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| ***Title:*** | *Economics* |
| ***Lecture hours:*** | *45 hours of lectures, 24 hours of practical classes, 6 hours of computer classes* |
| ***Study period:*** | *winter semester* |
| ***Level:*** | *bachelor* |
| ***Location:*** | *Wrocław* |
| ***Examination:*** | *written (theory and exercises), at the end of the semester* |
| ***Language:*** | *English* |
| ***Prerequisites:*** | *material from the secondary school* |
| ***Course content:*** | 1. Microeconomics 2. Goods. 3. Forms of markets. 4. Demand, elasticity of demand. 5. Supply, elasticity of supply. 6. Market equilibrium and its changes. 7. Theory of the firm. Production function. 8. Cost function, cost curves. 9. Profit maximization in the perfectly competitive market. 10. Monopoly, price discrimination. 11. Oligopolies. 12. Market failure. 13. Macroeconomics 14. Measuring the Economy. 15. Modern macroeconomic theories. 16. Goods and services market equilibrium: the IS curve. 17. Financial market equilibrium: the LM curve. 18. General Equilibrium in the IS – LM model. 19. The aggregate demand (AD) curve. The demand shocks. 20. The aggregate supply (AS) curve in the short and long run. The supply shocks. 21. Economic fluctuations in the AD-AS model. The long run equilibrium. 22. The tradeoff between unemployment and inflation in the short and long run. The role of inflation expectations. 23. Basic concepts in the open economy. Balance of payments. The exchange rate regimes. 24. Monetary and fiscal policies under the fixed and floating exchange rate regime. 25. Labour market. 26. Price stability. |
| ***Learning outcomes:*** | *knowledge: the most important microeconomic and macroeconomic definitions terms, methods, and theories, identification, and explanation of microeconomic and macroeconomic phenomena*  *skills: prediction of changes in the markets due to various factors, analysis of the demand, cost analysis and calculation of the optimal production and price levels, calculation of GDP and GNP, quantitative and qualitative macroeconomic analysis*  *competence: understanding of the basic economic phenomena and ability to discuss it with other students, assessment of the role of government intervention in the economy* |
| ***Contact person:*** | *Dr Paweł Kuśmierczyk,* [*pawel.kusmierczyk@ue.wroc.pl*](mailto:pawel.kusmierczyk@ue.wroc.pl)*, Dr Radosław Kurach, radoslaw.kurach@ue.wroc.pl* |
| ***Literature:*** | 1. Mankiw N. G,m Taylor M. P., “Economics”, South-Western Cengage Learning 2. Varian H. R. “Intermediate Microeconomics. A Modern Approach”, W.W. Norton & Company 3. Mankiw N. G., “Macroeconomics”, Worth Publishers 4. Begg D., Fischer S., Dornbusch R. “Economics”, McGraw-Hill |
| ***Faculty:*** | *Management, Informatics and Finance; Major Business Informatics* |

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| ***Title:*** | *Information and Communication Technologies* |
| ***Lecture hours:*** | *20h – lecture*  *20h – tutorials*  *20h – computer laboratories* |
| ***Study period:*** | *Winter or summer semester* |
| ***Level:*** | *Basic* |
| ***Location:*** | *Wrocław* |
| ***Examination:*** | *Written tests (lecture, tutorials)*  *Project (laboratory classes)* |
| ***Language:*** | *English* |
| ***Prerequisites:*** | *Basic computer skills* |
| ***Course content:*** | *Course lectures provide an overview of key concepts of information and communication technologies:*   * *Computer architecture and computer networks* * *Data management and data processing* * *World Wide Web technologies* * *Database technologies* * *Applications and future trends in IT*   *In the laboratory classes office applications are presented: a word processor, a spreadsheet and a database system. These tools are used for performing various tasks such as creating multiple documents from templates, analyzing and visualizing data, storing information in a database, creating reports, etc.* |
| ***Learning outcomes:*** | *This course presents I&CT foundations. The students will achieve introductory knowledge in essential IT techniques necessary for further studies: data processing basics, computer architecture, database and web technologies introduction, text processing and advanced spreadsheet computing.*  *The students will have practical skills in using office applications: a word processor, a spreadsheet and a database system.* |
