



UNIVERSITETI I EVROPËS JUGLINDORE
УНИВЕРЗИТЕТ НА ЈУГОИСТОЧНА ЕВРОПА
SOUTH EAST EUROPEAN UNIVERSITY

Study program Computer Sciences (2019/2020)

Faculty	Contemporary Sciences and Technologies
Study Cycle	First Cycle (Undergraduate)
ECTS	240
Code	CE-240
Title	Bachelor of Science in Computer Sciences / Module: Computer Engineering
Accreditation archive number [240]	03-30/2
Decision for starting of the program	03-28/4 (31.05.2019)
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Description of the program

The Faculty of Contemporary Sciences at SEEU - Tetovo is a higher education institution with a general objective to perform high-educational, scientific-research activity in the field of Computer Sciences, Computer Engineering and Business Informatics.

Specific fields at the Faculty of Contemporary Sciences and Technologies for the study program Computer Engineering are: Computer hardware and System software, Embedded computer systems, their design and programming, Basic Concepts of Computer Engineering, Fundamentals of Electrical Engineering and Electronics, Automatic Control Systems and Real-time Systems, Computer Networks, Wireline and Wireless Computer Networks, Grid Computing and Distributed Computing Systems, Multimedia and Multimedia Systems, Data Transfer and Telecommunication Systems, Data Bases, Information Systems and their design etc. These disciplines possess great potential for raising the quality of the education.

The restructuring of the lectures is designed in order to meet the requirements of the local market (through analyzing the requirements of the IT companies and organizations in the RNM), while providing a modern and global perspective.

Programme Objectives

- To enable students to gain a wider communication, language and analytical skills.
- To enable students to acquire theoretical and practical knowledge of information and communication technologies, and to apply them in real life and their professional practice.
- To empower students to engage in the development and implementation of various solutions in information and communication technologies.
- To enable students to work on projects, individual or group that by nature, may be scientific-research, development and practical work.
- To provide a good basis for further adaptation to new technology/market changes and their implications.
- To provide skills to support the organization, realization and implementation of methods and procedures in other areas.

Career

After successfully completing the program, graduated students will have the opportunity to be employed in different IT areas, where they could effectively use the different technologies which are present in the fields of Information Technology, Computer Systems, Computer Networks, Information Systems, Automated Control, Multimedia and Telecommunication

Systems, test and validate them, evaluate different platforms and develop optimal solutions.

They will be able to: design, create and maintain computer-based systems and computer networks as well as apply hardware-oriented solutions; maintain the system software; maintain automated control systems; develop multimedia systems; manage information and telecommunication systems.

Learning outcomes

Knowledge and understanding

- Demonstrates knowledge and understanding in the fields of Computer Science, Information Technology and fundamentals of Electrical Engineering.
- Demonstrates knowledge and understands the fields of Information Technology, Computer Hardware and System Software, Computer Networks, Information Systems, Control Systems, Multimedia and Telecommunication Systems.
- Has an advanced knowledge of English language.

Applying knowledge and understanding

- Design, create and maintain some computer-based systems as well as apply hardware-oriented solutions.
- Design, implement and service computer networks and communication systems.
- Realize and maintain control systems, embedded systems, multimedia systems and information systems.
- Implement applicable solutions to a hardware-software-oriented problem, starting with the stage of analyzing, designing and implementing to the stage of performing, testing, performance analyzing and maintaining.

Making judgement

- Evaluate, contextualize and take decisions on appropriate hardware and software solutions.
- Use problem-solving techniques to effectively provide ICT solutions.
- Decide on usage of appropriate development tools.

Communication skills

- Participate and organize team work.
- Present, document and communicate technical documentation.
- Evaluate, argument and report solutions to different issues, problems, and ideas in the field of ICT.
- Find, organize and classify information in the field of ICT (hardware/software docs, manuals).

Learning skills

- Is able to learn and use new hardware components.
- Acquires and use new and updated system software.
- Evaluates, learns and uses new tools in creating and/or maintaining hardware-software solutions.
- Demonstrates workshop and laboratory skills.

List of courses

Semester 1

- [CCS-203] [6.0 ECTS] **Programming**
- [CCS-101] [6.0 ECTS] **Introduction to Computer Sciences**
- [CCS-104] [6.0 ECTS] **Calculus 1**
- [3.0 ECTS] **Albanian/Macedonian Language**
- [3.0 ECTS] **English Language**
- [6.0 ECTS] **Elective course (Language, Skills or Culture)**

Semester 2

- [CCE-205] [6.0 ECTS] **Digital Circuits Design**
- [CCS-303] [6.0 ECTS] **Object - Oriented Programming**
- [CCS-204] [6.0 ECTS] **Calculus 2**

- [3.0 ECTS] **Albanian/Macedonian Language**
- [3.0 ECTS] **English Language**
- [6.0 ECTS] **Elective course (Language, Skills or Culture)**

Semester 3

- [CCS-202] [6.0 ECTS] **Computer Architecture**
- [CBI-203] [6.0 ECTS] **Discrete Structures**
- [CCS-301] [6.0 ECTS] **Algorithms and Data Structures**
- [6.0 ECTS] **English for Specific Purposes**
- [6.0 ECTS] **Elective course (Professional)**

Semester 4

- [CCS-401] [6.0 ECTS] **Operating Systems**
- [CCS-403] [6.0 ECTS] **Databases**
- [CCS-402] [6.0 ECTS] **Applied Probability and Statistics**
- [CCE-405] [6.0 ECTS] **Signal Processing**
- [6.0 ECTS] **Elective course (Professional)**

Semester 5

- [CCS-503] [6.0 ECTS] **Computer Networks**
- [CCE-505] [6.0 ECTS] **Embedded Microprocessor Systems**
- [CCS-502] [6.0 ECTS] **Software Engineering**
- [6.0 ECTS] **Elective course (Professional)**
- [6.0 ECTS] **Elective course (Professional)**

Semester 6

- [CCS-602] [6.0 ECTS] **Distributed Systems**
- [CCE-605] [6.0 ECTS] **Software Design and Architecture**
- [CCE-606] [6.0 ECTS] **Software for Embedded Systems**
- [6.0 ECTS] **Elective course (Professional)**
- [6.0 ECTS] **Elective course (Professional)**

Semester 7

- [CCE-703] [6.0 ECTS] **Introduction to Data Science**
- [CCS-701] [6.0 ECTS] **Project Management**
- [CCS-802] [6.0 ECTS] **Logical and Functional Programming**
- [6.0 ECTS] **Elective course (Professional)**
- [6.0 ECTS] **Elective course (Professional)**

Semester 8

- [CCS-804] [6.0 ECTS] **Information Security**
- [EACS-14] [6.0 ECTS] **Intelligent Systems**
- [CCE-603] [6.0 ECTS] **Capstone Project**
- [6.0 ECTS] **Elective course**
- [6.0 ECTS] **Elective course**

Description of courses

Core courses

- **Programming**

The course offers an introduction to programming and covers concepts such as basic data types, arithmetic,

operators, input-output commands, conditional structures, loop structures, functions, recursion, algorithms dealing with arrays and matrices, search and sorting algorithms, pointers and pointer operations, declaration of custom data structures.

