons per week:**	3
Teacher:	László Lublóy, Dr.	**Language:**	Hungarian
Email:	lubloy@sze.hu	**Term:**	spring
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

Basic design concepts of steel structures. Determination of loads. Material properties of structural steel. Quality classes and assortment of steel construction elements. Design of concentrically and eccentrically tensioned steel members. Design and construction of bent and sheared girders. Strength limit, local and global stability, brittle fracture, fatigue, strains and deformations. Torsion of steel cross-sections. Design of members with solid and complex cross sections under centrical and eccentrical axial loads. Analysis, classification and modelling of joints. Design of connections made with bolts or rivets. Welding technologies. Design of welded connections.

Recommended material

Molnár I.-Szűcs S.- dr. Szabó L-né: Tartószerkezetek II. Fa- és acélszerkezetek (főiskolai jegyzet, J 15-554)
dr. Ijjas Gy.- dr. Szabó L-né: Tartószerkezetek példatár II. Fa- és acélszerkezetek (főiskolai jegyzet)
Halász O.- dr. Platty P.: Acélszerkezetek. Egyetemi tankönyv

ECTS Course description

Subject:	**Structures IV**	**Subject code:**	**NGB_SE004_4**
Credits:	3	**Lessons per week:**	3
Teacher:	Dr. György Németh	**Language:**	Hungarian
Email:	nemethgy@sze.hu	**Term:**	autumn
Pre-study requirements:	Structures III	**Assessment:**	exam

Description of the subject

Application areas and possibilities, advantages and disadvantages of steel structures. Design of different steel structural elements. Types, structural features, spatial stiffening and structural analysis of steel halls. Calculation of internal forces and design of structural elements of steel halls. Types of crane supporting structures. Types of multi-storey framed steel structures. Stresses in steel-concrete composite members. Shear connections. Practical work: design of a lattice girder.

Recommended material

Dr. Csellár Ödön: Magasépítési acélszerkezetek.
Palotás László: Mérnöki kézikönyv (2. kötetre vonatkozó fejezetei)

ECTS Course description

Subject:	**Structures V**	**Subject code:**	**NGB_SE004_5**
Credits:	3	**Lessons per week:**	2
Teacher:	János Guzmics	**Language:**	Hungarian
Email:	guzmics.janos@gyor.net	**Term:**	autumn
Pre-study requirements:	Mechanics II	**Assessment:**	exam

Description of the subject

Features and materials of timber structures. Sawn wooden products. The wood as an orthotropic structural material, effects influencing its strength. Design of rectangular and complex cross-sections under bending and shear forces. Connections in timber structures. Dimensioning of connections. Features and design of timber columns. Deformations of timber structures, effects acting on stiffness. Structural materials resisting only to compression. Strength of stone and brick masonry, effects influencing the strength. Quality parameters of brickworks and stoneworks. Slenderness of walls and columns. Calculation of resistance against shear. Vaulting in walls, approximating calculations of internal forces and resistance. Concrete walls. Effect of cracks.

Recommended material

Dr Horváth Sándor: Faanyagú szerkezetek alkalmazása a magas- és mélyépítésben (J 9-1274 Kézirat, Tankönyvkiadó, Budapest 1992)
MSZ 15025-1989. Építmények falazott teherhordó szerkezeteinek erőtani tervezése
Rónai-Somfalvi: Fa tartószerkezetek, Tervezés, méretezés (Műszaki könyvkiadó, Budapest 1982)
Molnár-Szűcs- dr. Szabó L.-né: Tartószerkezetek II. Fa és acélszerkezete (YMMF) (J15-554 Kézirat, Tankönykiadó, Budapest 1989)
Massányi-Dulácska: Statikusok könyve, Műszaki Könyvkiadó, Budapest

ECTS Course description

Subject:	**Supply Chain Management I**	**Subject code:**	**NGB_LO009_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Péter Németh, Zoltán Nagy	**Language:**	Hungarian
Email:	nemethp@sze.hu	**Term:**	autumn
Pre-study requirements:	Logistics I	**Assessment:**	exam
Description of the subject			
Supply chain basics, logistics and supply chain context, the theory of network economy. Basics of logistics management, logistics objectives and instruments. Typical procedures applied in the field of logistics management, controlling. Logistics indicators: BSC, KPI, SMART. Quality management in logistics, quality objectives and indicators. Supply distribution management, strategic level logistics functions, logistics organisation, outsourcing, installation problems. Strategic alliances in supply chain, cluster, virtual logistics centre. Case study and examples.			
Recommended material			
Ellátási lánc menedzsment I-II. – Hirkó Bálint, Bikás Ernő, Bajor Péter.			

ECTS Course description

Subject:	**Supply Chain Management II**	**Subject code:**	**NGB_LO009_2**
Credits:	2	**Lessons per week:**	2
Teacher:	Bálint Hirkó, Dr.	**Language:**	Hungarian
Email:	hirko@sze.hu	**Term:**	spring
Pre-study requirements:	Logistics I, Transport Informatics	**Assessment:**	exam

Description of the subject

The subject of logistics information technology, its location in computer science. The features of information management in logistics systems. Software quality interpretation concepts and models. Software quality metrics and measurement tools. The expectations about logistics softwares. General description of PARAGON system, databases in the system, route planning solutions. Functions of EM-Plant system, its applications in supply chain analysis. Functions of logistics modules of ERP systems. The role of interfaces, expectations in logistics softwares.

Recommended material

Szegedi – Prezenszki: Logisztika – Menedzsment. Kossuth Kiadó, 2003.
Prezenszki József (szerk.): Logisztika II. (Bevezető fejezetek). BME Mérnöktovábbképző Intézet, 2002.

