

**The courses' availability depends on the minimum number of registered students (5). If the course couldn't start, students can still complete it in the form of project work and regular consultations with the supervising teacher.**

## Courses in English

### Hungarian Language and Culture

**Number of Credits: 2**

lecturer: Dr. Katalin Kiss

requirements: report (mid-term mark)

**The objective:** The aim of the course is to provide useful knowledge about Hungary, Hungarian culture, history and the basics of Hungarian language.

Course summary: The program consists of language and cultural studies and provides opportunities to actively explore Hungary and contemporary Hungarian culture. During the language training students learn the basic rules of grammar, pronunciation, reading, words and expressions in everyday situations.

In the framework of cultural studies the students learn about history, geography, folklore, art history and social issues.

#### Topics

Language:

Pronunciation, Hungarian alphabet, giving your name, nationality, occupation  
Greetings, personal pronouns, intonation, vowel harmony, everyday  
conversations

Culture:

History of Hungary, National Symbols, Hungarian cuisine, Geography, regions,  
nature, Traditional culture, folklore, Hungarian holidays and their celebrations

### Computer Architecture (I)

**Number of Credits: 4**

Lecturers: Dr. István Vári-Kakas

Requirement: written exam

**Purpose of the subject:**

Computer Architecture is a basic subject worldwide for the students in Computer Engineering and Information Technology. Our course is based on the most recent edition (2015) of William Stallings's textbook, which covers as well the evolution and the actual implementations of the related concepts. The main goal of the course is to give a solid understanding of the organization of computers from a hardware perspective along with a lot of practical examples. Most of the examples are given from the Intel and ARM families, the first being widely used in personal computers and the second in embedded applications like cell phones, iPods and remote controls. The main principles and techniques used in the design of computers are illustrated by interactive simulations.

**Topics:**

The topics covered throughout the course include the following:

- computer evolution and performance
- number systems and representations
- computer components and interconnections
- CISC and RISC processors
- pipelining and superscalar processors
- internal memory
- cache memory
- external memory
- input/output
- multicore computing

## Project Management

### **Number of Credits: 2**

lecturer: Dr Endre Horvath

requirements: report (term paper)

### **Purpose and requirements of the subject:**

- Get acquainted with the methods and techniques used in the preparation, planning, management and realization of projects (technical buildings, developments, change). Practice their implementation and result facilitation techniques through case studies. The overall change in the economic structure, the cumulative effects of altered property relations have invoked changes that having a huge impact on management mindset and behaviour.
- Following a theoretical foundation, students will get acquainted with the use of the software Microsoft Project, in the form of a laboratory practice.

### **Topics:**

The foundation and functions of Project Managements

- General concepts
- Project life cycle
- Cost-time-quality balance

Project definition

- Project stakeholders and participants
- Project documents

Project Planning

- Risk management
- Work breakdown structure (WBS)
- Timing, Logistics, local connections
- Realistic scheduling
- Accurate estimating
- Network planning methods
- Cost planning
- Project balancing

Project Management

- High performance project team
- Project tracking

- Enterprise Project Management
- Project-, Program- and Portfolio Management
- Agile approach

## Strategic and Business Planning

### **Number of Credits: 5**

lecturer: Dr Endre Horvath

requirements: report (term paper)

### **Purpose of the subject:**

To introduce students into

- the basics of strategic management, its concepts and tools, methods of implementation,
- the philosophy of strategic and management systems, their basic approach, the principles of strategic thinking,
- the tools of strategic management, contemporary methods of evaluation and the selection criteria of the required strategy;
- the process of business planning, on the basis of which students will be able to create the business plan for an organisation.

## Visual Programming

### **Number of Credits: 4**

lecturer: György Mészáros

requirements: exam

### **Purpose and requirements of the subject:**

- The goal of the subject is the introduction of a widely used, Windows-based development environment, i.e. the Microsoft Visual Studio, and

getting acquainted with some of its popular .NET programming languages like Visual Basic or C #.

**Topics:**

- After getting acquainted with the foundation of programming, the students will learn the basic steps of developing Windows-based programmes by applying object oriented planning and implementation techniques, setting up the graphical user interface, and setting up event driven control, which can be used in similar development environments.
- Requirements:
- Practical knowledge of the Microsoft Windows Operating System and the MS Office Software Suit.

**Business Communication**

**Number of Credits: 3**

lecturer: Dr Endre Horvath

requirements: practical

**Purpose and requirements of the subject:**

The basic purpose of this subject is to develop effective communication and attitude-behaviour skills required in business life. In order to improve business communication skills, various practical tasks, case studies, tests, situational exercises and consultations supplement the theoretical grounding of communication theory. Students acquire the communicational knowledge necessary for career management and to effectively develop successful business relationships.

