Information sheet about the Business Information Systems Bachelor programme (B.Sc.) at Faculty of Wood Sciences, University of West Hungary

1. Course Format

Bachelor programme in the form of regular university study.

2. Programme Curricula

The Bachelor programme comprises min. 210 credit points, corresponding to a study period of seven semesters (3.5 years). On the completion of the Bachelor programme the candidate receives the degree <<Bachelor of Science in Business Information Systems NYME>>.

3. Programme Overview

The main goal of the Business Information Systems Bachelor programme is to educate specialists who are able to understand, appreciate and solve the problems hidden in real business processes applying the possibilities and tools that the modern information technologies provide. The educated specialists will be able to model, based on cooperation, the info communications processes and information technologies; to plan and control processes; to design, develop and maintain applications; and they will have enough background knowledge to continue education in the field's Master programme.

4. Lecture Overview

- *Fundamental natural science studies*: Analysis, Probability Theory, Statistics, Discrete Mathematics, and Optimization Algorithms.
- *Economy and human studies*: Economics, Corporate Economy, Marketing, Communications, Financing and Accounting, Economic Law, EU Knowledge, Management and Organization.
- *Fundamental and advanced information science studies*: Computer Architectures, Operating Systems, Computer Networks, Basics in Programming, Web Systems Programming, Basics in Software Technology, Data Bases, Enterprise Resource Planning, Performance Evaluation, Security of Information Systems, Software Management, Operation and Maintenance of Information Systems.

5. Majors and Specializations

After the first four semesters of the Bachelor programme the students select the major from three possibilities. The *Business Major* prepares the students to support the activities of small, medium and large enterprises from informatics point of view. The *Non-Profit Major* gives practical knowledge to the students related to the control, finance, operation and maintenance of the non-profit sector from the viewpoint of information systems. Finally, the *Master Preparation Major* strengthens the theoretical knowledge of students to continuing education in the field's Master Programme.

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1. Mathematics 1. (4+2+0 e) 1. semester; 6 credits

Complex numbers, polynomials, inequalities. Convergence of sequences and series. The number *e*. Functions of one variable: inverse, composition. Exponential, trigonometrical, hyperbolic functions and their inverses. Limit, differentiation and integration. Applications in extreme value problems and analysis of functions. Numerical and infinite integrals.

2. Mathematics 2. (3+2+0 e) 2. semester; 6 credits

Limit, differentials and integrals in higher dimension. Applications in extreme value problems, regression and physics. Basic combinatorics. Algebra of events. Elementary probability theory, conditional probability, independence of events. Random variables: distribution function, density function, expected value and standard deviation. Special probability distributions: binomial, hypergeometric, Poisson, uniform, normal, exponential, chi-square, Student and Fisher.

3. Discrete Mathematics 1. (2+2+0 e) 1. semester; 5 credits

This course introduces students to the basics of combinatorics, graph theory and elementary number theory. Connections to computer science are strongly emphasized.
Some topics are as follows: counting problems, combinatorial tools, Pascal's triangle, Fibonacci numbers, integers, divisors, primes, congruences, graphs, Eulerian walks, Hamiltonian cycles,
trees, Cayley's theorem, optimum spanning trees, the travelling salesman problem, matchings, planar graphs, Euler's formula, colouring, a glimps of complexity.

4. Discrete Mathematics 2. (2+2+0 e) 2. semester; 5 credits

The subject of this course is an introduction into graph theory, abstract algebra and number theory necessary for informatic studies. The algorithmical point of view and usage of mathematical models are emphasized.
Topics: zero- and first order logic, complex numbers, systems of linear equations, determinants, matrices, vector spaces, linear functions, rank, eigenvalues, Euclidian spaces, quadratic forms.

5. Optimalization Algorithms (3+2+0 e) 3. semester, 6 credits

This course introduces students to the analysis and design of computer algorithms. Upon completion of this course, students will be able to demonstrate a familiarity with major algorithms and data structures and synthesize efficient algorithms in common engieneering design situations. Some topics are as follows: searching and sorting, red-black trees, B-trees, graph algorithms, dynamic programming, greedy algorithms.