- **Introduction to Computer Sciences**

This course presents a wide, integrated introduction to fundamental concepts of computer sciences. The following subjects are covered: history of computing; digital logic and digital systems; introduction to computer architectures, basic algorithmic, problem solving and data structures; introduction to programming languages, operating systems, databases, networks, web and software engineering; application types, including specific software descriptions (word processors, database, browsers, etc.); traditional and multimedia data processing.

- **Calculus 1**

The aim of the module is to provide students with mathematical knowledge from the part of functions (as a special mapping), the ways of defining a function, features of the function, continuity of the function. To provide with a knowledge about the limit of a function and other properties as a derivatives of a function. The aim is also to apply the concept of the derivative in finding the monotony and the extreme values of a function which is used in sketching the graph of a function as a very important tool in understanding and analysing everything concerning the given function. Then the aim is to find the integral of a function and to apply it in solving different problems. The aim is also to provide students with numerical methods and solutions of the above mentioned topics in order to have the straightforward application in the field of computer sciences. The aim is also to learn some concepts from matrix computation, determinants and solving the systems of linear equations.

- **Digital Circuits Design**

The aim of the module introducing the students to the topics that include combinational and sequential circuit analysis and design, digital circuit design optimization methods using random logic gates, multiplexers, decoders, registers, counters and programmable logic arrays.

- **Object - Oriented Programming**

The course objective is to introduce the student to the basic concepts of object-oriented programming through the C++ programming language. For that purpose the concepts of objects and classes are introduced. Students will be introduced to class inheritance, hierarchy and polymorphism. Upon the completion of the course the student will be capable to understand the principles of object-oriented programming and capable for programme writing by using the C ++ programming language.

- **Calculus 2**

The aim of the module is to provide students with mathematical knowledge that has a straightforward application for engineers in computer engineering. A part of the concepts dealt within this module are already known to the students, but the aim here is to formalize these to a level up which allows them to provide ideas for solving different practical problems. The aim is to provide students with the knowledge concerning sequences, understand and apply numerical series, Fourier series, then understand the concept of differential equation of the first order and of the bigger order, understand the system of linear differential equations, as well as the Laplace and the inverse Laplace transformation.

- **Computer Architecture**

This course covers the design and technology behind modern computer architectures and machine programming. It provides a detailed overview of the hardware and software components, the structure, organization and relationship of the subcomponents of a computer, as well as their performances.

- **Discrete Structures**

The objective of this module is to provide students with mathematical knowledge that have direct application in the Business Informatics field. Some of the concepts provided in this course are already familiar to the students, but the objective here is even greater, to formalize these concepts to an even higher level that will allow them to enrich their range of ideas and apply them while solving various practical problems.

- **Algorithms and Data Structures**

Through this course, students will learn about fundamental concepts and principles of algorithm analysis and design, and in using different data structures. It reviews different algorithms for solving the same problem. It reviews in details the time and space complexity of algorithms and establishing criteria for finding the best algorithm. It studies the

design of different, well-known data structures (linear and nonlinear) and considers the possibility of creating new data structures, as well as their concrete application. The final part of the course represents an introduction to graphs and reviewing of basic models for graph-algorithms. Students become familiar with different abstract data types and algorithms, which allow further direct involvement in analyzing, designing and application of specific software projects.

- **Operating Systems**

The main objective of this course is to introduce the fundamental concepts behind operating systems (OS). As an intermediate level between the hardware and the application level, operating systems need to control and share computer resources. This course starts with a short introduction of the main OS concepts, their evaluation and detailed analysis. The discussion, among others, covers processes and tasks, synchronization points, memory management, input/output devices, file systems and security. The second part of the course deals with the concepts of distributed, multimedia and on-chip operating systems. At the end, the concepts of mobile operating systems will be covered. All these concepts will be accompanied with case studies of specific OS in each category.

- **Databases**

The course is an introduction to the database concepts and systems. After completing this subject, students will be able to use models and concepts while designing databases. They will be able to use and design simple specific databases, based in the relational database model, use MS SQL Server system for managing databases (DBMS), SQL language and implementation of queries.

- **Applied Probability and Statistics**

The course objective is to provide students with the required knowledge of probabilities and statistics that have direct application in computer sciences. The goal is to learn about the processing of statistical data, their rules and presentation, and the laws for appropriate conclusions based on processed data. Furthermore, the students will learn about basic principles of probability and their application in different areas of everyday life, especially in the field of computer science.

- **Signal Processing**

- Understanding the display of the signal in the timely and frequency domain;
- Understanding sampling, sampling theorem;
- Understanding the systems, linear time-invariant system;
- Understanding convolution and discrete convolution;
- Fourier transform, discrete Fourier transform and use;
- z-transform, use of z-transform;
- Discrete filter design.

- **Computer Networks**

The course objective is to introduce the basic concepts and principles of computer networks. It reviews the different network components and their interaction. It provides a detailed overview of network architectures and their design. The course illustrates the concepts behind important network architectures such as Ethernet and the Internet. The students will obtain the skills needed to analyze, design and implement LAN networks and optimization of their performance.

- **Embedded Microprocessor Systems**

This course aims to give students a thorough understanding of the architecture of microprocessors and microcontrollers, and how they can be programmed. The in-depth analysis of 8-bit and 16-bit architecture is designed to provide students with the fundamentals of microprocessor and microcontroller construction as well as the principles of their evolution. By analyzing different instruction formats, addressing modes and programming models, the course intends to provide students with a methodology for programming in assembly language, as well as programming in C, use of specific libraries and operating systems to design microcontroller based systems. Also, students will learn different aspects of the use of microprocessors and microcontrollers and their communication with external integrated circuits.

- **Software Engineering**

The course objective is to provide students with in depth, critical and systematic understanding of principles and techniques of software specification, analysis and design, programming, testing and evaluation, maintenance and management with projecting effective software applications. Students will capture clear understanding of tools and methodology for developing software solutions.

- **Distributed Systems**

This course introduces the students with the basic concepts of distributed systems. It provides an overview of distributed system architectures and look to their advantages and disadvantages compared to traditional centralized systems. Students will learn about inter-process communication and network protocols for communication. Students will also be introduced to basics of client-server programming, middleware platforms (CORBA, JavaBeans, DCOM, .NET), Web Technologies and Web Services as distributed system technologies. The last part of this course deals with transactions, nested transactions and distributed transactions. The students will familiarize with standard application solutions for distributed systems.

- **Software Design and Architecture**

The course objective is to explore the application of software design principles and the design of applications. It teaches the principles and concepts involved in the analysis and design of large software systems, the architecture and design of complete systems, building on components and patterns.