ECTS Course description

Subject:	**Supply Chain Management III**	**Subject code:**	**NGB_LO009_3**
Credits:	2	**Lessons per week:**	2
Teacher:	Péter Földesi, Dr.	**Language:**	Hungarian
Email:	foldesi@sze.hu	**Term:**	spring
Pre-study requirements:	Logistics I, Transport Economics I	**Assessment:**	exam
Description of the subject			
The option of using simulation technology in the logistics planning processes. Supply distribution network planning. Advanced Logistics Systems (hospital logistics, environmental management and logistics, passenger transport logistics, city logistics, logistics implications of e-business, etc.).			
Recommended material			

ECTS Course description

Subject:	**Teacher Communication**	**Subject code:**	**NGB_MT005_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Miklós Kovács	**Language:**	Hungarian
Email:	kovacsm@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

Definition and types of communication. Channels of communication: verbal and non-verbal, meta-communication. The function of verbal communication. Relationship between speech and language. Possibilities of communication by mimicry and facial expressons. Motional communication: gestures, posture, space control. Good appearance as a communicational message. The role of cultural signals in communication. Applications of information-communicational technologies in education.

Recommended material

1. Katona András (szerk.): A tanári mesterség gyakorlata. Nemzeti Tankönyvkiadó-ELTE, Budapest, 2003.
2. Szabó Katalin: Kommunikáció felsőfokon. Kossuth Kiadó, Budapest, 1997.
3. Pléh Cs.-Siklai I.-Terestyéni T.(szerk.): Nyelv-kommunikáció-cselekvés. Osiris Kiadó, Bp. 1997.
4. Buda Béla: A közvetlen emberi kommunikáció szabályszerűségei. Animula, Budapest, 1994.
5. Forgas, J.P.: A társas érintkezés pszichológiája. Gondolat Kiadó, Budapest, 1989.
6. Pease, A.: Testbeszéd. Park Kiadó, Budapest, 1988.
7. Lukács István: Mikrotanítás, tanári kérdéskultúra. OOK, 1983.

ECTS Course description

Subject:	**Technical Chemistry**	**Subject code:**	**NGB_KM001_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Juraj Lesny, Dr., Gábor Simon, Dénes Szalay	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Chemical fundamentals, atomic structure, bindings. Conditions, solution coherence, calculation of concentration. Stochiometrics fundamentals, calculations, thermo-chemical elements. Fundaments of reaction kinetic, balances. Acid-basics theoretics, pH, calculation of pH. Basics of inorganic chemistry, relevant elements and their combination. Basics of organic chemistry, review of carbo-hydrates, their relevant reactions. Review of organic combinations with oxygen and nitrogen content. Carbo-hydrates, aminoacids, proteins, nucleic acids.

Recommended material

Lesny-Simon-Végh: Általános kémia. Universitas-Győr, 2002.

ECTS Course description

Subject:	**Technical Communication Preparatory Course I**	**Subject code:**	**NGB_IT024_1**
Credits:	0	**Lessons per week:**	4
Teacher:	Gábor Szabó	**Language:**	English
Email:	szabog@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The aim of the course is to prepare students for the intermediate technical English exam. Students should be able to discuss their field of study and related areas of their profession from practical life. They will present information from graphs, tables, etc in oral form. Improving their technical vocabulary is one of the main considerations during the course. Special emphasis is put on reading skills using authentic texts, especially in the form of reading comprehension. Reading to identify the main ideas (skimming) and scanning for specific information, interpreting data from tables and charts. The course aims to familiarize students with different rhetorical functions of scientific English.

Recommended material

Technical Communication - BME Course Book.
Relevant Internet Pages

ECTS Course description

Subject:	**Technical Communication Preparatory Course II**	**Subject code:**	**NGB_IT024_2**
Credits:	0	**Lessons per week:**	4
Teacher:	Ferenc Csendes, Dr.	**Language:**	English
Email:	csendesf@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	Technical Comm. Prep. Course I	**Assessment:**	continuous assessment

Description of the subject

The aim of the course is to prepare students for the intermediate technical English exam. Students should be able to discuss their field of study and related areas of their profession from practical life. They will present and analyze information from graphs, tables, etc. Improving their technical vocabulary is one of the main considerations during the course. Special emphasis is put on reading skills using authentic texts, especially in the form of reading comprehension.

Recommended material

Technical Communication - BME Course Book.
Authentic exam materials

ECTS Course description

Subject:	**Technological Systems**	**Subject code:**	**NGB_KM021_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Géza Nagy, Dr., András Torma, Dr.	**Language:**	Hungarian
Email:	nagyg@sze.hu; andras.torma@audi.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam + project work
Description of the subject			
The goal of the subject is to provide information about the main industrial technologies (for example: technologies of energy recovery, technologies of plastic industry, etc.). The students can get knowledge about this technologies from the view of operation and also from the view of environmental protection. The theoretical information is confirmed with concrete practical examples and case studies.			
Recommended material			
Dr. Nagy Géza: Technológiai rendszerek. Főiskolai jegyzet, Győr, 2001.			

ECTS Course description

Subject:	**Telematics**	**Subject code:**	**NGB_KO012_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Péter Holló, Dr., Ferenc Oláh, Dr., Richárd Horváth	**Language:**	Hungarian
Email:	hricsi@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Transport Technology III	**Assessment:**	continuous assessment

Description of the subject

The subject provides students with a comprehensive overview of telematics systems used in transport. It is related to the subjects Transport technology and Transport informatics.

Recommended material

Westsik György: Közlekedési informatika, telematika, Műegyetemi Kiadó, 1997.
Oláh Ferenc: Járműazonosító és helymeghatározó rendszerek.
Detrekői Ákos, Szabó György: Bevezetés a térinformatikába, Nemzeti Tankönyvkiadó, Budapest, 1995.
Erdősi Ferenc: Telematika, Távközlési Könyvkiadó, Budapest, 1992.
Dárdai Árpád: Mobil távközlés, Nap Kiadó, Budapest, 1999.