6. Statistics (2+2+0 e) 4. semester; 5 credits

Descriptive statistics: measures of central tendency and variability, graphic resolution. Dependency, empirical covariance and correlation. Estimates of parameters (unbiased, consistent, effective estimators). Parametric tests (chi-square, t, F tests). Analysis of variance,

design of sampling, regression analysis. Nonparametric tests (independence, density function, regression function). Statistical index system and evaluation method of financial security

7. Economy (4+2+0 e) 1. semester; 6 credits

Introduction into microeconomics. Customers' behaviour and demand, customers' preferences. Profit, prices, optimalisation. Market demand. Manufacturers' behaviour and demand. Costs, cost- and profit types. Market structures and regulatory guidelines of the market. Capital, interest, investment. Asset-market, factor prices. General competitive balance.
Basic correlations of macroeconomics. Listing the activities of macroeconomics, measuring the national output. Labour market. Commodity market I, Commodity market II. Money and money market. IS-LM balance. Social and economic welfare. Market insufficiencies.
Listing the activities of macroeconomics, measuring the national output. Inflation, inflationary processes. Monetary and fiscal policy. Business cycle, periodicity.

8. Corporate-economy (2+1+0 e) 2. semester; 3credits

Problems in creating economic information support for the management's decision making viewed from different aspects of the levels of leadership. Fundaments of resource use and evaluation. Costs, income, profit. The conventional approach and model for cost and efficiency analysis.
Creating the balance of targets of consumer-cost and profitability Materials, stocks, transportation costs. Wages, creating the balance of human resources and economic aims. Managing the invested assets. The problem of general costs. General costs of different levels. Capacity and general cost. General financing ability. Non productive general costs.
Investment evaluation and its methods. Economic analyses needed for the determination of company processes. Process development, process cost, process efficiency. The cost management and control of company units. Setting up cost standards. Performance motivation of cost positions. Checking project costs. Complex performance evaluation systems.

9. Marketing (2+1+0 e) 3. semester; 3 credits

Basics and concepts of marketing. New tendencies in marketing. The micro- and macro-environment of marketing. Market types and their comparison. Customers' market and customers behaviour. The characteristics of the industrial market. Marketing research and marketing. Information System – with the information background, applicable techniques and instruments of marketing. Market segmentation in practice. Product policy, branding, product development, life cycles, price and merchandising policy. Theory of marketing communication. Image, image types. Advertisements, advertisement types. Public Relations. Sales promotion, success factors of personal selling.

10. Communication (2+0+0 m) 3. semester; 2 credits

The correlations of communication theory. The content of the functions and structure of interpersonal and cultural communication. The meanings of languages recorded digitally and analogue (verbal and non verbal communication). The role of cultural context as an enormous joint code system. Business communication, the forms of written contacts, trial techniques and the unique requirements of merchandiser-customer relations. (protocol, etiquette)

Question types used in communication. Trial strategies. (win-win strategy, lose-win strategy). Setting up trial delegations. The material, environmental conditions of business trials. Preparing for business trials. The documents of trials. The roles of information techniques in communication.

11. Finance and Accounting (3+2+0 e) 4. semester; 6 credits

Company finance, fiscal markets. Selling bonds and shares. Investment decisions, investment criteria. CAPM, CAPM capital cost. Financing decisions. Capital structure.
Accountancy, bookkeeping, reports. Balance. Devices-resources (result report). Economic events. Book entries. Account mirror. Time- or account series bookkeeping. Resume. Guidebooks, analytic filing. Clearing costs. Cost item, -place, -representative. Supplies of own production. Profit. Clearing sales. Profit-expenditure I. Result report (A-B) Accounting regulations. Evaluation. Money turnover accountancy. Time limitation. General balance knowledge. Invested assets. Changes of value. Immaterial goods, invested fiscal assets. Material assets. Current assets. Stocks. Clearing. Merchandised and self-produced stocks.

