

COURSES IN ENGLISH AT THE FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

UNIVERSITY OF LODZ

WINTER SEMESTER 2017/2018

REMARK: A course will be open for Erasmus or Mobility Direct students who choose at least 3 courses at the Faculty of Mathematics and Computer Science.

Otherwise, a course can be open for at least 15 students.

No.	COURSE	FORM	ECTS	USOS CODE	SHORT DESCRIPTION
1.	Algebra and Number Theory	L/D	6	1100-EAOENG	The goal of the course is to present the notions of number theory and abstract algebra which are necessary for the understanding of the modern applications of those branches of mathematics in computer science, e.g., in cryptography.
2.	Logic with Elements of Set Theory	L/D	4	1100-LSOENG	The aim of the subject is to acquaint students with the basic notions and methods of logic and the set theory, focusing on precise formulating of thought and acquiring the skill of proper reasoning.
3.	It Work Environment	LAB	4	1100-ITOENG	The main aim of the course is to familiarize students with various basic information technologies (UNIX, LaTeX, HTML, PHP, MySQL).

4.	Introduction to Computer Science	L/D	6	1100-ICOENG	The course is a basic introduction to the most important computer science ideas and concepts. Topics vary from short historical background of computer science, through data representation, logic circuit design to programming languages, operating system concepts and computer networks. During the tutorials students acquire skills in using different numeral systems, boolean formula transformation, different data (e.g. numbers or images) representation methods. The emphasis is placed on learning how to describe algorithms and how to use them to solve given problem. A special attention is paid to adapt knowledge for a specific problem (student has to justify his/her choice, give appropriate example etc.)
5.	Introduction to Programming	L/ LAB	6	1100-PIOENG	The aim of the course is to acquaint the students with the basics of programming in high-level programming languages (using a one chosen). The topics covered by the course are basic notions and structures used in programming (variables, data types, statements, input/output procedures, subprograms), as well as preparing programs which apply the above elements (together with developing algorithms to solve the problems) and analysing their correctness.
6.	History of Computer Science	L	3	1100-HCOENG	The aim of the course is to give fundamental knowledge of the key topics and events in the history of computing.
7.	Algorithms and Complexity	L/ LAB	5	1100-ACOENG	The goal is to make students familiar with the methods of design and analysing algorithms. Topics connected with the notion of computational complexity, basic algorithms and data structures will be presented.
8.	Discrete Mathematics	L/D	6	1100-DMOENG	The aim of the course is to teach the students foundations of discrete mathematics together with their applications.
9.	Object-Oriented Programming	L/ LAB	5	1100-OP0ENG	The aim of the subject is to acquaint students with the object programming paradigm. They will learn the good practice of programming and object programming and the ability to abstract and solve problems in the programming language. The lecture includes presentation of the methods of creating dynamic data structures.
10.	Introduction to Databases	L/ LAB	6	1100-IDOENG	The course familiarizes with basic concepts of database management systems. It focuses on relational model, relational algebra, and SQL (the standard language for creating, querying, and modifying relational databases). It also covers many aspects of database design using Entity-Relationship-Model. The software used in this course is Oracle 10g and Oracle Data Modeler.

11.	Computer Graphics	L/ LAB	6	1100-CGOENG	The aim of the lecture is a presentation of theoretical basics of computer graphic without implementation details, presentation the most important algorithms in 2D and 3D graphics.
12.	Computer Aided Calculations	LAB	5	1100-CCOUII	The main aim of these classes is to familiarize students with well known and the most common numerical operations using MATLAB software. These skills will be crucial in their future professional career in any areas related to the research and development (R&D).
13.	Artificial Intelligence	L/ LAB	6	1100-AIOUEN	The lecture includes the most important problems concerning artificial intelligence such as: fundamental methods and algorithms of artificial intelligence, fundamental information about neural networks as well as fuzzy logic. The aim of the computer laboratory is to implement selected algorithms presented during the lecture and to solve artificial intelligence problems.
14.	Algorithmic Techniques	L/ LAB	5	1100-ATOUEN	The goal is to make students familiar with the methods of design and analyzing algorithms. Topics connected with the notion of computational complexity, basic algorithms and data structures will be presented. During the workshop we will present advanced algorithms and data structures, on issues such as: efficient implementations of dictionaries, complex data structures, compression, graph algorithms, pattern matching algorithms, parallel algorithms, NP-completeness problems.
15.	Modelling and Simulation	L/ LAB	5	1100-MSOUEN	The aim of the course is to present mathematical models of various phenomena, e.g. of biological, medical, economical processes. For example, the prey-predator, infected-susceptible, simplex, optimal portfolio models will be covered with emphasis on simulation skills. Basic modelling and simulation tools will be discussed. All models will be analyzed with the aid of computer programs.
16.	Advanced Programming Techniques	LAB	6	1100-TPOUEN	The main goal of the course is to develop the skills of object oriented programming using advanced techniques, design patterns, libraries and multithreading. During the course we shall introduce unit testing methodologies and application tracing techniques.
17.	Programming Web Services	L/ LAB	5	1100-PUOUEN	The course aims to familiarize students with the methodology of concurrent and network application development, with particular emphasis on applications running on the internet.