ECTS Course description

Subject:	**The Use of Nuclear Energy and Its Impact on the Environment**	**Subject code:**	**NGB_FI009_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Andrea Szabó Nagyné, PhD	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	Technical Chemistry, Physics	**Assessment:**	exam

Description of the subject

The role and importance of nuclear energy in the 21st century. Summary of fundamentals (nucleus decomposition, radioactive radiation, special nucleus reaction). The nuclear fuel cycle. Types of nuclear reactors and trends in their developments. The operational and safety features of atomic reactors. The structure, operation, safety and radiation protection system of the nuclear power plant of Paks. The refrigerants of atomic reactors. Radioactive contamination-decontamination, corrosion of structural materials and their protection against corrosion. Emissions of power plants. Classification of radioactive wastes. Handling, temporary and permanent disposal of radioactive wastes. Special field of utilizing nuclear materials (isotope production, activation analytics, gamma-sources, etc.). Decontamination processes in nuclear technology.

Recommended material

Németh Z.: Radiokémia és izotóptechnikai alapismeretek. Veszprémi Egyetemi Kiadó, 1996.
Nagy Lajos György: Radiokémia és izotóptechnika. Műegyetemi Kiadó, Bp. 1997.

ECTS Course description

Subject:	**Theory of Design**	**Subject code:**	**NGB_ED005_1**
Credits:	2	**Lessons per week:**	2
Teacher:	János Golda, DLA	**Language:**	Hungarian
Email:	golda@teampannon.hu	**Term:**	autumn
Pre-study requirements:	Residential Building Design II	**Assessment:**	exam

Description of the subject

This subject covers the theoretical and practical methodology of design. Theoretical design methodology focuses on design as a process that can be modelled: the process of design is compared to an informatics system, thus the methodology is described using the tools of informatics. Practical design methodology presents architectural designing (as an event) via a concrete design problem, following the concrete steps of the design process. The practical part is the simulation of reality, which allows a wide range of interpreting the methodology. The description of the design process of a fictitious building may raise several problems or alternatives. Special design processes involve solving special problems and designing special buildings. Students are introduced to the particular design process of building reconstruction and to the design of buildings where specific technology or constructions represent special restraints on design. An extra class is devoted to ecological design methods due to their great importance.

Compulsory material

Neufert, Ernst: Építés és tervezéstan

Recommended material

lecture materials, magazines

ECTS Course description

Subject:	**Tourism**	**Subject code:**	**NGB_KO028_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Gábor Fülöp, Dr.	**Language:**	Hungarian
Email:	fulopg@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject shows the relation between tourism and transport. It focuses on the main issues related to tourism.

Recommended material

Prof. Dr. Claude Kaspar: Turisztikai alapismeretek 1-2.
Dr. Nagy Éva (ed.): Utazásszervezési és értékesítési alapismeretek

ECTS Course description

Subject:	**Town Construction**	**Subject code:**	**NGB_EV005_1**
Credits:	2	**Lessons per week:**	3
Teacher:	Tibor Kuslits	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The beginnings of settlement and town development. The formation and characteristics of towns in different historical periods. Town construction until these days, region and regional planning. The structure of settlements, historical and modern town structures. Public transport, residential districts, industrial areas in towns and agglomerations. City centres, green areas. The aspects and practice of town planning. Town reconstruction, settlement plans, regulations.

Recommended material

Tóth Zoltán: A települések világa. Ponte Press Kiadó, Pécs, 1997.
Dr. Nagy Béla: A település, az épített világ. Lap- és Könyvkiadó Kft., 2005.
Rossi, Aldo: a város építészete. Bercsényi, Bp. 1986.
Mumford, Lewis: A város a történelemben. Gondolat, Bp. 1985.
Meggyesi Tamás: A városépítés útjai és tévútjai. Műszaki Könyvkiadó, Bp. 1985.

ECTS Course description

Subject:	**Traffic Engineering I**	**Subject code:**	**NGB_ET009_1**
Credits:	3	**Lessons per week:**	3
Teacher:	László Kálmán, Dr.	**Language:**	Hungarian
Email:	kalman@bauconsult.hu	**Term:**	spring
Pre-study requirements:	Mathematics II. Linear Algebra	**Assessment:**	exam

Description of the subject

Basic characteristics of traffic flow (traffic volume, speed, density), interrelations among them. Measurement and survey methods of traffic flow characteristics. Vehicle-road relation. Local traffic safety analyses. Environmental impacts and possibilities to influence them. Traffic regulation of running sections. Speed regulation. Types and traffic regulation of grade junctions. Types and traffic regulation of grade-separated junctions. Traffic management with traffic lights. Junctions with signal plan with fix timing. Information systems. Traffic calming. Pedestrians, cyclists. Preference of public transport.

Recommended material

Krizsán - Koren: Úttervezés és forgalomtechnika I-II. SZIF.
Az utak forgalmi szabályozásáról és a közúti jelzések elhelyezéséről. Forgalomtechnikai műszaki szabályzat. 20/1984. (XII. 21.) sz. KM-rendelet

ECTS Course description

Subject:	**Traffic Engineering II**	**Subject code:**	**NGB_ET009_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Emese Makó, Dr.	**Language:**	Hungarian
Email:	makoe@sze.hu	**Term:**	autumn
Pre-study requirements:	Traffic Engineering I	**Assessment:**	exam

Description of the subject

Outlines of transport management. Strategy, goals, tools. Transport demand management. Traditional and intelligent systems. Transport management and environment. Weak participants of transport. Traffic control signal lights. Linking of traffic lights, traffic control centres. Toll collecting systems. Parking control systems. Public transport in the integrated system. Safety management. PR work.

Recommended material

Fi István: Forgalmi tervezés, technika és menedzsment. Műegyetemi Kiadó, Budapest, 1997.

ECTS Course description

Subject:	**Traffic Planning and Control**	**Subject code:**	**NGB_KO031_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Gábor Fülöp, Dr.	**Language:**	Hungarian
Email:	fulopg@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The aim of the subject is to show the operation of public transport. The subject is the continuation of the subjects Public transport. It deals with fleet management planning and personal management planning. If focuses on methods and tools related to these.