**Description of the subject:**

The first task of the students is to get acquainted with the basic approach and terminology of communication enabling them for a later independent study of communication theory reference material. This is followed by the introduction of well-known models and the study of the dynamics of communication as a necessity and a socially embedded activity. Students will be able to identify different roles,

communication channels and targets. With this theoretical foundation they are ready to implement it in the context of business communication.

**Application Development Technology**

**Number of Credits: 5**

lecturer: Dr Elemér Károly Nagy

requirements: computer exam

**Objective:**

Students finishing this course should be able to create an advanced Java application that could run on multiple computers or processors, and/or participate in a distributed developer team to do so.

**Topics:**

- modern software development methods
- build tools, release management
- unit testing, integration testing, test frameworks, continuous integration
- higher level visual components
- patterns: singleton, MVC, ...
- events, event handlers, java.awt.Robot, Reflection API
- threads, multi-thread programming
- JProgressBar, JTabbedPane, JTable
- MVC: model, renderer, editor
- Properties, I18N, L10N
- running external programs, JNA, JNI
- documentation, javadoc, Doclet API
- installing, running Java programs, jar, class, exe
- DB layer of multi-tier applications
- serialization and deserialization: XMLEncoder, XMLDecoder
- SQL queries: dynamic, prepared statements, pooling

## Image Processing

### **Number of Credits: 5**

lecturer: Dr. József Berke

requirements: exam

### **Purpose and requirements of the subject:**

Our goal is to provide students with a comprehensive picture of the jobs at the end of their digital image processing topics of theory and practice, as well as major development and application trends in the near future. Students, with digital imaging multimedia instructor systems / DIGKEP v7.0 / using the theory and practical applications related tasks solved.

### **Topics:**

Introduction

- Digital image processing concept, historical overview.

Human and machine vision

- Comparison of human and artificial vision systems. Image sensors in practice.

Image Processing Tools

- Input, storage, processing, copy, coding, compression and transmission.

Digital Imaging

- The digital imaging model, sampling, quantization, restoring a continuous image.

Image Enhancement

- Basic concepts, image restoration, Look-up-table transformations, noise reduction, edge enhancement, multi-band image correction.

Geometric Correction

- The geometric correction model, coordinate transformations, homogeneous coordinates, into practice.

Segmentation

- Segmentation aims, model, split, merge, edge detection.

Classification

- The classification model, statistical pattern recognition, clustering, pattern recognition, texture analysis.

Image Encoding and Compression

- Redundancy, expectations, lossless and lossy image compression, compression of moving images.

Applications

- agricultural applications,
- medical applications,
- remote sensing,
- digital photography,
- machine vision systems,
- digital video,
- computer animation,
- optical character recognition,
- visual data formats,
- criminal and security applications.

## Multimedia

### **Number of Credits: 5**

lecturer. Dr. Beáta Jarosievitz

requirements: exam

### **Purpose and requirements of the subject:**

The purposes of the subject are as follows:

- To acquaint students with the multimedia, information processing technology in general (audio, video, Internet, interactivity)
- To acquaint students with the most important hardware and software components, their operation characteristics and application possibilities.
- Theoretical lectures are followed by laboratory practices to develop the skills of the students in handling multimedia applications.

At the output of the course the student has to be able:

- to create little animation from a set of photos
- to create colourful multimedia projects (video movies with sound)

### **Topics:**

### **Lectures:**

- Basics of multimedia, introduction to multimedia systems

- Discussing the importance of multimedia in different fields of society
- Design steps of a multimedia project. General considerations
- Storage media for digital technology (CD, DVD, BD).
- Multimedia applications (OCR, hypertext, hypermedia etc.).
- Human vision and informatics. Light, colours, etc.
- Image processing, comparison of different procedures of pictures' compression, animations
- Human hearing (acoustics). Sound, different frequencies, sampling.
- Digital technique of the sound, digitalizing different sounds, processing of the sound.

Multimedia and the internet, different animations, movies, videos, video technique Videoconferencing

**Laboratory:**

- Use of different Web 2.0 programs for manipulation of the images, use of professional photo editor program (Photoshop). Creation of animations.
- 1st practical exam: creating of animation
- Introduction to use of video editing programs
- Use of video editing programs: Adobe Premier Pro, etc.
- 2nd practical exam: creating a little film with music, subtitle and narration.