- **Software for Embedded Systems**

This course aims to provide students with a general introduction of embedded systems, their use and the principles of their design. The design of embedded systems requires a thorough understanding of different levels, ranging from basic hardware specifications to high level programming. Students will learn about different microcontroller architectures and their programming in assembler and C language. Also, students are introduced to a variety of operating systems used for the realization of embedded systems and the principles for programming applications on these operating systems.

- **Introduction to Data Science**

- To be able to understand basic data analytics methodologies.
- To be able to use tools that are used for data analytics.
- To be able to practically apply their knowledge from the fields of statistics and data analytics.
- To be able to present their results through various reporting and data visualization techniques.

- **Project Management**

The course introduces the area of software project management, presenting techniques and approaches and aims to develop a critical awareness of the challenges and shortcomings of the area. The module is based on knowledge of Software Engineering and in other Information systems courses.

- **Logical and Functional Programming**

This course aims to introduce logic programming paradigm through Prolog language. The subject focuses on syntax and the semantics of Prolog, the working of a Prolog interpreter and various applications of Prolog. In particular, its application database querying, parsing, meta-programming, and problem solving in Artificial Intelligence (AI).

- **Information Security**

This course teaches principles of computer security from an applied viewpoint and provides hands on experience with security threats and countermeasures. The course additionally covers principles and skills useful for making informed security decisions and for understanding how security interacts with the world around it. Applied topics include cryptography, authorization control, operating systems security, and web and network security. Other topics include general security principles, human factors such as trust and social engineering, the security of complex systems, and the economics of security. The course aims to balance theory and practice.

- **Intelligent Systems**

This subject aims to give an introduction to the rapidly-developing field of intelligence systems and to cover techniques used by this subject and by other artificial intelligence subjects in the faculty of contemporary science and technologies. Having successfully completed this subject, students will be able to demonstrate knowledge and understanding of the principal achievements of intelligent systems, main techniques that are used in IS, and their range of applicability.

- **Capstone Project**

In this course, students will work on completing an applied or theoretical project. The aim of the course is to enable students to integrate the knowledge gained from the courses across the curriculum, in order to deliver a 'product', such as software or thesis. The students will have opportunity to gain experience in designing, programming, and evaluating a computer engineering project. At the end, students document their works in form of written reports and oral presentations, which are evaluated by a faculty committee.

Elective courses

- **Macedonian Language for Beginners 1**

The programme Macedonian Language for Beginners 1: reading, writing, listening and speaking. Through special exercises and lectures introduction to basic communication in Macedonian language is provided, i.e. introducing, greeting, presentation, enriching vocabulary and write and understand short texts. When we created this program we took into the consideration that students can apply the acquired knowledge further. The material is processed under the principle of combined lectures and exercises, and continuous tasks through which students are actively involved during class and participate with their questions and suggestions.

- **Macedonian Language for Beginners 2**

The programme Macedonian Language for Beginners 2 includes: reading, writing, listening and speaking activities. In this course the following issues are covered: daily routines, planning activities for the next period, description of persons, places and objects. When we created this program we took into the consideration that students can apply the acquired knowledge further.

- **Macedonian Language Intermediate Level 1**

The curriculum for Macedonian Language intermediate level 1 includes: reading, writing, listening and speaking through which the students: will enrich the vocabulary through appropriate texts for daily activities (in a bank, in a library, in a ministry, etc.) and will improve the skills for professional writing and speaking that are necessary for clear and effective communication in their further professional career. A special, continuous emphasis on the overall activity is placed on the linguistic elements, that is, on the spelling and grammar of the Macedonian standard language. Experts as one of the key elements for good written expression state the correct use of language.

- **Macedonian Language Intermediate Level 2**

The curriculum for Macedonian Language intermediate level 2 includes: reading, writing, listening and speaking. Special emphasis is placed on the development of students' communication skills, or the use of language in daily activities and professional context, enriching the vocabulary and acquiring knowledge about the structure and types of professional texts. Different communication styles will be covered, with the goal being for students to establish good communication with the audience through their texts and to attract and retain their attention.

- **Macedonian Language for Professional Purposes 1**

Upon completion of the course Macedonian for Professional Purposes 1, students are expected to broaden and strengthen their abilities for more advanced written and oral expression in Macedonian in the context of the different professional settings. Students are expected to be able to read, write and comprehend various professional texts in Macedonian. They are also expected to acquire knowledge and skills about the general terminology from the field of law, business and economy, administration, computer sciences, language and communication and to be able to use that terminology in the framework of their future professions. Besides accomplishing these professional aims, students are expected to become more autonomous language learners and be able to think critically about different topics in a multilingual and multicultural environment.

- **Macedonian Language for Professional Purposes 2**

Upon completion of the course, Macedonian for professional purposes 2, students are expected to reconfirm and expand further their abilities for advanced written and oral expression in Macedonian, in the context of their future professions. They should be able to read, write and comprehend different kinds of professional texts in Macedonian, to analyse and discuss those texts, as well as to create their own documents, including professional biography in Macedonian (CV). They should also expand the knowledge of specific terminology from the field of law, business and economy, administration, computer sciences, language and communication and be able to use that terminology in simulation of authentic situations from the professional environment, in debates and exchange of opinion regarding different aspects of these professions.

- **Albanian Language for Beginners 1**

Albanian Language course for beginners 1, 2 is prepared with the purpose to enable the students, who do not have basic knowledge of the Albanian language, to get to know the characteristics of this language, to gain knowledge of the linguistic structure of the Albanian language, and to extend and apply their knowledge in everyday situations. Correspondingly, they will gain knowledge on the structure of the Albanian language, will overcome a modest set of various lexical and grammatical categories which will enable simple conversations.

- **Albanian Language for Beginners 2**

Albanian Language course for beginners 1, 2 is prepared with the purpose to enable the students, who do not have basic knowledge of the Albanian language, to get to know the characteristics of this language, to gain knowledge of the linguistic structure of the Albanian language, and to extend and apply their knowledge in everyday situations. Correspondingly, they will gain knowledge on the structure of the Albanian language, will overcome a modest set of various lexical and grammatical categories which will enable simple conversations.

- **Elementary English**

By the end of this course students are expected to be at A1 level of the Common European Framework (CEF) and should be able to understand and use familiar expressions and very basic phrases aimed at the satisfaction of needs of a concrete type; ask and answer questions about personal identification and personal relations; students should be able to introduce themselves and others by using pronouns and possessives, use greetings, name things in the classroom, distinguish between singular and plural. Students should be able to describe a typical day, recognize and use simple constructions in order to describe their daily routine; talk and write about their everyday lives, leisure; ask and answer questions about food and drink. students should be able to give dates, use appropriately the vocabulary related to months in the year, make polite requests, describe places; choose a destination and give directions; discuss likes and dislikes.