Recommended material

Dr. Prileszky I. - Csonka B.: Gépjárműüzemszervezéstan III.
Dr. Prileszky I. - Csonka B. - Fülöp G.: Gépjárműüzemszervezéstan
Current papers from the literature
Articles from journals: Városi közlekedés, Közlekedéstudományi Szemle

ECTS Course description

Subject:	**Transport Administration**	**Subject code:**	**NGB_KO011_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Fülöp Gábor, Dr.	**Language:**	Hungarian
Email:	fulopg@sze.hu	**Term:**	autumn / spring
Pre-study requirements:	Legal Studies	**Assessment:**	continuous assessment

Description of the subject

The subject provides students with an overview of transport administration. It presents the conditions of freight and passenger transport, the concerning laws and regulations, the duties, the competence and the activities of the organizations of transport administration.

Recommended material

Literature selected by the teacher.
Concerning laws, regulations.

ECTS Course description

Subject:	**Transport Construction Project I**	**Subject code:**	**NGB_ET013_1**
Credits:	3	**Lessons per week:**	1
Teacher:	Ferenc Horvát, Dr., István Hausel	**Language:**	Hungarian
Email:	horvat@sze.hu, hauseli@sze.hu	**Term:**	spring
Pre-study requirements:	Transport Infrastructure I	**Assessment:**	continuous assessment

Description of the subject

Improvement of the students' knowledge in team work, where beside professional results ethical aims also play an important role. Transport construction project (preparation): collective thinking, task-sharing, utilising the advantages of co-operation, individual responsibility to reach the common goal.

Recommended material

OTÉK és különféle tervezési szabályzatok, irányelvek, előírások.
Építőipari költségvetés kiíró szövegkönyv és áradattár I., II., III., V., VI., ÉMIR - FÉMIR; 1998.

ECTS Course description

Subject:	**Transport Construction Project II**	**Subject code:**	**NGB_ET013_2,**
Credits:	3	**Lessons per week:**	1
Teacher:	Ferenc Horvát, Dr., István Hausel	**Language:**	Hungarian
Email:	horvat@sze.hu, hauseli@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Construction Project I	**Assessment:**	continuous assessment
Description of the subject			
Clarifying the aim of the project. Preparation of a work plan. Gathering and studying the necessary literature, standards etc., continuous ensuring of the background material of the work. Technical calculations, design. Preparation of detail plans. Examination of construction and management view-points. Analysis of cost factors. Technical report. Closing plan works.			
Recommended material			
OTÉK és különféle tervezési szabályzatok, irányelvek, előírások. Építőipari költségvetés kiíró szövegkönyv és áradattár I., II., III., V., VI., ÉMIR - FÉMIR; 1998.			

ECTS Course description

Subject:	**Transport Economics I**	**Subject code:**	**NGB_LO002_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Csaba Hegyi	**Language:**	Hungarian
Email:	hegyi@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject and contents of transport economics. Transport in reproduction process, the social-economic location and role of transport. Freight and passenger needs, freight and passenger demand and influential factors. Transport and logistics. Evaluation of economic effectiveness of production. Specialities in economic studies, relative character and the role of time factor. The interpretation of economic efficiency, general rate categories, production functions as the basis of economic activity modelling. Labour productivity, the main factors affecting labour productivity trends. Production costs, calculation. Analysis of cost change, specific methods for cost price calculation in transport. Cost functions, marginal costing. Profitability, its characteristics. Transport market, demand and supply, price trends. Socio-economic efficiency, the evaluation of the level of efficiency. External costs of transport, complex analytical methods of socio-econmic efficiency.

Recommended material

Dr. Tóth Lajos - dr. Bikás Ernő: Válogatott fejezetek a közlekedésgazdaságtanból

ECTS Course description

Subject:	**Transport Economics II**	**Subject code:**	**NGB_LO002_2**
Credits:	5	**Lessons per week:**	4
Teacher:	István Tömpe, Dr., Csaba Hegyi	**Language:**	Hungarian
Email:	hegyi@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Efficient allocation and utilization possibilities of limited resources. Transport labour division, international cooperation in transport. Labour division planning, economy and efficiency analysis. Quality of transport, optimal criteria. Management systems in transport, basic properties and groups of micro-economic systems. Management information basis, the fundamentals of accounting system. Basic types of transactions, sub-areas of accounting, use of information - controlling. Functional components of enterprise management. Functions of asset management, structure and groups of assets. Economical lifespan, the amortization. Operation of fixed assets, economic issues of maintenance and improving. Innovation policy, technological development. The concepts of replacement, expansion and investment. Investment funding, project management. Stock management systems, cost components, stock decision models. Labour management, labour supply planning. Work organization, motivation and encouragement

Recommended material

Dr. Tóth Lajos - dr. Bikás Ernő: Válogatott fejezetek a közlekedésgazdaságtanból
Dr. Bikás Ernő: Üzemgazdaságtan I.

ECTS Course description

Subject:	**Transport Informatics**	**Subject code:**	**NGB_KO004_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Sándor Zvikli, Dr., Balázs Horváth, Dr., Lajos Szabó, Richárd Horváth	**Language:**	Hungarian
Email:	zvikli@sze.hu, hbalazs@sze.hu	**Term:**	spring
Pre-study requirements:	Informatics I	**Assessment:**	exam

Description of the subject

The subject presents general and special transport information systems by showing system approach applications, the operation and the possible developments of current solutions.