12. Economic Law, EU Knowledge (3+0+0 e) 4. semester; 3 credits

The members of the market in general, the subjects of economic law and their roles. Private enterprises, cooperative society law and the rights of operation. The legal regulations of business enterprises, partnerships. The characteristics of non-profit organisations, some enterprises. The bases of target law. Abolishing economic organisations. The basic institutions of the laws of bankruptcy. The contract types of fiscal law, document forms and types, public authenticity. The institutional system of state and legal regulation of economic processes. Legal regulation of competitive law. The elements of the regulation of labour rights.
The internal markets of the EU. The system of ways and means of the foreign trade authorities. The system of ways and means of the home trade authorities. Customs procedures, the system of customs regulations in the EU. Free fluctuation of capital and people in the EU. Tendering and consumer protection in the EU. Regulation of competition in the EU.

13. Management and Organization (3+2+0 e) 5. semester; 6 credits

The functions, process, basic techniques and methods of management. Classical management directions. The techniques and methods of organisation changes. Organisation forms and their roles in the management process. Public relations, management styles and their effect on efficiency. Special management tasks of innovation processes and projects. The connection system of the lines of tasks, authority and responsibility, the significance of delegation in modern management. The role of quality in the process system of managerial decisions.

14. Integrated Management (2+1+0 e) 6. semester; 3 credits

The fundaments of strategic management, the methods of strategies, planning, organisation and decision-making.
The position of modern HR, its role and tasks. The methods of modern HR efficiency improvement. The employment, education, retraining and issuing of human resources. Career

Planning. The main factors of innovative business enterprises – increasing consciousness. Introducing the social-economic environment and interference of innovation; the role of innovation in the national and international economy, in international development; the economic profit of innovative activities, the special needs of innovative business enterprises; innovation as driving force; innovation as possibility; innovation as resource.
The methods of project management, the coordination of contract making, the time and space optimalisation of output processes, the techniques of process analysis and control.
The project management's role as bridge between the operative organisation and realisation of strategic management and processes.

15. Computer Architectures (3+0+0 e) 1. semester; 3 credits

First the subject deals with the history of computers emphasizing the milestones at which significant qualitative changes occurred in the development of computer architecture. After this on different architecture levels those hardware and software solutions are shown which contribute significantly both to increasing of the speed and decreasing of the price of computers. Subsequently the subject deals in detail with the parallel computer systems.

16. Operating Systems 1. (3+0+0 e) 2. semester; 3 credits

The aim of the subject is to present the basic principles of multiprogrammed operating systems, review their common problems and show some possible methods to solve them. It is not supposed to provide system administrator level practical skills to the students.
Covered topics: structure and interfaces of operating systems; process model and cooperation, communication and synchronization of processes; deadlocks; processor scheduling; memory management and virtual memory; I/O system, storage management and file systems; security issues; concurrent, parallel, distributed and network systems.

17. Operating Systems 2. (0+0+2 m) 3. semester, 3 credits

The main goal of the subject is to give the students practical skills regarding the topics of the Operating Systems 1. theoretical lecture course. The basics of two prominent operating systems (Linux and Windows) are presented to identify the concepts learnt in the Operating Systems course and to study their realization in these specific systems. Some smaller case studies and the tools used are reviewed during the laboratory practices, while the students have to complete some smaller practical exercises on their own.
The main topics include: introduction and history of the Linux operating system; user and group management, file system and process management in Linux; the Linux kernel; shells and shell scripts; filters and regular expressions in system administration. General characteristics of the Windows operating systems; user, group and rights management; kernel, device drivers and hardware configuration in Windows; batch files and scripts; Active Directory.

18. Computer Networks 1. (4+0+0 e) 3. semester; 4 credits

The aim of the course is to introduce students the basic concepts of computer networking. Covered topics: Overall view of computer networks and Internet: Network edge and core, services, network access and physical media, Internet structure and ISPs, delay and loss in packet-switched networks, protocol layers and service models.

Application layer: Principles of network applications, web and HTTP, FTP, electronic mail, SMTP, POP3, IMAP, DNS, P2P file sharing, socket programming with TCP and UDP.
Transport layer: Transport-layer services, multiplexing and demultiplexing, connectionless transport –UDP, principles of reliable data transfer (rdt), connection-oriented transport – TCP (segment structure, rdt, flow control, connection management), principles of congestion control, TCP congestion control.
Network layer: Virtual circuit and datagram networks, inside a router, IP -- Internet Protocol (datagram format, IPv4 addressing, ICMP, IPv6), routing algorithms (link state, distance vector, hierarchical routing), routing in the Internet (RIP, OSPF, BGP), broadcast and multicast routing.
Link layer: link layer services, error detection and correction, multiple access protocols, link-layer addressing, Ethernet, hubs and switches, PPP.