- **Pre-Intermediate English**

By the end of this course students are expected to be at A2 level of the Common European Framework (CEF) and should be able to understand and use correctly expressions and phrases aimed at the satisfaction of needs of a concrete type; ask and answer questions about personal relations, describe different jobs, talk and ask about people's working lives, ask about and describe someone's job and make appointments. They should be able to talk about events in the past, describe places, travel and personal histories; choose a destination and give directions; to talk about everyday office activities, express obligation, talk about daily journey. They should be able to talk about things and jobs in the house, understand and give advice and express their opinions; discuss likes and dislikes.

- **Intermediate English**

By the end of this course students are expected to be at B1 level of the Common European Framework (CEF) . They should be able to ask and answer questions about university degrees, job skills and situations; invite and respond to invitations. Students should be able to ask about or describe family relationships and marital status and they should be able to recognize and use appropriately vocabulary related to degrees and university education, art, travelling and sport.

- **Upper-Intermediate English**

By the end of this course students are expected to be at B2 level of the Common European Framework (CEF); They are expected to be independent users of English language and to implement some of the following language functions: give advice; ask and answer questions about university degrees, job skills and situations; invite and respond to invitations, read and listen for gist, detail and comprehension.

- **Advanced English**

Upon successful completion of the course, the students' proficiency level should be at C1 according to Common European Framework. As a result, the students should be able to deliver successfully oral presentation, participate in an online debate/ discussion forum stating their opinion and arguments and give feedback to others in a constructive manner. In addition, the students should be able to listen and read for gist and detail and write an argumentative paragraph and essay stating their opinion. They should write a problem solution paragraph and essay. They should be able to present visual information in a form of Power Point poster presentations for a given topic.

- **German Language**

After completing this course, students will be able to gain appropriate knowledge according to the European Language Framework (specifically and concretely determined by level). In addition, students are expected to become more autonomous and more responsible language learners. By the end of the course, students will be able to think critically and make conclusions about different topics based on the texts that they have read, as well as to express their thoughts and opinions in written and spoken German.

- **Italian Language**

The purpose of the course is for students to get acquainted with the Italian culture, the Italian civilization and the Italian language. The idea is for students to know a slightly different reality, which may help them to become aware of themselves, as well as in creating a better picture for themselves and for their future. Corresponding to the level (from A1 to B2), which students choose, or the levels that they will follow in the semesters they have at their disposal for a free elective subject, the matter progresses deeper. The first level starts from basic settings such as: orthography

(spelling), pronunciation, vocabulary for managing simple, everyday language situations (personal presentation, presentation of others, orientation in space and in time, communication expressions in a bar, restaurant, supermarket, on the market), and it is reaching more complex constructions in the continuing stages, which refer to the expression of attitude, desire, need, telling past events, talking about future actions, etc. Grammar is introduced inductively (through awareness of situations (audio recordings, videos, films, various texts) and conclusions), in which the students themselves playing the key role, with their active participation in the lectures.

- **French Language**

The purpose of this course is for students to strengthen their language skills and competencies, as well as to develop four communication competencies, particularly in the following areas: • to be able to express an opinion, • to be able to express their feelings, • to understand the essence of an expression, thought or idea, • to be able to argue and defend their opinion. • to manage different situations, • to maintain a simple and coherent speech, • to tell an event, • to talk about a dream or experience, • to present the reasons for a project or idea, • to communicate spontaneously.

- **Human Rights and Freedoms**

Aims of the course: The struggle for human rights begins with the historic efforts to identify them. Over the time, the corpus of rights and freedoms that are incriminated by laws or international treaties is expanding but it certainly does not prove that the same are respected in practice. Human rights at the first were considered as internal matters of states (under the principle of absolute sovereignty of states) and only in more recent times have gained the title of jus cogens norms. This course will study how to develop doctrine on human rights, types and categories of human rights and will be studied the relevant documents that regulate certain rights. The purpose of this course is: to introduce students to the concept of international law on human rights, implementation of the same, influence in the formulation of national policies; This will encourage students to critically reflect on the relationship between international law and national law; make them aware of current international events, how they affect the daily lives of people in the world; encourage students to contribute in matters of drafting laws for the protection of human rights.

- **Assisted Reproductive Technology and Law**

Aims of the course: This course aims to emphasize the fact that in the modern society, there is no one universal, generally accepted model of family and parenting. By studying the subject 'Assisted reproductive technology and Law', students will gain knowledge about new artificial reproductive technologies that are part of the contemporary natal policy. In more detail, students will be introduced to all artificial reproductive technologies, such as artificial insemination, in vitro fertilization, surrogate motherhood, the birth of children from a woman with sperm donation, posthumous reproduction, co-parenting, 'three parent' baby technique, cryopreservation of gametes or embryos. Students will have the opportunity to be informed that there are many other opportunities offered by science but are forbidden, for example, cloning, gender selection, improvement of the physical, intellectual or other capacities (eugenics) of the future child, etc. By studying this course students are expected to develop their critical thinking by debating the complex set of moral, ethical and legal dilemmas regarding these new reproductive technologies.

- **Intercultural Communication**

Having completed this course the students will be able to identify global questions and problems from the perspectives of different cultures, the communication dynamics in the other cultures, the similarities and the differences between their values and those of other cultures, as well as the similarities and differences between their communication practices and those from other cultures. In addition, students are expected to become more aware of the stereotypes that society has for different cultures and as a result will better understand their place in the global community. The students will start thinking critically about topics related to their ethnicity, gender identity, class, religion, national origin, age and other demographic characteristics and their impact on the communication process. After finishing, the students will also gain communication skills for working in groups through participation in research projects and will acquire the necessary skills to present their research projects.

- **Web Creation**

Aim of this course is developing even a simple web page according to current standards, requires knowledge of Hypertext Markup Language (XHTML) and Cascading Style Sheets (CSS). Most of the websites also use images, whether in the form of banners, buttons, logos, photos or scans. Adobe Fireworks is built as a tool to create and manipulate images from the web and to allow the makers to optimize these images in order to reduce the file size. Firework also provides an excellent integration with Dreamweaver. This series provides a comprehensive introduction to XHTML, CSS and creating web graphics.

- **Digital Media Design**

The aim of this course is designing and processing raster and vector graphics through the leading programs Adobe Photoshop and Illustrator, as well as designing and publishing commercial materials for print using Adobe InDesign.

- **IT Skills Office Productivity**

This program builds skills that help students improve their classroom and career IT productivity. The program offers a wide range of modules that include: COMPUTER ESSENTIALS - skills and concepts relating to the use of devices, file creation and management, networks and data security. ONLINE ESSENTIALS - skills and concepts relating to web browsing, effective information search, online communication and e-mail. WORD PROCESSING - skills to accomplish everyday tasks associated with creating, formatting and finishing word processing documents, such as letters, CVs, and other documents. SPREADSHEETS - skills to perform tasks associated with developing, formatting, modifying and using a spreadsheet, to use standard formulas and functions, and to competently create and format graphs or charts. PRESENTATION - create professional standard presentations. Perform tasks such as creating, formatting, modifying and preparing presentations using different slide layouts for display and printed distribution. USING DATABASES - use a desktop database effectively. Understand the main concepts of databases and demonstrate the ability to use a database application: creating and modifying tables, queries, forms and reports, and preparing outputs ready for distribution. Learning to relate tables and to retrieve and manipulate information from a database by using query and sort tools.