Recommended material

Westsik György: Közlekedési informatika, Tankönyvkiadó, 1989.
Westsik György: Közlekedési informatika, telematika, Műegyetemi Kiadó, 1997.
Westsik György: Közlekedési informatika, SZIF, 1995.
Westsik György: Közlekedési informatika II., SZIF, 1996.
Zvikli S., Horváth B., Horváth R., Szabó L.: Közlekedésinformatika, SZE-Universitas, 2008.
Publications in journals

ECTS Course description

Subject:	**Transport Infrastructure I**	**Subject code:**	**NGB_ET007_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Ferenc Horvát, Dr., István Hausel	**Language:**	Hungarian
Email:	horvat@sze.hu, hauseli@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics II, Building Materials I	**Assessment:**	exam

Description of the subject

Hungarian road and rail network, international aspects. Road and rail classification. Road and rail vehicle dynamics (road and rail resistances, pull force types). Characteristics of rail bound traffic (width of track, loading gauge, clearance, movement in curves, adhesion). Acceleration and forces affecting road/rail vehicles in curves. Superelevation of road/rail (cause and effect, height of superelevation, superelevation ramp, design rules). Transition curves used in road/rail design. Calculation and setting out of pure and symmetric transition curve points. Rail basket curves and inflexion reverse curves. Road/rail cross-sections. Horizontal and vertical alignment of roads/rails, harmonisation. Design of road/rail grade-crossings. Road traffic issues (average daily traffic, design hourly traffic volume). Stopping and overtaking sight distance. Classification of road junctions, grade-crossings, grade separated junctions. Bicycle tracks. Materials of road pavement structure. Asphalt, concrete and stone pavements.

Recommended material

Major I. - Tóth G.: Út-, vasútépítés (J 19-620); Gajári J.: Vasútépítés I. Tankönyvkiadó, Budapest, 1983.

ECTS Course description

Subject:	**Transport Infrastructure II**	**Subject code:**	**NGB_ET007_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Kálmán Adorjányi, Dr.	**Language:**	Hungarian
Email:	adorjany@sze.hu	**Term:**	Autumn
Pre-study requirements:	Transport Infrastructure I, Geoinformatics II	**Assessment:**	exam

Description of the subject

Classification of roads, road network elements. Characteristics of traffic volume. Interrelations of road vehicle dynamics and design parameters. Stages of road location design. Road design specifications. Cross-sections rural and urban roads, public utilities. Road clearance, cross-section patterns. Truck climbing lanes. Pedestrian and bicycle lanes and tracks. Horizontal alignment of roads. Sight distances, circular and spiral curves, friction, superelevation. Curve widening. Vertical curves, crests and sags. Sight distances in vertical curves. Harmonisation of horizontal and vertical alignment. Spatial alignment, aesthetics of roads. Design of drainage system. Agency and user costs. Cost-benefit analyses. Environmental design of roads. Design problems of by-passes. At-grade junctions, roundabouts. Sight triangles. Grade separated interchanges. Design of roadside facilities, bus bays, rest areas.

Recommended material

A Policy on Geometric Design of Highways and Streets. AASHTO, 2004.
Nemesdy E. Úttervezés. 44474/1, Tankönyvkiadó, Budapest.
Fi István. Utak és környezetük tervezése. Műegyetemi kiadó, Budapest, 2000.
Dr. Krizsán-Dr. Koren: Úttervezés és forgalomtechnika I-II. J19-559/J19-574.
Adorjányi K.- Hausel I.- Kálmán L.- Koren Cs.: Úttervezés és forgalomtechnika gyakorlatok I-II. J 19-346-J 19-346a.

ECTS Course description

Subject:	**Transport Infrastructure III**	**Subject code:**	**NGB_ET007_3**
Credits:	3	**Lessons per week:**	3
Teacher:	Ferenc Horvát, Dr.	**Language:**	Hungarian
Email:	horvat@sze.hu	**Term:**	autumn
Pre-study requirements:	Transport Infrastructure I, Geoinformatics II	**Assessment:**	exam

Description of the subject

Development of rail track superstructure, track systems, loading power types affecting the track. The rail. Sleepers of the track and turn outs. Rail fastening systems. Rail joints mounted with fish plates. Rail welding. Crashed stone ballast. Protection layers. Superstructure of level crossings. Ballastless superstructure. Dilatation of the railway track. Continuous welded rails (CWR). Safety of the railway tracks against buckling. Rail fracture in winter times and their repair.

Recommended material

Gajári J.: Vasútépítés I. Tankönyvkiadó, Budapest, 1983.
Korszerű vasút, korszerű vasúttechnika. Vasútépítés és pályafenntartás I. és II. MÁV Zrt., 1999.

ECTS Course description

Subject:	**Transport Infrastructure IV**	**Subject code:**	**NGB_ET007_4**
Credits:	3	**Lessons per week:**	3
Teacher:	Csaba Koren, Dr.	**Language:**	Hungarian
Email:	koren@sze.hu	**Term:**	spring
Pre-study requirements:	Mathematics II	**Assessment:**	

Description of the subject

Approaches and process of transportation planning. Transport demand. Characteristics of mobility and its determinants. Transport supply. Characteristics of networks. Balance of demand and supply. Mobility management. Calculation and evaluation of delays. Traffic safety and its evaluation. Prognoses, scenarios. Classification of interventions, examples. Traffic calming. Parking. Designing for bicycle traffic. Modal share of public and private transport. Evaluation methods of road projects. Social acceptance, consultation. The assignments are related to bicycle traffic and parking studies.

Recommended material

Dr. Koren Csaba: Közlekedéstervezés. PMS, 1998.

ECTS Course description

Subject:	**Transport Planning and Operation Control**	**Subject code:**	**NGB_KO024_1**
Credits:	5	**Lessons per week:**	4
Teacher:	István Szily, Dr.	**Language:**	Hungarian
Email:	szily@sze.hu	**Term:**	spring
Pre-study requirements:	Railway System Technology	**Assessment:**	exam

Description of the subject

The aim of the subject is to show the goods transport flow, timetable and capacity planning at the railway. It focuses on the technological processes and process planning as well as the connections between economical and operational issues.

Recommended material

Kisbakonyi József: Vasúti üzemszervezés III. Tankönyvkiadó.
Teacher's handouts
Dr. Czére Béla: Vasúti technika kézikönyve. Műszaki Könyvkiadó.
Turányi István: Vasúti üzemtan. BME.

ECTS Course description

Subject:	**Transport Planning**	**Subject code:**	**NGB_KO006_1**
Credits:	3	**Lessons per week:**	3
Teacher:	István Prileszky, Dr., Balázs Horváth, Dr.	**Language:**	Hungarian
Email:	prile@sze.hu, hbalazs@sze.hu	**Term:**	autumn
Pre-study requirements:	Mathematics III	**Assessment:**	exam

Description of the subject

The subject presents the comprehensive system of transport planning. It shows the models used in transport planning, furthermore it helps students to develop a system approach way of thinking.