19. Computer Networks 2. (0+0+2 m) 4. semester; 3 credits

Practical application, via laboratory exercises prepared by J. F. Kurose and K. W. Ross, of the theoretical factual knowledge about computer networks and the Internet covered in the lecture Computer Networks I. Detailed topics: Get familiar with the Ethereal packet sniffer program; Explore the HTTP protocol (the basic GET/response interaction, HTTP message formats, retrieving large HTML files, retrieving HTML files with embedded objects, HTTP authentication and security); Take a closer look at the client side of DNS (the Nslookup program, tracing DNS with Ipconfig/Ifconfig/Ethereal); Explore the ICMP protocol (ICMP messages generating by the Ping program, ICMP messages generated by the Traceroute program, the format and contents of an ICMP message); Study the TCP protocol (reliable data transfer with TCP, TCP's congestion control algorithm and flow control mechanism, investigate the performance of a TCP connection); Investigate the IP protocol (the IP datagram, the various fields in the IP datagram, fragmentation in IP).

20. Basics of Programming 1. (2+0+2 e) 4. semester; 5 credits

The subject of this course is an introduction into basic of structured programming. Algorithm based problem solving is emphasized.
Topics: Elements of programming languages, control structures, modules (functions), basic algorithms: decision, counting, minimum/maximum selection, partitioning, intersection, union, merging, searching, sorting. Methods for program design: flow-chart, struktogram, pseudo code, state chart. Data structures. Testing, debugging, error correction. The Visual Basic programming language.

21. Basics of Programming 2. (2+2+2 e) 2. semester; 7 credits

The subject of this curse is the principles of the object-oriented programming and the Java programming language:
class, object, encapsulation. inheritance, extension, polymorphism, instantiation, abstract methods and classes, complex data structures (queue, stack, tree), containers
J2SE API, basic classes, Object, wrapper classes, input-ouput, streams, Graphical User Interface (GUI), event-driven programming.

22. Programming Web Systems (3+0+2 e) 3. semester, 6 credits

The aim of this course is the knowledge of modern web technologies that can be possible dynamic web contents. The subjects are: web and internet, the HTML and XHTML languages, usage of style sheets, the core JavaScript, client side JavaScript, DHTML with JavaScript, Java applets, XML, CGI programming, Java Servlets, JSP and ASP, further functionalities of the Apache web server: SSI, the basic PHP, PHP and MySQL, more PHP subjects.

23. Basics of Software-technology 1. (3+0+0 e) 4. semester, 3 credits

Software life cycle models. Software development process models and their generic steps. Architectural elements of software systems and their relations to software paradigms. Task and requirement analysis methods and models. Object oriented and functional design and decomposition. Modelling and design in UML. Implementation methods. Software architectures and design patterns. 4GL development tools. User interface design and implementation. Concurrent and real-time systems. Declarative systems. System verification, validation and testing methods.

24. Basics of Software-technology 2. (0+0+2 m) 5. semester; 3 credits

Architectural parts of the software systems. Analytical and design methodologies. Structured dataflow and data-structure oriented design. Design of user interface. The Arch reference model. Command oriented and graphical user interfaces. The MVC architecture. User interface markup languages: HTML, WML, UIML. Basics of component based systems. Basics and the methodology of generative programming. Basics of functional programming.

25. Computer Applications (2+0+2 m) 1. semester; 5 credits

The subject gives a basic knowledge of the theoretical and hardware related aspects of informatics. It demonstrates the most frequently used softwares from the operation systems to business oriented applications.

26. Databases 1. (3+0+2 e) 2. semester, 6 credits

This course introduces students to the basics of design of databases and database programming. In most cases the mathematical background is also included. Some topics are as follows: evolution of database systems, entity-relationship data model, relational data model, functional dependencies, normal forms, the database language SQL

27. Databases 2. (3+0+2 e) 3. semester; 6 credits

This course introduces students the internal components of the database management systems. Several practical and real life examples are given for better understanding. The main topics are the followings: transaction management, indices .distributed databases, server-side programming and information integration.