- **Microsoft Office Access**

Microsoft Official Academic Course (MOAC) for Access 2016 provides the hands-on experience to increase your personal productivity skills. This program is divided into 15 lessons cover all product areas required. to pass MOS exam 77-730.

- **Microsoft Office Excel**

Microsoft Official Academic Course (MOAC) for Excel 2016 provides the hands-on experience to increase your personal productivity skills. This program is divided into 15 lessons cover all product areas required to pass MOS exam 77-727.

- **Microsoft Office PowerPoint**

Microsoft Official Academic Course (MOAC) for PowerPoint 2016 provides the hands-on experience to increase your personal productivity skills. This program is divided into 11 lessons resources cover all product areas required to pass MOS exam 77-729.

- **Microsoft Office Word**

Microsoft Official Academic Course (MOAC) for Word 2016 provides the hands-on experience to increase your personal productivity skills. This program is divided into 11 lessons resources cover all product areas required to pass MOS exam 77-725.

- **Legal Writing and Reasoning**

Aims of the course: The course purpose is to provide the basic knowledge of legal writing and justification to the first year students of Legal studies and Criminalistics and Security studies. In this course, there will be gained knowledge for the legal writing and reasoning principles and basic guidelines for it, by applying the various methods of legal writing of normative legal acts (regulations, laws, decisions, judgments, contracts, wills etc.) and acts (CV, claim, competition, application, notification, plaint etc.). For law students this course is more than necessary. They have to take advantage of the proper legal writing skills and the proper reasoning of what they are writing legally, because the mastery of legal writing is essential to any lawyer in his upcoming professional work.

- **Information Technology (IT) Law**

Aims of the course: The main goal is for students to become familiar with the possibilities of applying information and communication technologies in the legal profession. Students will be introduced to the general conceptual foundations of legal informatics. Special emphasis is on acquiring skills, that is, practical knowledge in finding and using legal information with the help of new technologies, databases and search engines. Students will also be familiar with the basic issues of e-governance, e-commerce, e-procurement, e-justice and e-democracy.

- **Professional Career Development**

The course is designed to develop and improve the abilities and skills of students to search for work and to succeed in their workplace. This course includes a package of materials, practical exercises and experience of people in practice in order to better prepare students for the labor market, which is more and more competitive. The course aims at enabling students to produce a quality CV, a motivation letter, and prepare them for the interview. Additional fields that are addressed in this course are: self-assessment, workplace analysis, job description etc. So students at the end of the course are provided with a portfolio of documents that will be needed to apply for job and to have a competitive advantage in the labor market.

- **Administrative Terminology and Nomotechnics**

In this course, students will acquire basic knowledge about the scientific discipline of Administrative Terminology and Nomotechnics, legal issues in the creation of draft acts of national legislation. Also, students will learn the techniques of creating international legislation, the procedures for adopting legal acts (laws, by-laws) etc.

- **Social Skills Development**

In this course, students will acquire basic individuals with interpersonal skills, build positive working relationship with others through understand emotions, share differences, resolve conflicts, giving or receiving feedback in a constructive manner. They interact successfully to gain consensus from stakeholders and decision makers and foster positive communication climate within the challenging workplace environment. They rise to the top in their personal effectiveness, help to reduce the cost of rehiring and training cost and contribute significantly to the organizational growth.

- **Career Search Strategies**

This course is designed to be beneficial to all students, both for those who are actively in the job search and for those who are already employed. The course has been extremely helpful to students making the transition from an academic environment to a career setting. Transitions involve change and change brings on a flurry of questions about the unknown. Sometimes the unknown relates to options, starting salary, earning potential, risk, security, location, training, lifestyle considerations, etc. Career planning is like a “wheel” with four spokes, rolling continuously and collecting new career-related information as it moves. The information collected provides data, enabling you to answer questions and ease the transition.

- **Selected Chapters in Computing**

This course presents a wide, integrated introduction to fundamental concepts of computer sciences. The following subjects are covered: history of computing; digital logic and digital systems; introduction to computer architectures, basic algorithmic, problem solving and data structures; introduction to programming languages, operating systems, databases, networks, web and software engineering; application types, including specific software descriptions (word processors, database, browsers, etc.); traditional and multimedia data processing.

- **Web Technologies**

The main objective of the course is to give students a practical knowledge of basic mechanisms, services and protocols of the global network - Internet. The course provides mastering of the overall architecture of an effective, scalable and secured web page. The students will acquire deep technical knowledge of HTML (lists, tables, figures, multimedia and forms), CSS (formatting, styles and layouts), and JavaScript (variables, conditions, loops and functions) important in building web pages.

- **Academic Writing in English**

In this course, students’ academic writing skills will be enhanced in a variety of ways. Students will be enabled to communicate their ideas in a clear, fluent and effective way in order to produce a piece of writing. Students’ academic writing skills will be developed through activities that promote writing like: writing different types of paragraphs and essays. In addition, students will be introduced to paraphrasing and citing rules as well as will be made aware of what plagiarism is. Giving feedback on students’ pieces of writing will involve self-correction, peer-correction and teacher-correction of content, organization and language errors.

- **Academic Writing in Albanian**

By the end of each level, the students are expected to write an essay and a research paper based on the rules learned during the semester. Specifically, from them it is expected to know the function, the structure and the different types of paragraphs, ways of choosing research topics, collecting the material, the rules for source documentation and the final model.

- **Academic Writing in Macedonian**

After finishing this course, the students are expected to gain appropriate knowledge and advanced communication in Macedonian language with particular emphasis on writing skills. In addition, it is expected that students will become more autonomous and responsible learners. Moreover, students will be able to improve their writing skills in more levels and thereby they will become more confident and more competent when writing in Macedonian. They will be able to reflect critically on different topics, to make conclusions and they will develop skills for excellent written and oral communication in Macedonian.

- **Albanian Language for Specific Purposes**

The subject aims at improving and perfecting the expression of Albanian language (speaking and writing).

Specifically, the course aims to introduce students to specific terms, the possibilities of its use, with the most common errors in daily speech, but also for communication in specific circumstances. The students will learn about the conditions in which the rules work, so they can use them not only for tasks related to the subject but also in their future profession.

- **Practical English Grammar**

This course is intended mainly for intermediate and upper-intermediate students, students who have already studied the basic grammar of English. It concentrates on those structures which the named students want to use, but which often cause difficulty. It can serve both as a basis for revision and as a means for practising new structures. While students expect and need to learn formal rules of a language, it is crucial that they also practice new structures in a variety of contexts in order to internalize and master them. To this end, this course provides an abundance of both controlled and communicative exercises so that students can bridge the gap between knowing grammatical structures and using them.