| ***Contact person:*** | *Krzysztof Michalak (krzysztof.michalak@ue.wroc.pl)* |
| ***Literature:*** | *Balzan P., Phillips A., Business Driven Information Systems, McGraw-Hill, 2009, ISBN-10: 0073195588*  *Beekman G., Beekman B., Tomorrow’s Technology and You, Pearson, 2009*  *Senn J.A., Information Technology: Principles, Practices, and*  *Opportunities, Prentice Hall, 2003, ISBN-10: 0131436260* |
| ***Faculty:*** | *All students* |

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| ***Title:*** | Databases |
| ***Lecture hours:*** | 30 lectures + 30 labs |
| ***Study period:*** | Whole year |
| ***Level:*** | Basic |
| ***Location:*** | Wrocław |
| ***Examination:*** | Written form: Report prepared by students confirming a designed database/warehouse application and/or multiple choice question – single answer test |
| ***Language:*** | English |
| ***Prerequisites:*** | Fundamentals of Computer science and optionally: Information Systems Design, Business Programming |
| ***Course content:*** | Basic concepts of databases. Database infrastructure. Query languages overview. SQL – an universal access language to modern databases. Query and transaction processing. Advances topics of databases: distributed databases, post-relational databases. Universal DBMS server and future trends in databases. A concept of data warehouses (DW). Data warehouse models and architecture. Data warehouse Design Methodology. OLAP and DW. |
| ***Learning outcomes:*** | Understanding an essence and features of database/data warehouse technology. Ability to model and define a database for the specific domain. Capability to process a database using queries (with SQL commands). Basic knowledge about processing modern databases (using transactions and queries respecting database features) on universal database servers. Ability to model and define a data warehouse. Basic knowledge about processing data warehouses (ETL phases) and On-line Analytical Processing. Orientation in future trends in database/data warehouse technology. |
| ***Contact person:*** | Prof. Mieczysław Owoc, [mieczyslaw.owoc@ue.wroc.pl](mailto:mieczyslaw.owoc@ue.wroc.pl) room 602Z phone: 71 3680503; Prof. Malgorzata Nycz ([malgorzata.nycz@ue.wroc.pl](mailto:malgorzata.nycz@ue.wroc.pl) room 612Z phone: 713680507; Dr Maciej Pondel room 614Z [maciej.pondel@ue.wroc.pl](mailto:maciej.pondel@ue.wroc.pl) phone: 71 3680 516 |
| ***Literature:*** | 1. Connolly T.M, Begg C.E.: Database Systems: A Practical Approach to Design, Implementation, and Management. Addison-Wesley, 2014. 2. Coronel C., Morris S., Robb P.: Database Systems: Design, Implementation & Management. Cengage Learning, 2013. 3. Hoffer J.A, Ramesh V., Topi H.: Modern Database Management. Prentice Hall, 2012. 4. Inmon W.H.: Building the Data Warehouse. Wiley Publishing, 2005 5. Kimball R. et al.: The Data Warehouse Lifecycle Toolkit. Wiley Publishing 2007 |
| ***Faculty:*** | All students |

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| ***Title:*** | Business Programming |
| ***Lecture hours:*** | 15 (lectures) and 45 (laboratories) |
| ***Study period:*** | Fall or Spring semester |
| ***Level:*** | Basic |
| ***Location:*** | Wrocław |
| ***Examination:*** | Written exam |
| ***Language:*** | English |
| ***Prerequisites:*** | None |
| ***Course content:*** | This course concerns programming languages. In particular it focus on programming paradigms, basic terms and definitions (algorithm, programming languages, programming, source code, compilers), fundamental elements of programming languages (keywords, syntax, semantics, data structures and types, standard libraries), structured programming, object-oriented programming, integrated development environment (IDE) and development of graphical user. |