28. Security of Information Systems (3+0+0 e) 5. semester, 3 credits

This course introduces students to the basic cryptographic algorithms and cryptographic protokols. In most cases the mathematical background is also included. Some topics are as follows: some simple cryptosystems, block ciphers, DES, AES, public-key cryptosystems, RSA, signature schemes, hash functions, key distribution, key agreement, applications

29. Enterprise Resource Planning Systems (4+0+2 e) 4. semester; 7 credits

The aim of the subject is to present the main functions, structure, usage and operation of Enterprise Resource Planning (ERP) and other, typical business systems. The process of selection, implementation and customization of these systems is also reviewed during the course. The students gain concrete experiences on the usage and operation of these systems, and on the possibilities and process of customization and custom developments.
The main topics include: business process models, standard processes, business data models; the structure of ERP systems, the characteristics of the modular structure, hardware and system architecture, input-output interfaces, standard message exchange; selection of enterprise applications: preconditions, rough and fine selection; implementation and customization of ERP systems, custom developments; integration of information systems; e-business.

30. Performance Evaluation (3+0+0 e) 4. semester; 3 credits

Recapitulation of probability theory, statistics, and estimation theory. Performance modelling, implementation and verification of models. Performance measuring and simulation. Traffic generators. Data collection and parameter estimation. Discrete and continuous time Markov chains, homogeneous state transition, irreducible and aperiodic chains, recurrence time, stability, transient and steady-state probabilities. Random walks and birth-death processes. Basic notation in queuing theory. Delay, blocking probability, throughput, utilization. Little's result. Evolution equation for queue length. Expected queue length. Kendall's notation. Basic queuing systems (M/M/1, M/M/m, M/M/m/m, M/M/1//K, M/G/1) and their performance parameters. Queuing networks, product form solutions. Case studies.

31. Software-management (3+0+2 e) 5. semester; 6 credits

The subject of the curse is to present a real software development project. Students learn in theory and try in practice how to perform a project from selecting the methods and tools to use across the analysis, design, implementation, management of requirements and modeling to making a complete documentation.

32. Operation of Information Systems (3+0+2 e) 6. semester; 6 credits

The subject of this curse is presenting the tasks coming up in management of information systems. We will examine this problems both in theory and in practice:
hardware and software components, system design, quality management, system security, hardware installation, software choice, software installation, upgrade, patch, application migration, resource management, system configuration, data security, backup/recovery, user policy, journal (log) systems, software rights, copyrights, system-administration tools, automation, script languages

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35. Non-profit section regulation (2+1+0 e) 5. semester; 3 credits

The realisation of the modern non-profit sector after the change of the political system. Budget authorities, semi-budget authorities and social organisations. The regulation of public administration. The state finance law. E-government. The non-profit law. Possibilities and bonds. Sponsoring and regulation. The importance, necessity and forms of control. National Civil Foundation. The role of NGOs in international life.

36. E-Business Systems (2+1+0 e) 5. semester; 3 credits

The aim of the course is to give a comprehensive knowledge on one hand about the questions of IT infrastructure and, on the other hand, about the architecture of the typical e-Business applications. The main topics covered by the seminars are the following: e-Business architectures, modeling of customer behavior, UML, resource modeling (GRM), dependability. Design patterns, patterns for e-Business applications. Web service-based workflows as a special application area. Concepts of the IT infrastructure planning, capacity planning, performance models, workload characteristics and forecast techniques. Benchmark suites and their application. Three-tier architecture and J2EE basics. HA clusters and clustering in J2EE.

37. Independent laboratory 1. (0+0+2 m) 5. semester; 3 credits

Students know tools and environments of their free special subject. They work a trade project on their own. Students have to write an essay about their experiences and results, and they have to show them in a lecture too.

38. Non-profit section financing (2+1+0 e) 6. semester; 3 credits

The state finance and the non-profit sector. Financing municipalities. The management of state institutions. NGO organisations in Hungary. The assistance of the civic sphere. Internal and external sources. The role of management in financing. The importance of marketing and PR. The steps of financing. Organisation structure. Lobbying, representation, professional associations, chambers.

39. Decision-management Systems (2+1+0 e) 6. semester; 3 credits

Structure of the Decision-management Systems, Knowing of different Decision-management Systems. Specification and implementation of an own Decision-management System.