- **Conversational English**

Conversational English is a one semester course designed for intermediate-level English speakers and above, and will be available to students in all semesters. English is an international language that facilitates communication in a variety of contexts around the world, ranging from business meetings and transactions to casual conversations between friends and interactions during travel. Conversational English will build students' listening and speaking skills, providing grammar, vocabulary, pronunciation, and fluency practice needed for common types of spoken English interactions. This course will cover topics related to professional conversation, casual conversation, and everyday interactions, providing students with conversational confidence in a variety of contexts. Professional conversation will include formal and polite varieties of speech used in contexts such as work meetings or discussions with colleagues. Casual conversation will include practice with language used while socializing with friends or family and other informal situations and will include slang and informal speech. Everyday interactions will include conversations at stores, during travel, and asking for or providing assistance. Methods of learning will focus on practice and will include listening activities, dialogues, role-plays and simulations, debates, and discussions.

- **Digital and Online Literacy**

Digital and Online Literacy is a one-semester course meeting 3 class hours per week, offered in the undergraduate studies. The course is designed according to students' needs and it includes a number of 21st century skills related to using technology appropriately and effectively. The course will encompass the three categories of the 21st century skills. By the end of the course students will be able to search for and access online information successfully using variety of digital tools, critically evaluate the reliability of online resources and distinguishing between credible and untrustworthy sources, demonstrate understanding of ethical issues related to academic context, understand proper referencing in order to avoid plagiarism, learn how to effectively communicate in a professional manner, understand the basics of being safe online and the positive and negative aspects of creating an online identity, investigate cyber bullying and identify possible solutions for reducing online harassment.

- **Consumer Protection**

Aims of the course: The main goal is for students to become familiar with the concepts, Sources, Relationship with other branches of law, Entities (natural and legal persons), Legal institutes for consumer protection, protection through the application of liability due to physical defects in the item, protection of legal deficiencies in the item, protection of normal functioning the welding, by the use of administrative networks by administrative bodies, protection by setting standards, protection through private legal measures, consumer protection procedures.

- **Trade Law**

Aims of the course: The main goal is for students to become familiar with the entities of commercial law (trader, sole proprietor, trade companies), connection of trade companies, termination of trade companies (liquidation and bankruptcy), trade agreements, industrial property rights, securities).

- **Domestic Violence**

Aims of the course: Domestic violence is a social phenomenon of wide scale and widespread in contemporary society. It is present in all states and societies regardless of their development and emancipation. Immune to this phenomenon is neither our country nor the region in which we live. Therefore, law students through this course gain knowledge of what is domestic violence, the forms in which it is manifested, the legal arrangements in the country, the region and the international sphere as well as the ways of preventing it. Through this course, students at the end of the course will be able to identify domestic violence, identify criminal offenses that are incriminated in the Criminal Code as domestic violence, and develop critical thinking about this problematic. This course enables the future jurisdiction to handle issues of this sphere of high sensitivity as well as to provide the most adequate assistance and

protection for the victims of these criminal offenses in the exercise of his future profession as a judge, prosecutor or lawyer.

- **Cyber Security**

Aims of the course: Cyber security in context will explore the most important elements that shape the playing field on which cyber security problems emerge and are managed. The course will emphasize how ethical, legal, and economic frameworks enable and constrain security technologies and policies. It will introduce some of the most important macro-elements (such as national security considerations and the interests of nation-states) and micro-elements (such as behavioral insights into how people understand and interact with security features). Specific topics include policy-making (on the national, international, and organizational level), legal frameworks (including duties of security, privacy issues, law enforcement access issues, computer hacking, and economic/military espionage), standards making, and the roles of users, government, and industry.

- **Social Media and the Law**

Aims of the course: By the end of the semester students will be able to: identify their individual rights, specifically those who refer to social media; describe the ways in which new communication technologies are reshaping, and continue to influence, national and international legal order; develop a picture of how social media, internet, television and other communication technologies affect our understandings of law and justice; classify legal issues that companies from different industries may face when integrating social media into their business practices; to recognize the potential positive and negative consequences of their personal presence in the media.

- **Business Communication**

The purpose of this course is to introduce students to the concepts of business communication. This course is an attempt to improve students' communication skills with theoretical indicators and first of all with practical demonstrations of the right way of communication in an organizational environment with employees and managers, as well as holding meetings, interviewing, how to respond during the interview, negotiation and motivation of everyone in their circle.

- **Leadership and Organizational Development**

The course aims to enable students to identify how leaders and managers are developing and implementing the achievement of the mission and vision of an organization in the public sector; develop values required for long-term success and their application through appropriate activities and habits; how leaders and managers are personally involved in providing assurance that the systems for managing the organization will be developed and implemented. Also, about how the organization implements its mission and vision through a clear strategy based on the views of all interested parties, supported by all relevant policies, plans, goals and processes.

- **Communication Skills**

The course Communication Skills is designed to enable students to practically apply interpersonal communication. Students will have the opportunity to learn interpersonal skills (such as perception, listening, verbal and non-verbal communication); public speaking (such as organization, delivery and the basics of writing public speeches) and small group communication (such as leadership, self-confidence and listening). The course will also focus on providing basic knowledge and understanding of the job hunting process through written and oral communication by doing tasks such as writing a resume and a cover letter, conducting interview simulations etc.

- **Critical Thinking Development**

Students identify and use critical thinking skills, processes and techniques that will assist them in their careers and personal lives. Students develop their ability to investigate and evaluate thinking from different viewpoints and synthesize their own positions based on the evidence available. Also, students practice techniques that enable them to maximize the results they create in any long-term learning experience, while identifying, analyzing and formulating solutions to problems as they arise. They will develop critical thinking strategies and apply them to reading, writing, and listening. Students will apply questioning strategies, engage in reflective thinking, problem-solving, and testing arguments.

- **Public Relations and New Media**

The course focuses on the development of those communication skills and techniques that are essential for effective functioning in the era of globalization. Students will elaborate the process of globalization, social, political, economic and cultural aspects of modern phenomenon, the consequences and impacts in the communication sphere marked an era of postmodernism, particularly the impact of new social media, their structure, Multi-language functions of social networks, the effects and consequences in the modern world communication realities.

- **English for Information Technology 1**

This course is offered with the aim of improving the four main language skills such as reading, writing, listening and speaking in the content-specific area as well as revision and advancement of selected intermediate and upper-intermediate grammatical items and vocabulary in the field of computer sciences and technologies. This is done to enable students to comprehend more complicated texts in the mentioned area and enable them to communicate fluently with colleagues and experts in the field. Special attention is paid to the use of authentic materials in order to follow the latest trends and achievements in this field.