Recommended material

Prileszky István: Közlekedéstervezés.
Monigl János: Az országos, regionális és városi közlekedési hálózatok tervezésének néhány időszerű kérdése, Közlekedéstudományi Szemle, 1980/11.
Monigl János et al.: A városi közlekedésfejlesztés hatásainak értékelése, Városi Közlekedés, 1999/2.
Kövesné Gilicze Éva et al.: Időtényezőn alapuló keresleti függvények a városi közlekedésben, Városi Közlekedés, 1989/1.
Közúti közlekedési kézikönyv, 2.1. pont, Műszaki Könyvkiadó, 1978.

ECTS Course description

Subject:	**Transport Processes I**	**Subject code:**	**NGB_KO002_1**
Credits:	4	**Lessons per week:**	3
Teacher:	István Prileszky, Dr., Gábor Fülöp, Dr.	**Language:**	Hungarian
Email:	prile@sze.hu, fulopg@sze.hu	**Term:**	spring
Pre-study requirements:	Transportation	**Assessment:**	exam

Description of the subject

The subject presents the bases of transport processes and technologies and helps students to develop a system approach. It shows the processes of different transport sectors in order to support specialization.

Recommended material

Horváth Gábor, Ugróczky László: Közlekedési üzemtan I. jegyzet.
Koller Sándor: Forgalomtechnika és közlekedéstervezés, Műszaki Könyvkiadó, 1984.

ECTS Course description

Subject:	**Transport Processes II**	**Subject code:**	**NGB_KO002_2**
Credits:	4	**Lessons per week:**	3
Teacher:	Lajos Szabó, Gábor Horváth	**Language:**	Hungarian
Email:	szala@sze.hu	**Term:**	autumn
Pre-study requirements:	Transportation	**Assessment:**	exam

Description of the subject

The subject presents the bases of processes and technologies of road and rail transport thoroughly and helps students to develop a system approach in these fields.

Recommended material

Fülöp Gábor, Horváth Gábor, Prileszky István, Szabó Lajos: Közlekedési üzemtan II. jegyzet.
A közúti közlekedés kézikönyve I. kötet pp. 13-88, 481-528, 623-630, Műszaki Könyvkiadó, 1978.
Kövesné Gilicze Éva: Térbeni-időbeni intézkedések a városi közforgalmú közlekedés minőségének javítására, Városi Közlekedés, 1996/3.

ECTS Course description

Subject:	**Transport Safety**	**Subject code:**	**NGB_KO008_1**
Credits:	3	**Lessons per week:**	2
Teacher:	Holló Péter, Dr., Károly Arató	**Language:**	Hungarian
Email:	arato@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject presents the complex system of transport safety. It shows the role and the effects of technological and human aspects, the Hungarian and international actualities, the relation between transport safety and engineering, environmental protection, hygiene and education. It provides students with the opportunity to study the tasks, the conditions and the results of accident prevention.

Recommended material

Jankó Domokos (ed.): Közúti közlekedésbiztonság, NOVADAT, Győr, 1997.

ECTS Course description

Subject:	**Transport Statistics**	**Subject code:**	**NGB_RT030_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Dr. Éva Szalka	**Language:**	Hungarian
Email:		**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Definition and development of statistics, phases of statistic work. Common instruments of statistic analysis: graphic presentation, ratio numbers. Average values, statistic indices. Sampling, the methods of statistic estimation. Hypothesis examination, correlation and regression analysis. Timeline analysis.

Recommended material

Szalka Éva (2007) Statisztika I. és Statisztika II. Universitas Kht, Győr
Szalka Éva – Dusek Tamás (2007): Statisztikai képletek és táblázatok, Universitas Kht, Győr
Szalka Éva – Dusek Tamás (2008): Statisztikai példatár I., Universitas Kht, Győr
Szalka Éva – Dusek Tamás (2009): Statisztikai példatár II., Universitas Kht, Győr

ECTS Course description

Subject:	**Transport Technology I**	**Subject code:**	**NGB_KO003_1**
Credits:	4	**Lessons per week:**	3
Teacher:	Sándor Zvikli, Dr., Károly Arató, Gábor Horváth	**Language:**	Hungarian
Email:	zvikli@sze.hu, arato@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject presents the requirements against the technological background of modern transport systems, the main elements of transport roads and tracks, their tasks and classifications, properties, structures, operating conditions and effects.

Recommended material

Hausel István, Arató Károly, Horváth Gábor, Mudra István: Közlekedéstechnika I., NOVADAT, Győr, 1996.
Ábrahám Kálmán: A közúti közlekedés kézikönyve I., Műszaki Könyvkiadó, Budapest, 1978.
Czére Béla: A vasúti technika kézikönyve I., Műszaki Könyvkiadó, Budapest, 1975.

ECTS Course description

Subject:	**Transport Technology II**	**Subject code:**	**NGB_KO003_2**
Credits:	5	**Lessons per week:**	4
Teacher:	Sándor Zvikli, Dr., Gábor Fülöp, Dr., István Szily, Dr., Gábor Horváth	**Language:**	Hungarian
Email:	zvikli@sze.hu, fulopg@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject presents the general user requirements against modern passenger and freight transport devices (road, rail, pipeline, water and air transport), their functional elements, operating conditions and the forces effecting passengers and freight.

Recommended material

Antal A., Kőfalusi P., Fülöp G., Gál P., Szily I., Vincze K., Zvikli S.: Közlekedéstechnika II., SZIF-Universitas Kft., Győr, 1999.
Zvikli S., Vincze K.: Áruszállító járművek II., SZIF-Universitas Kft., Győr, 2000.

ECTS Course description

Subject:	**Transport Technology III**	**Subject code:**	**NGB_KO003_3**
Credits:	4	**Lessons per week:**	4
Teacher:	Sándor Zvikli, Dr., Tibor Héray, Dr., Ferenc Oláh, Dr.	**Language:**	Hungarian
Email:	zvikli@sze.hu, heray@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject presents the requirements against the controlling of modern transport systems, the structure and the properties of transport automation devices, their operating conditions and effects.