40. Quality Control Systems (2+1+0 e) 6. semester; 3 credits

In this curse students will get acquainted with concepts of quality, quality management and specially the Total Quality Management. We will show how to build a quality management system in a firm, how to make an audit, and what does it mean in informatic industry.

41. Specialization laboratory 1. (0+0+4 m) 6. semester; 6 credits

The aim of the subject is to present real applications and give practical skills in the fields of the courses *Software Technologies* and Architectures and *E-business systems*.

Related to the *E-Busines systems*, the students get a basic knowledge about the Lotus document management and groupware software suite. They have to set up a system with the Lotus Designer software which should be available via a standard Web browser and utilize the automated from management functions of Lotus. Students also become familiar with the Web servicees architercture by the example of the Oracle BPEL engine.

42. Independent laboratory 2. (0+0+2 m) 6. semester; 3 credits

Students know tools and environments of their free special subject. They work a trade project on their own. Students have to write an essay about their experiences and results, and they have to show them in a lecture too.

43. Informatics Systems in Non-profit Sphere (2+1+0 e) 7. semester; 3 credits

General characteristics of the informatics systems used in the non-profit sphere. Comparison of the integrated and island systems. Different conditions of the installation, introduction and management of the integrated informatics systems. Methods for the introduction of an integrated system. Special expectations of the non-profit sphere with an informatics system, data-security, archiving, personality rights, availability. Different informatics systems used in the non-profit sphere (health, education, civil service, etc.)

44. Specialization Laboratory 2. (0+0+2 m) 7. semester; 3 credits

During the first half of the curse students study the Lotus Domino/Notes system and different applications of it:
Domino server, Notes client, WEB client, document management, Workflow, Quickplace, Web conferencing, Workplace Collaboration Services, Workplace Rich Client
During the second half of the curse students will get acquainted with different methods of building a quality management system on paper basis, on computers and with Lotus Notes.

45. Degree Project (0+0+12 m) 7. semester; 15 credits

The aim of this subject is the workig out of the complex professional task to give reason for the qualification and skills in special literature of the engeenier-candidates.

46. Production Information Engineering (2+1+0 e) 5. semester; 3 credits

The tasks of Production Planning and Control. Models, basic information processes and functional units of production systems, and the integration of these according to the modern computerized system approach. Structural models of manufactured products: Bill of Materials (BOM), recipe models. Process and data model of manufacturing. Technical, economic and IT-based taxonomy of data. Principles and methods of capacity, stock and time management. Aggregate production planning, Master Production Scheduling (MPS).

Material Requirements Planning (MRP), Capacity Requirements Planning (CRP), Manufacturing Resource Planning (MRP II), scheduling.

47. Logistics (2+1+0 e) 6. semester; 3 credits

The concept of logistics, its basic role. Logistic systems, the development and planning of company logistic systems. The material handling systems, their position and role in logistics. Systems of storing and transporting. Supply logistics. Distribution logistics. The connection system of distribution and logistics. The processes of logistics in connection with distribution channels. The processes of logistics in connection with customer service. Transportation and shipping logistics. Logistic controlling. Recycling logistics and environmental marketing-management. The concept of quality in logistic processes. The logistic elements of quality management systems.

48. Data Mining (2+1+0 e) 7. semester; 3 credits

Process of the knowledge digestion. Architecture of the datamining systems. Basic elements, mathematical principles. Preprocessing, Boole-algebra, Trees and graphs, Correspondence-searching, Datamining in world wide web, Datamining in practice.

49. Discrete Mathematics 3. (2+1+0 e) 5. semester; 3 credits

Abstract algebraic constructions, Direct-production, homomorph image, Factoralgebra, halfgroups, groups, rings, bodies, nets. Boole-algebra, BCH-coding, Post nets

50. Artificial Intelligence (2+1+0 e) 5. semester; 3 credits

Theoretical base of knowledge based systems, production systems, problem space, knowledge representation, deduction algorithms, Logical knowledge representation, Resolution, Artificial intelligence in practice: basics of LISP and Prolog programming languages. Expert systems. Examples and caseworks.