- **English for Information Technology 2**

This course is offered with the aim of improving the four main language skills such as reading, writing, listening and speaking in the content-specific area as well as revision and advancement of selected intermediate and upper-intermediate grammatical items and vocabulary in the field of computer sciences and technologies. This is done to enable students to comprehend more complicated texts in the mentioned area and enable them to communicate fluently with colleagues and experts in the field. Special attention is paid to the use of authentic materials in order to follow the latest trends and achievements in this field.

- **Introduction to Information Systems**

Aims of the course program: 1. To learn the basic concepts and the terminology of Information Systems: a. Basic Information Systems concepts: hardware, software, networks; b. E-World: e-business and e-commerce; c. Developing Processes; 2. To learn about the Information Systems and technologies that improve business values and various processes inside organizations; 3. To apply IS concepts with various managing disciplines, during analysis, interpretation, assessments and decisions; 4. To understand the process of redesigning organizations using information systems; 5. To describe the role of information systems in decision making; 6. To examine information security, ethical, and social issues; 7. To be familiar with the Internet, electronic commerce, and e-business; 8. To prepare students to work on small scale projects, individual or group work, who by nature could fall into these categories: case studies, scientific research project, development projects or internship projects;

- **Advanced Programming in .NET**

This course aims to provide students with the necessary knowledge and practice of programming .NET applications. The different concepts covered are: - The basics of .NET programming (variables, types, conditions, loops, etc.); - Windows Forms applications, manipulating files, database access technologies and concepts (connections, commands, data readers, etc.); - ORM systems; - Development of web and mobile applications; - Reporting with Crystal Reports and Microsoft Reports; - Creating installation packages and software distribution methods;

- **Programming in Java**

Aims of the course program: To provide students regarding Java programming language with a deep, critical and systematic understanding of the principles and techniques for programming effective software applications. This course introduces fundamental structures and object-oriented programming concepts and techniques, using Java, and it is intended for all who plan to use computer programming in their studies and careers.

- **Multimedia System**

Aims of the course program: At the end of the semester, the student will be able to do the following: - Explain multimedia concepts such as the elements and principles of design, color theory, and compression schemes; - Demonstrate knowledge and skills in the use of software for graphics (Adobe Photoshop), video (Adobe Premiere), and animation (Adobe Flash) through exercises and projects; - Plan, design, develop and evaluate multimedia applications and their elements;

- **Introduction to Cryptography**

Aims of the course program: Cryptography provides important tools for ensuring the privacy, authenticity, and integrity of the increasingly sensitive information involved in modern digital systems. Nowadays, core cryptographic tools, including encryption, message authentication codes, digital signature, key agreement protocols, etc., are used behind millions of daily on-line transactions. In this course, we will unveil some of the "magic" of cryptography. Modern Cryptography uses mathematical language to precisely pin down elusive security goals, design primitives and protocols to achieve these goals, and validate the security of designed primitives and protocols using mathematical proofs based on clearly stated hardness assumptions. Therefore, to learn cryptography, it is essential to understand its mathematical underpinning. In this class, we will see the inner-working of cryptography for several core cryptographic tools, from encryption, to message authentication codes, hash functions, digital signatures, etc.

- **Numerical Computations**

This course is designed to equip students with the basic concepts and methods of numerical calculations. The primary intent is to provide students with a sound introduction to the numerical methods. They have big application in solving different problems which can be solved just by using the computers, therefore, solving numerical problems will help students not just to apply them in different other areas, but simply it will help them to become better computer scientists. After a brief look at the ways numbers are placed and manipulated in computers we will deal with fundamental computational problems, such as solving the equations, system of equations followed by an approximation theory. We will deal with the accuracy of numerical solutions and also the aim is to evaluate the functions, numerical differentiation and integration.

- **Programming Mobile Devices**

This course will cover the basic concepts of designing applications for interactive mobile devices. The goal is for students to learn how to write clear and efficient, personal and business applications using a large spectrum of programming techniques.

- **Game Programming**

The goal of this course is to introduce the principles of developing computer games, focusing on games that can be played on web browsers. The students will learn how to create objects, to animate them, to introduce sounds and other techniques used in games. The course will also cover the design of interactive games that can receive user input through keyboard, mouse or similar peripheral elements. The students will also learn about the introduction of basic artificial intelligence. All these techniques will be practiced with the development of popular games.

- **Introduction Artificial Intelligence**

Aims of the course: Introduction to the basics of artificial intelligence, intelligent agents, techniques for presenting knowledge and intelligent search and decision-making, game theory, formal logic, probability and logical reasoning systems, learning by observation, training of neurons and learning stimulation. Also, students will be familiar with the basic concepts of LISP.

- **Introduction to Parallel Processing**

Aims of the course: This course is intended for students interested in the efficient use of modern parallel systems ranging from multi-core processors to large-scale distributed memory clusters. The course covers theoretical principles of parallel computing as well as different parallel programming techniques. It begins with a survey of common parallel architectures and types of parallelism, and follows with an overview of formal approaches to assess scalability and efficiency of parallel algorithms and their implementations. In the second part, the course focus is on selected parallel programming techniques and APIs, including shared address space, many-core accelerators, distributed memory clusters and big data analytics platforms. Each component of the course involves solving practical problems on a corresponding parallel architecture.

- **E-commerce**

Aims of the course: - To learn the basic concepts and the terminology of e-commerce: ● The history of e-commerce ● E-World: e-business and e-commerce ● Business Models for e-commerce ● Online payment systems ● Online Marketing ● E-infrastructures - To learn about the core technologies that are mandatory to run e-commerce nowadays, including servers, software, Internet connections, payment gateways and their security, cookies, etc. - To apply e-commerce concepts and theory in practice by doing appropriate analysis on business models and technologies and making decisions on the most appropriate solutions. - To understand the process of creating a web shop and connecting it with the payment gateways. - To be able to put the idea on paper, create business model and prepare the finances. - To be able to differentiate various online marketing tools and be able to apply some of them in practice. - To examine information security, ethical, and social issues and know how to address specific issues. - To be familiar with the Internet and Cloud computing.

- **Computer Network Management**

This course provides knowledge about Simple Network Management Protocol (SNMP) and Open Systems Interconnection (OSI) standards and technologies for managing networks. The course covers various aspects of network management, including features, equipment, communication protocols, processes and methodology. The subject also provides students with knowledge about specific products and technologies based on these standards which are used for practical network management solutions.