18.	IT Projects Management	L/ LAB	6	1100-ZPOUEN	<p>The course aims to acquaint the students with the classical and agile methodologies of project management and also with systematic approach to developing software products. Course will consider methods of analysis of potential projects and breaking tasks into smaller pieces. Moreover roles in the project and communication in the group and between project manager and project board will be presented. Techniques of measuring quality of the work, making contingency plans and immediate actions will be discussed. Also students will be acquainted with documentation templates.</p> <p>Laboratories aims to practice presented techniques with the students gathered in the project groups.</p>
19.	Machine-Language Programming	L/ LAB	6	1100-JWOUEN	<p>The aim of the course is to provide specific low-level programming including applications that are used in programming languages and presenting internal methods and algorithms for language-specific interior and the relation between these methods and the architecture of the computer system. Computer lab is the practical implementation of methods and algorithms for language specific example of internal architecture and x86 MASM assembly language and software development based on the combination of modules created in high-level and internal languages.</p>
20.	Compiler Construction	L/ LAB	6	1100-KKOUEN	<p>The aim of the course is to acquaint the student with the process of compilation as well as techniques and tools used today to build compilers. The stages of compilation are presented along with their detailed description. The main focus is on lexical and syntactic analysis. The rules implementing compilers, using specialized tools for creating analyzers and lexical syntax such as LEX and YACC and LLGEN, as well as ways to implement finite automata are discussed. Moreover, implementation (in a high-level programming language, which is C++) of finite automata deterministic and nondeterministic, underlying lexical analysis.</p>
21.	Database Systems Administration	L/ LAB	6	1100-ABOENG	<p>The course addresses issues related to the administration of database management systems. It focuses on installing and configuring database server, working with databases, performing backup and recovery. It also covers authenticating and authorizing, auditing database server environment. The database server used in this course is SQL Server.</p>

22.	Security of Computer Systems	L/ LAB	6	1100-BSOENG	The aim of the course is to acquaint the student with the fundamental problems of computer security. These are the risks associated both with the same operating systems and network infrastructure. Students will learn about the creation of an information system security policy, secure programming methods and tools, security analysis and monitoring, intrusion detection and protection.
23.	Technical Writing	LAB	5	1100-TWOUEN	Students acquire the ability to create and develop a variety of business documents such as contracts, presentations, manuals, product catalogs, user manuals, etc.
24.	Complex Analysis	L/D	5	1100-AZOUUMM-Erasm	The purpose of the lecture is to introduce students with basic concepts of one-dimensional complex analysis. The main accent is to teach calculations competences which allow to use complex analysis in different branches of mathematics.
25.	Classical Geometry	L/D	4	1100-GKOUNM-Erasm	The aim of the subject is to develop geometric methods based on topology, algebra and elementary calculus. Euclidean space, sphere and hyperbolic space are studied. From one hand they are applied in many parts of mathematics. On the other hand, these model space are at the start of differential geometry. In these spaces the following objects are described: geodesic structure, triangle relationships and isometry group.
26.	Introduction to Topology	L/D	4	1100-TOOLMM-Erasm	The purpose of course is provide the basic properties of the metric spaces, continuity and different types of sets. After the course is over student: verifies the function of metric, describes the interior and closure of set, open and closed sets, operates the notion of dense set, nowhere dense, perfect, the first and the second category set, investigates the continuity of function in a metric space, defines and classifies separable, compact, complete and connected spaces, describes some topological properties of subsets of R^n equipped with the natural metric.
27.	Probability Basis of Statistical Inference	L/D	4	1100-PROUFM-Erasm	The aim of the course is to provide the students with basic notions and methods of the mathematical statistics.
28.	Abstract Algebra	L/D	5	1100-AAOUMM-Erasm	The course aims to acquaint the students in detail with major concepts and theorems of abstract algebra within the scope of the theory of groups, commutative rings and fields.

29.	Differential Geometry	L/D	5	1100-GROUMM-Erasm	<p>The aim of the subject is to develop analytical and geometric actions on low-dimensional manifolds: curves and surfaces.</p> <p>Parametric curves and its basic properties as well as regular surfaces as smoothly parametrizable objects are studied.</p> <p>Applications of mathematical analysis and linear algebra lead to the characteristic forms of surfaces and their quantities, in particular Gauss curvature and covariant derivative.</p> <p>Some global results on topology of surfaces with given geometry appear.</p>
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Abbreviations: L – lecture; D – discussion class; LAB – Information technology laboratory