**Requirements:**

- Should be able to solve all exercises discussed during laboratories
- Pass the practical exam (see study guide for detailed requirements)

**Remote Sensing**

**Number of Credits: 4**

lecturer: Dr. József Berke

requirements: exam

**Purpose and requirements of the subject:**

The course in addition to the basics of remote sensing, are presented in terms of the most important concepts, procedures, standards, tools, and processing of remote sensing information related to specialized areas through a number of practical examples. Our goal is to provide students with a comprehensive picture of the jobs at the end of their theoretical and practical topics of remote sensing, as well as major development and application trends in the near future.

**Topics**

- Introduction. The concept of remote sensing. The place and role in the industrial and economic systems of remote sensing.
- The physical basis of remote sensing. EM radiation, emission and reflexion.
- Basic methods of remote sensing (active and passive).
- The most important basic concepts used in the survey to characterize the air.
- Multi- and hyperspectral devices and their applications.
- Satellite remote sensing systems.
- Ground reference tools and applications - GNSS, digital video / image capture devices.
- Field measurements (planning, implementation and evaluation).  
Interactive field measurement protocol
- Hardware and software tools for computer processing of the information obtained through remote sensing.
- Photogrammetric. The basic concepts of image restoration.
- Image classification and practical implementation.
- Monitoring and index analysis.
- Creating a virtual terrain model. The integration of remote sensing data into GIS. Remote sensing and the Internet.
- The worldwide use of remote sensing. Solving practical exercises, based on aerial and satellite images.

### Research Methodologies

**Number of Credits: 3**

lecturer: Endre Horvath, PhD

requirements: report (term paper)

**Purpose of the subject:**

The course covers the basics of scientific research as applied in social studies and natural science. Basic terms are presented and practical tools are introduced in order to prepare students for writing research papers, and thesis projects. Best practices and evaluation benchmarks are discussed.

As a result, students will be able execute experiments, observations and conduct interviews, and present findings. Course evaluation is based on submitted and presented term papers describing individual or group research projects.

**Topics:**

1. Introduction
2. Theory, Research, Statistics
3. Social and Natural Science
4. Successful Research Projects
5. Research Planning
6. Research Indicators
7. Research Samples
8. The Experiment
9. The Questionnaire
10. The Field Research
11. Secondary Research
12. Impact Assessment
13. Data Analysis
14. Presentation of Findings
15. Evaluation

### Open Source Operating System

**Number of Credits: 4**

lecturer: Dr Elemér Károly Nagy

requirements: computer exam

**Objective:**

This subject aims to teach the students basic usage and administration of a Free and Open Source Operating System (Debian 10) while venturing into the internal workings of such a system.

During the course, the student is introduced to:

- \* installation and configuration of Debian 10
- \* encrypted and multi-path devices (RAID, LVM, LUKS)
- \* BASH programming

During the course, the student is expected to

- \* get comfortable with installing and using a Debian 10 Linux system
- \* understand the possibility of implementing free services with Linux
- \* learn the basics of scripting

**Topics:**

- \* installing Debian
- \* block devices, partitions, RAID, LVM, encryption, local file systems
- \* basic commands to copy, edit, delete files, directories
- \* adding and deleting users, changing passwords and user meta-data
- \* changing permissions, designing a Unix-style permission system
- \* BASH programming
- \* network configuration
- \* installing and removing programs, packages, services
- \* configuring and restarting services
- \* firewalls: iptables
- \* encrypted traffic: SSH, HTTPS, SCP/SFTP

## Mobile Application Development

### **Number of Credits: 5**

lecturer: Dr Elemér Károly Nagy

requirements: mid-term grade

### **Objective:**

This subject aims to teach the students to create Android applications that run on multiple mobile devices and are of professional quality.

During the course, the student is introduced to

- \* the history of mobile computing, mobile phones and Android
- \* using Android Studio to design user interfaces for different devices
- \* simple GUI components used in Android applications
- \* multi-threading and networking in Android

During the course, the student is expected to

- \* actively use the previously achieved object-oriented software design methods
- \* create easy-to-use (ergonomic) user interfaces
- \* use relational databases in the applications

### **Topics:**

- \* the history of mobile computing, mobile phones and Android
- \* Android - the platform, and the Linux beneath
- \* multi-language and multi-resolution applications
- \* GUI in Android vs. GUI in Java
- \* Android GUI I: XML, R, findViewById, ConstraintLayout, gravity
- \* Android GUI II: ListView, using multiple layouts
- \* event handlers in Android
- \* multi-threading (AsyncTask): a must in complex Android apps
- \* Activities: a GUI designed for small screens
- \* sound and animation in Android
- \* lifecycle of an Android application
- \* files and directories of Android applications