- **NoSQL Databases**

Relational database systems have been dominant in the market for over forty years, and remain so today. However, the emergence of distributed and cloud computing, as well as the increasing need for storage of large datasets (i.e., big data, such as human genome, Google search engine, social media data, Large Hadron Collider, etc.), have

created the need for alternate data storage solutions. A number of different models / database management systems have been developed, that as a group are being referred to as NoSQL databases. A number of large, well-known companies use such databases, including Google, Amazon, Facebook, Twitter, Adobe, MTV, LexisNexis, the New York Times, Forbes and Netflix. This course will explore the origins of NoSQL databases and the characteristics that distinguish them from traditional relational databases. Core concepts of NoSQL databases will be presented, followed by an exploration of how different database technologies implement these core concepts. Each of the four main NoSQL data models (key-value, column family, document, and graph) will be analyzed. Also for each of those will be highlighted the business needs that drive the development and use of each database. Finally, we will present criteria that decision makers should consider when choosing between relational and non-relational databases and techniques for selecting the NoSQL database that best addresses specific use cases.

- **Mobile and Wireless Networks**

This course aims providing insight and knowledge about architectures and protocols for mobile and wireless communication. Topics ranging from physical layer to application layer covering specifically the mobile and wireless networking fields. The topics on the subject include: Wireless WANs and MANs, Wireless Internet, Wireless AdHoc Networks and protocols, Wireless Hybrid Networks and recent advances in Wireless and Mobile Networks. Application, design, performance analysis and development of mobile and wireless systems are investigated.

- **Computer Ethics**

Aims of the course program: - to develop an understanding of the relationship between computing, technological change, society and the law; - to emphasise the powerful role that computers and computer professionals play in the technological society; - to provide an understanding of legal areas which are relevant to the discipline of computing; - to provide an understanding of ethical concepts that are important to computer users and professionals; - to give experience in the consideration of ethical matters and solving ethical dilemmas.

- **Introduction to Semantic Web**

This course will give an introduction to Semantic Web technologies and their applications. The crux of the matter Semantic Web is in semantic representation and reasoning of data using ontologies. The main focus will be around different aspects of Ontology representation, creation, design, reasoning, programming and applications throughout the course. Topics covered will include: Basics of data representation through XML, Basics of resource description with Resource Description Framework (RDF) and RDFS, knowledge representation with Web Ontology Language (OWL) as well as basic tools for ontology engineering.

- **Business Analytics**

The aim of this program is for students to gain an understanding of how to use business analytics to formulate and solve business problems and to support managerial decision making. Students will become familiar with the processes needed to develop, report, and analyze business data. Furthermore they will learn how to use and apply software tools in order to solve business problems.

- **Parallel Programming**

For the past several decades the demand for high performances was addressed to the increase of the clock speed. Over the last decade, the regular clock speed increase starts to become infeasible and it starts to be replaced with more processing units with smaller clock speed. Today, almost all performance increases of recent processors come from more parallelism rather than clock speed increases. The shift toward parallelism affects the use of computer and specially computer programming. The goal of this subject is to introduce the students to the foundations of parallel programming including the parallel computer architectures, principles of parallel algorithm design, analytical modeling of parallel programs, programming models for shared- and distributed-memory systems. The course covers programming on multicore hardware, shared-memory programming models, message passing programming models used for cluster computing, data-parallel programming models for GPUs, and problem-solving on large-scale clusters using MapReduce.

- **IT Professional Ethics**

This course provides a comprehensive overview of the current ethical issues in Information Technology (IT) use. It examines an array of long-standing and emerging issues facing IT users ranging from free speech, privacy, intellectual property, hacking, and the digital divide, to ethics in social networking and online communities. The course discusses the ethical dilemmas and responsibilities of IT professionals, and promotes the critical examination and a responsible usage of IT.

- **Computer Logic Design and Simulation**

This course provides a modern introduction to logic design and the basic building blocks used in digital systems, in

particular digital computers. It starts with a discussion of combinational logic: logic gates, minimization techniques, arithmetic circuits, and modern logic devices such as field programmable logic gates. The second part of the course deals with sequential circuits: flip-flops, analysis and synthesis of sequential circuits, and case studies, including counters, registers, and random access memories.

- **Compilers**

This course aims to provide students with theoretical and practical knowledge on constructing compilers. It covers the main concepts used in compilers such as lexical and syntactical parsing, analysis of the program and code generation and optimization techniques. Students will be introduced to different tools that are used to build compilers. By the end of this course, students should be able to implement a simple compiler for a restrained general-purpose language.

- **Digital Circuits**

The aim of the module is to introduce the students to the topics that include combinational and sequential circuit analysis and design, digital circuit design optimization methods using random logic gates, multiplexers, decoders, registers, counters and programmable logic arrays.

- **Internet Technologies**

The main objective of the course is to give students a practical knowledge of basic mechanisms, services and protocols of the global network - Internet. The course provides mastering of the overall architecture of an effective, scalable and secured web page. Students will acquire deep technical knowledge of XML, XHTML (lists, tables, figures, multimedia and forms), CSS (formatting, styles and layouts), and JavaScript (variables, conditions, loops and functions).

- **Human - Computer Interaction**

This course aims to enable students with knowledge of the theory and practice in software development related to the communication between humans and computers, with the goal of creating usable application interfaces. The course deals with the psycho-motor aspects that influence the way people communicate with machines. Through concrete examples of user interfaces, students should understand the principles and be able to apply them while designing their applications.

- **Web Programming**

This course covers the design and development of web applications including both server-side and client-side programming. The course also deals with the design of databases for the web, web programming languages, data integration in web applications.

- **Computer Graphics**

This course introduces the basic concepts of computer graphics theory, linear algebra and usage of OpenGL API. Previous knowledge of C/C++ programming languages, which will be necessary in the exercises throughout this course, is recommended. Some knowledge of geometry and trigonometry is also recommended as well as some knowledge on linear algebra, vectors and matrices. In this course, topics regarding Computer Graphics will be covered such as: Transformations and matrices, basic concepts regarding viewports, viewing planes and framebuffer, ideas about anti-aliasing, texture mapping, the usage of cameras and light as well as some techniques and algorithms for implementing the above mentioned concepts.

- **Software Testing and Analysis**

Software plays an important role in our daily activities, often providing critical services to end users. It is important to ensure that these systems function as they are intended with a high degree of quality. Software testing and program analysis are two techniques that are widely used to ensure the software quality. These techniques are used by developers in order to validate, verify, and evaluate the quality of software produced during the software engineering process. This course aims to provide students with advanced knowledge of the techniques used in software testing and program analysis. Students will gain an understanding of the concepts and theories that underlie these techniques. Students will also learn to use existing popular tools that support testing and analysis tasks and will be exposed to new research in the area.

- **Internet of things**

This course provides a general introduction to the emerging concept of the "Internet of Things" and an overview of its stack of enabling technologies, spanning from sensors and actuators near the user or environment end to the cyber-physical systems that provide governing intelligence, via the Cloud that caters for virtually ubiquitous connectivity. This course brings together the next two big things, Semantic Web (Web 3.0) and the Internet of Things. The course

emphasizes software-hardware codesign. A student may choose to focus on either software, hardware, or both aspects. The course aims at highlighting open issues with the Internet of Things (IoT) model, deployment, evaluation and evolution, outlining future directions relevant for societal impact and research opportunities.