51. Decision- theory (2+1+0 e) 5. semester; 3 credits

Fundaments of decision theory. The theory of problem solving from the aspect of systems, decision theory directions, decision theory models.
The psychology of decision-making. Personality and decision-making. Risk taking willingness. Typology of decision-making behaviour. Recognition and impression. The manifestation of the subconscious in the decision-making.
Methods of decision theory. Normative, rational models, descriptive decision theory methods, rationality and ethics of decisions. Team decision-making methods.
Risk and decision. The decision theory of risk, risk analysis, different directions of probability theory. Quantitative methods of decision theory.

52. Theory of Algorithms (2+1+0 e) 6. semester; 3 credits

This course introduces students to the analysis and design of computer algorithms. Upon completion of this course, students will be able to demonstrate a familiarity with major algorithms and data structures and synthesize efficient algorithms in common engieneering

design situations. Some topics are as follows: serching and sorting, heaps and the heapsort, quicksort, hashing, binary search trees, red-black trees, B-trees, pattern matching. At the end of the course we outline some problems for which no efficient solution is known.

53. Programming 3. (2+1+0 e) 6. semester; 3 credits

Structured programming in C. Object-oriented programming in C++. Differences between C and C++. Pointeraritmetic and memory-management. Operator overloading. Polymorphism side effects: arrays, non-virtual methods. Multi-Inherintance. Problems with const. Templates. STL. Preprocessing, conditional compiling. Concurrent programming in C. GUI (graphical user interface)-programming. Networkmanagement. Management of compile and link dependences in large projects, isolation. Regular expressions. Optimization methods.

54. Infocommunication Networks and Services (2+1+0 e) 6. semester; 3 credits

Computer and communication networks, their collaboration. Technological, economical, and judicial factors of development of communication networks. Structure of communication networks: main functions. Types and requisites of the info-communication services. Data, speech, music, image transfer. QoS requisites. Main features of different transport facilities. Comparison of different network types. Methods and tools for network design and management.

55. Software Technics and Architectures (2+1+0 e) 7. semester; 3 credits

Programming in .NET environment. The available services and facilities in .NET platform. Practical guide for programming in modern programming environments. Concrete examples and problems in theory and in practice too.

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56. Reliability Modelling (3+0+0 e) 5. semester; 3 credits

Basic notation in reliability modeling. Key reliability parameters (survival probability, availability, failure rate, time parameters: MTFF, MTTF, MUT, MDT, MTBF) and their relations. Reliability modeling of components, non-redundant non-repaired and repaired systems and their reliability parameters.
Basic redundant (active and passive redundancy, n out of k) systems and their reliability parameters. Complex redundant (stand-by, voting, networks) systems.
Modeling of complex non-repaired and repaired systems with independent and dependent units (block diagrams, conditional probabilities, tie- and cut-set methods, event tree, connection matrix, Markovian models) Computer generation of Markovian models: Extended Petri nets.
Case studies for building reliability models and deriving reliability parameters.
Outlook: Software reliability. The impact of failures on performance parameters – performability.

57. EU and Hungary (2+0+0 e) 5. semester; 2 credits

Prehistory and the process of forming of European unit. The European integration model, from the European Economical Community to the European Union. Changeover from the planned economy, forming of market economy at Hungary. Regional development policy in the EU and Hungary. Opportunities of Hungary and the EU.

58. Ethics (2+0+0 e) 5. semester; 2 credits

The students can know the meaning and the beginning of the ethic. They can listen about the the relations of the ethic and the moral and of the law- freedom-determinism, civilization and the moral. They can study about the ethical reasoning and theory.

59. Logic (2+0+0 e) 5. semester; 2 credits

Students can know the definition of the logic, it’s principles and divisions. They can know the logical forms (notion, judgment, deduction). They can study about the methods of the logic and about the syllogism. They can know the history of the beginning of the logic, and speech of the logic in the middle ages. They study logic of the new age, and the modern, emblematic logic.

60. Conflict-management (1+1+0 m) 6. semester; 2 credits

Approximation of conflicts. The intervention of pedagogue at conflicts. Strategies. Consequents of conflicts and communication. Solving of conflicts through creative techniques. Creating of common rules. Non-violent conflict-handling in the class. Developing of abilities of constructive communication.