| ***Learning outcomes:*** | Students have basic knowledge in the field of programming languages, basic data types and structures, object-oriented programming. Students will be skilled to develop console applications, to develop Windows GUI applications, to use GUI elements in a chosen programming language as well as to develop an application that solves (using proper algorithms) a defined problem. Students will able to identify a problem, to use a proper solution algorithm and to implement it (develop an application). |
| ***Contact person:*** | Dr inż. Radosław Rudek, e-mail: [radoslaw.rudek@ue.wroc.pl](mailto:radoslaw.rudek@ue.wroc.pl), phone: +48 71 36 80 378  Dr inż. Krzysztof Michalak, e-mail: krzysztof.michalak@ue.wroc.pl, phone: +48 71 36 80 377 |
| ***Literature:*** | 1. Stroustrup B., The C++ Programming Language, Addison–Wesley, New Jersey, 2000.  2. Horton I., Beginning Visual C++ 2010, Wiley Publishing, Indianapolis, 2010.  3. MSDN Library http://msdn.microsoft.com, Microsoft |
| ***Faculty:*** | All students |

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| ***Title:*** | Computer Network and Security |
| ***Lecture hours:*** | 45 (lectures) and 15 (laboratories) |
| ***Study period:*** | Fall or Spring semester |
| ***Level:*** | Basic |
| ***Location:*** | Wrocław |
| ***Examination:*** | Written exam |
| ***Language:*** | English |
| ***Prerequisites:*** | None |
| ***Course content:*** | Introduction to information security. Types of attacks. Basics of cryptography. Public key cryptography. Methods of authentication and access control mechanisms. Security of computer systems and networks. Secure network protocols. Protection applications, systems and computer networks. Security policy. |
| ***Learning outcomes:*** | Students have knowledge in the field of information security, security threats and attacks. They can evaluate and increase security of applications, systems and computer networks. They have basic skills of analysis security of application, computer systems and networks. They are also aware of the role and importance of security of computer networks in the socio-economic. |
| ***Contact person:*** | Dr inż. Radosław Rudek, e-mail: [radoslaw.rudek@ue.wroc.pl](mailto:radoslaw.rudek@ue.wroc.pl), phone: +48 71 36 80 378 Dr Artur Rot, e-mail: artur.rot@ue.wroc.pl, phone: + 48 71 36 80 71 36 80 379 |
| ***Literature:*** | 1. Stinson D. R., Cryptography: Theory and Practice, Third Edition, Chapman & Hall, 2006.  2. Comer D. E., Computer Networks and Internets with Internet Applications, Prentice Hall, New Jersey, 2009.  3. Amato V., Lewis W., Cisco Networking Academy Program, Cisco press, 2000.  3. Tanenbaum A. S., Wetherall D. J., Computer networks, Prentice Hall, New Jersey, 2010.  4. D. R. Ahmad et al., Hack Proofing Your Network, Syngress Publishing, 2002. |
| ***Faculty:*** | All students |

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| ***Title:*** | IT Project Management |
| ***Lecture hours:*** | lectures: 30h, workshops: 30h, IT-labs: 30h |
| ***Study period:*** | summer term |
| ***Level:*** | bachelor |
| ***Location:*** | Wrocław |
| ***Examination:*** | Written assignments in MS Project / MS Excel environment |
| ***Language:*** | English |
| ***Prerequisites:*** | Fundamentals of Information System, Management, Business Finance and Accounting, Business Principles and Organization, System Analysis and Design |
| ***Course content:*** | The course presents fundamental ideas of the IT project management. It assists students in learning and understanding the basic concepts, methods, tools and technologies linked with IT project management. It helps them to acquire competences of using Project Office software, that are expected from IT project managers.  The course refers also to effectiveness of IT projects. It enables students to learn and comprehend fundamental ideas, methods and procedures used in measuring and evaluation of effectiveness and efficiency for IT projects as well as products or services they render. The course helps to obtain skills required to examine effectiveness of IT projects using spreadsheet software. |