Recommended material

Héray T., Mudra I., Oláh F., Ugróczky L.: Közlekedéstechnika III., SZIF-Universitas Kft., Győr, 1997.

ECTS Course description

Subject:	**Transport Trade Technology I**	**Subject code:**	**NGB_LO004_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Gyula Szalay, Dr.	**Language:**	Hungarian
Email:	szalaygy@sze.hu	**Term:**	spring
Pre-study requirements:	Legal Studies	**Assessment:**	exam
Description of the subject			
The concept of transit and its variants, state regulation, intermedia regulatory instruments. The concept, subject and object of carriage contract, and strengthening of the transport contract. Carriage of the cargo vehicle (ordering, issuing, checking goods and packaging, quantity and quality testing rules and requirements for loading), the bill of lading and shipper declarations. The provisions of the implementation of transit (route determination, transport time, accompanying documents, transport barrier). The delivery of mail, the carrier's liability basis, responsibility for the delay, the enforcement of claims. Compound transit and transportation funds.			
Recommended material			

ECTS Course description

Subject:	**Transport Trade Technology II**	**Subject code:**	**NGB_LO004_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Pál Monori, Dr.	**Language:**	Hungarian
Email:	monorip@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Basics of price theory. Pricing characteristics of services. The concept of tariffs. Goods and personal tariff systems. Reimbursement of expenses. Transport pricing, tariff policy. International, domestic rail transport, groupage tariffs.

Recommended material

Dr. Benkő: Díjszabáselmélet (kijelölt fejezetek)
Nyakasné dr. - dr. Monori: Díjszabás példatár
Ártörvény (1990. évi LXXXVII. törvény)
Tisztességtelen piaci magatartás tilalmáról szóló törvény (1990. évi LXXXVI. tv.)

ECTS Course description

Subject:	**Transport Trade Technology III**	**Subject code:**	**NGB_LO004_3**
Credits:	2	**Lessons per week:**	2
Teacher:	Pál Monori, Dr.	**Language:**	Hungarian
Email:	monorip@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Macro- and micro-surroundings of enterprises. Market-related concepts, transport market. The concept of marketing, its necessity and role in transport. Consumer behaviour, interpretation of buying process in transport services. The service as a product. Interpretation of marketing-mix elements in passenger transport and freight transport. Marketing strategy.

Recommended material

Bauer-Berács: Marketing. Aula Kiadó
Dr. Kiss Mariann: Marketing mérnököknek
P. Kotler: Marketing management
Monori: Marketing II.

ECTS Course description

Subject:	**Transportation**	**Subject code:**	**NGB_KO001_1**
Credits:	4	**Lessons per week:**	4
Teacher:	Ferenc Kovács, Dr.	**Language:**	Hungarian
Email:		**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

The subject provides students with a general overview of the history, the elements, the main processes, the Hungarian and international organizations, regulations and the importance of transport. It shows the principles and the aims of transport policy, the requirements of the European integration and the tasks deriving from it.

Recommended material

Kovács Ferenc: Közlekedéstan, Universitas-Győr Kht., 2003.
Magyar István: Közlekedéstan I. Műegyetemi Kiadó, 1999.
Hegedüs Gyula: Közlekedéstan-Közlekedéspolitika, NOVADAT, 1995.

ECTS Course description

Subject:	**Urban and Landscape Design I**	**Subject code:**	**NGB_EV002_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Piroska Szabó Pekkerné	**Language:**	Hungarian
Email:	pekkerne.szabopiroska@regioplan.hu	**Term:**	spring
Pre-study requirements:	Urban Engineering II	**Assessment:**	exam

Description of the subject

Planning of green areas: functions and rule of green zones in the town planning. History of urbanism and garden architecture. Basics of garden planning, ground elements of the using of plants.

Recommended material

Jámbor Imre: Zöldfelületrendezés.
Ormos Imre: A kerttervezés története és gyakorlata.
Schmidt Gábor: Növények a kertépítészetben.
4D Tájépítészeti és kertművészeti folyóirat

ECTS Course description

Subject:	**Urban and Landscape Design II**	**Subject code:**	**NGB_EV002_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Piroska Szabó Pekkerné	**Language:**	Hungarian
Email:	pekkerne.szabopiroska@regioplan.hu	**Term:**	autumn
Pre-study requirements:	Urban and Landscape Design I	**Assessment:**	exam

Description of the subject

Landscape-using, landscape ordination and environment planning. History of landscape planning, links with other special professions. Landscape survey, valuation of the environment. Self-supporting solution of planning problems. Effects of the natural environment. Links between urbanism and landscape planning. Tasks and monitoring in research, landscape ordinances, planning of the environment.

Recommended material

Csemez Attila: Tájtervezés – tájrendezés.
Kubinszky Mihály: Táj és építészet.
4D Tájépítészeti és kertművészeti folyóirat

ECTS Course description

Subject:	**Urban Engineering I**	**Subject code:**	**NGB_ET006_1**
Credits:	3	**Lessons per week:**	3
Teacher:	Csaba Koren, Dr., Emese Makó, Dr.	**Language:**	Hungarian
Email:	koren@sze.hu, makoe@sze.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Characteristics of settlements, concentration processes of settlements (causes, quantitative characterisation). Functions, density of infrastructure networks. Interrelations of infrastructure networks and settlement networks. Traffic volume distribution on road networks. Urban sprawl (grid, directions, limits). Land use patterns. Interrelations of land use and traffic (intensity, function, location, traffic, parking). Definition and regulation of building indices. Contents of master plans. Traffic facilities and public utilities of settlements. Infrastructure development dilemmas (branch-area, compromise-compensation, national-regional-local, public-private). Contents of settlement development plans. Environmental impacts of facilities. Definition of sustainable settlement and traffic development.