| ***Learning outcomes:*** | **Knowledge:**   1. Obtaining knowledge on methods and tools of planning, organising and operational IT management, in line with PMBOK. 2. Learning key methods of managing objectives and a scope of IT projects, including modifications resulting from stakeholders’ expectations. 3. Making familiar with IT project budgeting, including: identifying demand for and cost of resources. 4. Making acquainted with IT project time management, including: estimating a project duration, setting deadlines and task scheduling. 5. Obtaining knowledge on IT project teams, internal communication, quality requirements, project risk management, resources acquisition, and keeping documentation of a project. 6. Making familiar with basic methods and tools respecting economic analysis and assessment of IT projects, including the CBA methodology.   **Practical skills:**   1. Being able to plan a small IT project (respecting its range and scope), to organise a small IT project team and co-ordinate its actions. 2. Being able to set a budget of an IT project (estimating expenses and costs), and to define it in the Project Office environment. 3. Being competent to monitor, document and report the execution of a project. 4. Being able to manage the economic effectiveness of an IT project and to conduct feasibility studies respecting requirement of a CBA methodology. 5. Being competent to use selected methods and financial ratios (Payback Period – PB, Net Present Value – NPV, Internal Rate of Return – IRR, Modified IRR), as well as IT dedicated measures (TCO, Information Economics) in economic appraisal of diverse IT projects.   **Competences:**   1. Obtaining competences required to manage a small IT project team within the full span of a project’s life cycle. 2. Acquiring competences needed to managed economic effectiveness and efficiency in various types of IT projects. |
| ***Contact person:*** | 1. Dr Ryszard Zygała, room 707Z, phone: +71 36 80426, e-mail: [Ryszard.Zygala@ue.wroc.pl](mailto:Ryszard.Zygala@ue.wroc.pl) 2. Dr Wiesława Gryncewicz, room 611Z, phone: + 71 36 80506, e-mail: [Wieslawa.Gryncewicz@ue.wroc.pl](mailto:Wieslawa.Gryncewicz@ue.wroc.pl) 3. Dr Tomasz Dyczkowski, room 513Z, phone: +71 3680512, e-mail: [Tomasz.Dyczkowski@ue.wroc.pl](mailto:Tomasz.Dyczkowski@ue.wroc.pl) |
| ***Literature:*** | 1) *A guide to the project management body of knowledge: (PMBOK Guide)*, Project Management Institute, Project Management Institute, Newtown Square, 2013.  2) Kerzner, H. (2009), *Project management: a systems approach to planning, scheduling, and controlling*, John Wiley & Sons, Hoboken.  3) Remenyi, D., Money, A.H., Sherwood-Smith M. (2000), *The Effective Measurement and Management of IT Costs and Benefits*, Butterworth-Heinemann.  4) Willcocks, L.P., Graeser, V. (2001), *Delivering IT and e-business value Computer weekly professional*. Butterworth, Oxford. |
| ***Faculty:*** | Management, Informatics and Finance; Major Business Informatics |

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| ***Title:*** | ERP-SAP Introduction ERP (ISIZ) |
| ***Lecture hours:*** | *34 Lectures + 17 Tutorials + 17 Laboratories* |
| ***Study period:*** | *Summer* |
| ***Level:*** | *Bachelor* |
| ***Location:*** | *Wrocław* |
| ***Examination:*** | *Test: based on lectures, and*  *practical assignments (ABAP)* |
| ***Language:*** | *English* |
| ***Prerequisites:*** | Fundamentals of: information management systems, object-oriented programming, database design |
| ***Course content:*** | The course covers fundamentals of enterprise resource planning (ERP) systems concepts. The focus of this course is on functionality, technology and architecture of SAP’s ERP Business Suite as an example ERP system.  During laboratories, students will have the opportunity to learn the essentials of SAP ABAP programming. |
| ***Learning outcomes:*** | After successful completion of the courses, the students should:   * understand how ERP (Enterprise Resource Planning) systems are implemented and used in various business realities, * understand how ERP systems are implemented, * are familiar with the basic SAP ERP system functionality and architecture, * develop a suite of ABAP software tools. |
| ***Contact person:*** | *Dr Ryszard Zygala,* [*Ryszard.zygala@ue.wroc.pl*](mailto:Ryszard.zygala@ue.wroc.pl)*, Skype: Ryszard\_wroclawski* |
| ***Literature:*** | *George W. Anderson, Sams Teach Yourself SAP in 24 Hours, Sams Publishing; 4 edition (May 24, 2011). Kindle edition.*  *Peter Moxon, BEGINNERS GUIDE TO SAP ABAP, January 20, 2014, Kindle edition.* |
| ***Faculty:*** | *Management, Informatics and Finance; Major Business Informatics* |

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| ***Title:*** | *Systems Analysis and Design (SAD)* |
| ***Lecture hours:*** | *90hrs: 45-W(lecture), 15-C(tutorial), 30-L(practical)* |
| ***Study period:*** | *Fall* |
| ***Level:*** | *Bachelor* |
| ***Location:*** | *Wrocław* |
| ***Examination:*** | *Five tutorials (worth 10 marks total; 2 marks each; negative marks possible), three Assignments (of the combined value of 40 marks), final examination (50 marks).* |
| ***Language:*** | *English* |
| ***Prerequisites:*** | *Introduction to management information systems; Fundamentals of information and communication technology; Fundamental software programming concepts; Basic mathematical knowledge.* |
| ***Course content:*** | *Software Process*  *Requirements Determination.*  *System Behavior Modeling.*  *Use Case Modeling*  *No lecture on Thursday (Rector's Free Day)*  *Class Modeling.*  *Human-Computer Interaction*  *User Interface Design*  *User Modeling*  *Moving from Analysis to Design.*  *System Architecture and Program Design.*  *Persistence and Database Design.*  *Quality and Change Management.*  *REA approach in database design*  *Course Review. Examination Matters.* |
| ***Learning outcomes:*** | *Awareness of the life cycle of system development; Knowledge of requirements elicitation techniques and understanding of particular problem domains; Ability to analyze system requirements and build a logical model of the problem; Ability to turn the logical model from the analysis phase into a design model from which a system can be built; Ability to use a CASE tool to support the requirements, analysis and design phases; Ability to design a computer interface and knowledge of good HCI features; Awareness of the impact of implementation issues on various phases of the development life cycle and vice versa.* |
| ***Contact person:*** | *Leszek Maciaszek*  [*leszek.maciaszek@ue.wroc.pl*](mailto:leszek.maciaszek@ue.wroc.pl)*,* [*leszek.maciaszek@mq.edu.au*](mailto:leszek.maciaszek@mq.edu.au)  [*http://www.iie.ue.wroc.pl/lmaciaszek/en/*](http://www.iie.ue.wroc.pl/lmaciaszek/en/)[*http://web.science.mq.edu.au/~leszek/*](http://web.science.mq.edu.au/~leszek/)  *phone: +713 680 379, room 607/608Z* |
| ***Literature:*** | ASHRAFI, N. and ASHRAFI, H. (2009): *Object-Oriented Systems Analysis and Design*, Pearson, 624p. ISBN 978-0-13-135479-1  KENDALL, K.E., KENDALL, J.E. (2014): *Systems Analysis and Design*, Global Edition, 9th ed., Prentice Hall, 552p. ISBN-10: 0133023443 • ISBN-13: 9780133023442  MACIASZEK, L.A. (2007): *Requirements Analysis and System Design*, 3rd  ed., Pearson, 642p. ISBN 978-0-321-44036-5  VALACICH, J., GEORGE, J., HOFFER, J.J. (2012): Essentials of Systems Analysis and Design, 5th ed., Prentice Hall, 456p., ISBN-10: 0137067119 • ISBN-13: 9780137067114 |
| ***Faculty:*** | *All students* |

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| ***Title:*** | IT User Requirements Identification |
| ***Lecture hours:*** | 15 hours of lectures, 15 hours of mixed mode tutorial/practical classes. |
| ***Study period:*** | Fall or Spring semester |
| ***Level:*** | Basic |
| ***Location:*** | Wrocław |
| ***Examination:*** | Written exam |
| ***Language:*** | English |
| ***Prerequisites:*** | Fundamentals of Information Systems, Systems Analysis and Design |
| ***Course content:*** | This course is modeled on the specifications of the “Requirements Engineering” course in the ACM/IEEE “Computer Science 2013 Curricula”.  Topics of the course include:   * System planning * From business processes to solution envisioning. * Functional requirements. * Non-functional requirements and their relationship to software quality (the SQuaRE standard). * Requirements elicitation (interactive methods, unobtrusive methods, agile modeling and prototyping). * Requirements negotiation and validation. * Requirements management. * Requirements business model. * Requirements document. * Requirements analysis modeling techniques. * Requirements tracing. * Requirements change management.   Specifications of requirements range in formality from completely informal (e.g., spoken) to rigorously mathematical (e.g., written in a formal specification language such as Z or first-order logic). The objective of use requirements specifications is to reduce ambiguity and improve the consistency and completeness of the development team’s understanding of the vision of the intended software. Plan-driven approaches tend to produce formal documents with numbered requirements. Agile approaches tend to favor less formal specifications that include user stories, use cases, and test cases. |