Recommended material

Tóth Zoltán: Települések világa. Ponte Press, Pécs, 2000.

ECTS Course description

Subject:	**Urban Engineering II**	**Subject code:**	**NGB_ET006_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Iván Németh, Dr., Emese Makó, Dr.	**Language:**	Hungarian
Email:	makoe@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam
Description of the subject			
Lectures: interdisciplinary of urban planning; sharing the work among the settlements; stages of settlement development; areal co-operations; settlement grid: humane and technical infrastructures, built up conditions, operation, impacts; settlement plan types: development and master plans; protection of settlement environment. Seminar: supply functions of settlements, gathering and processing demographic data; identification of existing land use and road network; evaluation of public transport network; identification of existing built in conditions and intensity; SWOT analysis, literature survey via internet and elaboration.			
Recommended material			

ECTS Course description

Subject:	**Urban Planning I**	**Subject code:**	**NGB_EV006_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Tibor Kuslits	**Language:**	Hungarian
Email:	kuslits.tibor@sopron-ph.hu	**Term:**	spring
Pre-study requirements:	-	**Assessment:**	continuous assessment

Description of the subject

The students designate a problematical preferably central urban space in a well-known settlement on their own intention (birthplace, city of their school, etc.) and make out a complex analysis based on given aspects. According to the edifications of the analysis they work out developing proposal.

Recommended material

Paulhans Peters: A város az emberért.
Bernard Oudin: A város védelmében.

ECTS Course description

Subject:	**Urban Planning II**	**Subject code:**	**NGB_EV006_2**
Credits:	3	**Lessons per week:**	3
Teacher:	Tibor Kuslits	**Language:**	Hungarian
Email:	kuslits.tibor@sopron-ph.hu	**Term:**	autumn
Pre-study requirements:	Urban Planning I	**Assessment:**	continuous assessment

Description of the subject

The students elaborate an architectural-urban design based on the developing proposal worked out in the previous phase of the subject.

Recommended material

Paulhans Peters: A város az emberért.
Bernard Oudin: A város védelmében.

ECTS Course description

Subject:	**Vernacular Architecture**	**Subject code:**	**NGB_EV004_1**
Credits:	2	**Lessons per week:**	2
Teacher:	Tibor Kottmayer	**Language:**	Hungarian
Email:	koti@sze.hu	**Term:**	autumn
Pre-study requirements:	-	**Assessment:**	exam

Description of the subject

Definition and types of architectural spaces. Elementary spaces. The "message" of the spaces. Construction and the Art of Architecture. Communication, functionalism and symbolism. Levels of architecture: the sense of history. Vernacular architecture in the Carpathian Basin. The country house and their environment. Types of dwelling houses. Building materials and constructions in the vernacular architecture. Developing of decoration in the architecture: function and aesthetic importance.

Recommended material

István fi Gyula: Népi építészet, elemi építészet.
Kottmayer Tibor: Népi építészet (electronic textbook).
Magyar néprajz III. Építkezés.
Moskovszky Éva: Sors és játék – A táblás játékok eredet és őstörténete

ECTS Course description

Subject:	**Voluntary Support Practice**	**Subject code:**	**NGB_SM044_1**
Credits:	4	**Lessons per week:**	4
Teacher:	László Tóbiás	**Language:**	Hungarian
Email:	tlaszlo@sze.hu	**Term:**	autumn/spring
Pre-study requirements:	-	**Assessment:**	continuous assessment
Description of the subject			
Students meet with social groups who need special support for some reasons, they contribute to the improvement of these people's welfare. During the practice they gain experiences about social problems and their treatments, in addition they become acquainted with the opportunities of empirical learning. Students should include intellectual responsibility in their self-image for social integration, and the active participation in handling social problems.			
Recommended material			

ECTS Course description

Subject:	**Waste Management**	**Subject code:**	**NGB_KM014_1**
Credits:	6	**Lessons per week:**	4
Teacher:	András Torma PhD, Adrienn Buruzs	**Language:**	Hungarian
Email:	andras.torma@audi.hu, buruzs@sze.hu	**Term:**	autumn
Pre-study requirements:	Chemistry II	**Assessment:**	project work and exam

Description of the subject

General questions, principles and legal frame of waste management. Methods of selective waste collection. Recultivation of old landfills. Establishment and operation of modern regional landfills. Economical regulation of waste management. Waste treatment methods. Features of industrial waste. Physical and chemical methods of waste treatments. Waste management and logistics of manufacturing plants.

Recommended material

Hulladékgazdálkodás. Szerk.: Dr. Csőke, B. 2008. HEFOP 3.3.1.P-2004-0900152/1.0 (electronic textbook)
Dr. Nagy Géza - Torma András - Vagdalt László (szerk.): A környezeti teljesítmény javítása és értékelése, Universitas-Győr Kht., Győr, 2006.
The slides of the course.

ECTS Course description

Subject:	**Water Protection**	**Subject code:**	**NGB_KM011_1**
Credits:	6	**Lessons per week:**	4
Teacher:	Anikó Zseni, Dr.	**Language:**	Hungarian
Email:	zseniani@sze.hu	**Term:**	spring
Pre-study requirements:	Technical Chemistry, Geology and Geophysics I	**Assessment:**	exam

Description of the subject

Hidrogeography. Physical, chemical, biological components, properties and pollutants of water. EU Water Framework Directive. Regulation of riverways (technology and environmental results), flood prevention and its environmental effects. Water treatment technologies: drinking water treatment, sewer systems, sewage treatment. Social and economic water cycle in Hungary. The quality of surface and under surface water in Hungary. Water law.

Recommended material

Zseni Anikó: Vízvédelem. Lecture notes, UNIVERSITAS-GYŐR Nonprofit Kft., Győr, 2009.
HEFOP e-textbooks (2008): Környezetföldtan; Környezetvédelmi műszaki technológiák, technológiai rendszerek modellezése, ipari technológiák és szennyezéseik; Vízgazdálkodás-Szennyvíztisztítás; Földünk állapota: http://www.mk.uni-pannon.hu/hefop33