| ***Learning outcomes:*** | The purpose of the course is to develop an understanding of the needs, priorities, and constraints relevant to an IT software solution. Many software failures arise from an incomplete understanding of requirements for the software to be developed or inadequate management of those requirements. |
| ***Contact person:*** | Dr hab. Leszek Maciaszek, e-mail: [leszek.maciaszek@ue.wroc.pl](mailto:leszek.maciaszek@ue.wroc.pl), phone: +48 71 36 80 379  Dr Artur Rot, e-mail: [artur.rot@ue.wroc.pl](mailto:artur.rot@ue.wroc.pl), phone: + 48 71 36 80 71 36 80 379 |
| ***Literature:*** | 1. Maciaszek L.A. (2007): *Requirements Analysis and System Design*, 3rd ed., Pearson Education, 642p. ISBN 978-0-321-44036-5 2. Robertson S. Robertson J. (2013): *Mastering the Requirements Process: Getting Requirements Right*, 3rd ed., Perason Education 3. Kendall K.E., Kendall, J.E. (2014): *Systems Analysis and Design*, Global Edition, 9th ed., Prentice Hall, 552p 4. Rational Requisite Pro software documentation. |
| ***Faculty:*** | All students |

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| ***Title:*** | ***Business Process Management*** |
| ***Lecture hours:*** | *30h* |
| ***Study period:*** | *Fall and Spring* |
| ***Level:*** | *Intermediate* |
| ***Location:*** | *Wroclaw* |
| ***Examination:*** | *3 individual assignments, 1 (group) project, 1 final multiple-choice test* |
| ***Language:*** | *English* |
| ***Prerequisites:*** | ***Business Process Models and Notations*** *– recommended auxiliary course, usually conducted in parallel, for students without any prior knowledge or skills in business process modeling.* |
| ***Course content:*** | *Introduction to Business Process Management*  *Process Identification, Classification, Domains*  *Process Management Lifecycle. BPM Frameworks*  *Essential and Advanced Process Modeling Tools and Concepts*  *Qualitative and Quantitative Process Analysis. Process Simulation*  *Business Process Redesign (Business Process Improvement)*  *Business Process Maturity Models*  *Process Automation and Workflow Management System Architectures*  *Process Orchestrations. Process Choreographies*  *Process Administration and Monitoring*  *Data Mining and Process Intelligence*  *Process Configuration and Integration. Case Studies* |
| ***Learning outcomes:*** | *The course introduces the essential concepts of business process orientation and management, with regard to the modern IT solutions. Students will acquire the knowledge necessary to effectively identify, analyze, and document business processes using the most up-to-date modeling concepts, notations, and tools.*  *The goal of this course is to introduce business process modeling as a means to facilitate the analysis and understanding of business operations and emphasize its role in developing IT solutions supporting business process automation and management.*  *Participants of this course will be granted full access to the* ***Signavio Business Process Modeling Platform****.* |
| ***Contact person:*** | **dr Andrzej Niesler***<andrzej.niesler@ue.wroc.pl>*  *http://www.ue.wroc.pl/pracownicy/andrzej\_niesler.html*  *Room: 605-Z Phone: +48 71 3680 379 (secretariat)* |
| ***Literature:*** | *1.* ***Fundamentals of Business Process Management***  *– Dumas M., La Rosa M., Mendling J., Reijers H.A., Springer 2013.*  *2.* ***Business Process Management. Concepts, Languages, Architectures***  *– Weske M., Springer 2007.*  *3. Business Process Technology. A Unified View on Business Processes, Workflows and Enterprise Applications – Draheim D., Springer 2010.* |
| ***Faculty:*** | *All faculties* |