RIGA TECHNICAL UNIVERSITY

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Please note! This is a preliminary list of courses for the study year 2019/2020. Changes may occur!

AUTUMN 2019

BACHELOR COURSES (to be updated)

DIP320 Adaptive Data Processing Systems
2.00 CP (3.00 ECTS)
Basic Principles of ADPS Design. Application of Business System Planning Method and LIS Technology. Adaptive user dialogue design on the basis of mathematical and linguistic models. Different examples of Adaptive Data Processing Systems are considered: Financial, Banks, Insurance Information Systems.

DPI349 Software Evolution Technologies
3.00 CP (4.50 ECTS)
1968 is the year of identification of software crisis and software engineering was recognized as an engineering discipline, which enables to view software development as an engineering process. The course deals with modern software development techniques and technologies used in different stages of software development process. In general, software development can be divided into the following components: life cycle, process, analysis and design tools, programming environment, quality assurance, project management, team work. These components are discussed during the course, showing their evolution, solved and unsolved problems.

DSP202 Discrete Structures of Computer Science
3.00 CP (4.50 ECTS)
During their studies students acquire the practical applications of discrete mathematics concepts, graph algorithms and mathematical foundations of data base. Students acquire the properties of binary relations by detailed examination of equivalence and ordering. Students acquire key elements of graph theory, ways of graph representations. Theoretical knowledge has to be used by practical calculations with shortest path algorithm; algorithm for minimal spanning tree and algorithm for maximum flow problem. The course also observes basic concepts of relational database, operations of relational algebra and basics elements of Structured Query Language (SQL). While studying the subject students have to work out course work; they have to write a program that solves the defined task by using algorithms and concepts given in lectures.

DSP344 Systems Analysis and Knowledge Acquisition
2.00 CP (3.00 ECTS)
The course concerns systems analysis tasks in the context of information systems development. It focuses on various methods of knowledge acquisition and business and information systems modeling used by the systems analysts for the identification of organizational requirements for new ICT solutions or changes of ICT solutions. Methods included in the course conform to the first three levels of four - level competence framework defined by International Institute of Business Analysis. The course helps also to acquire specific skills, which are indicated in the national professional standard of systems analysts' PS 0067. It provides basic theoretical knowledge and practical skills in systems analysis in an integrated manner.

DSP347 System Engineering
2 CP (3.00 ECTS)
rofessional responsibilities of systems analyst require a good knowledge of methods and tools for identification of characteristics and operation principles of various types of systems. This course is focused on the specific method of systems theory – systems engineering, touching also main issues of systems theory and systems analysis. In the course the following topics are considered: systems notion, key concepts of systems thinking, systems engineering

process and principles, systems models, modeling methods, techniques and languages, systems development life cycle, structured techniques, process of systems analysis and design and its support by SSADM methodology.

DSP303 Technology of Large Databases
2 CP (3.00 ECTS)
The main differences of large databases (LDB) and desk-top databases. Data models of LDB. Architecture of LDB logical and physical data organization. On-line transaction management and On-line Analytical processing database systems. Instance and its structure. Database dictionary and configuration parameters. Optimisation of SQL queries. Tuning and audit. The most popular large database management systems: Oracle, MS SQL Server, DB2, Progress, Postgress. The future trends.

DMS212 Probability Theory and Mathematical Statistics
2 CP (3.00 ECTS)
Classical definition of probability. Axiomatic definition of probability. Algebra of events. Bernully's scheme. Formulas of complete probability and Baijes. Continuous and discrete random variable. Distributive and density of functions. Large numbers law. Central limit theoreme. Elements of mathematical statistics. Combinatoric. Test of hypothesis.

MASTER COURSES

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DIP485 Software Metrology and Planning Models *(graduate)*
4.00 CP (6.00 ECTS)
Software project management: development process models, task planning and assignment, project calendar, human resource management models, cost estimation models, software metrics, quality management models, testing and risk management. Management of “Mission Impossible” projects. Variety of software engineering. Tasks distribution. Tasks implementation graphic. Software cost estimation. Analytic, algorithmic, COCOMO models. Maintenance costs.

DPI503 Evolution of Object-Oriented Software *(graduate)*
4.00 (6.00 ECTS)
Students learn the implementation of object-oriented approach (OOA) principles in several programming languages. Both fundamental OOA principles (abstraction, encapsulation, inheritance, polymorphism) and some additional principles (parallelism, typing) are discussed. In the focus of attention there are three object-oriented programming languages: Ada, Java, Python. The course includes a survey of some specific questions: applet development, server script development, creation of complex data structures and others.

DIP501 Special Data Processing Technologies *(graduate)*
4.00 (6.00 ECTS)
Theoretical aspects and practical aspects of data processing systems (DPS) development are described. The main attention is paid to distributed DPS design and development. The main goal of the course is to strengthen competence in the field of application of DPT based on the set of mathematical models. To formalise application domain, to form and analyse user information requirements. To advance skills in the development of DPS demonstrators based on mathematical models and in the application of special case tools for mathematical models processing

DSP555 Requirements Engineering *(graduate)*
4.00 (6.00 ECTS)
The course explains the role of requirements engineering in the organizational development and information systems design. During the course students learn several requirements engineering methods, such as soft systems methodology, process oriented methods, and architecture, service, decision analysis, business rules, and agent oriented methods. The main emphasis in the course is on training the ability to understand in which situations which requirements engineering methods and tools are to be used and how they are to be combined to achieve desired level of requirements acquisition detail and manageability.

DIP483 Development Methods of Applied Intelligent Software Systems *(graduate)*
4.00 (6.00 ECTS)
The main goal of the course is to strengthen competence in the field of IACS design and development. To present basic principles of knowledge base modelling and creating. To form basic skills in development of IACS prototypes based on Artificial Intelligence methods and Web solutions.
The following major issues are considered within the course: basic principles and methodology of IACS development; knowledge base modelling and creating; implementation of logical deduction algorithms; development of IACS demonstration prototypes based on Artificial Intelligence models and advanced IT solutions

DSP411 Theory of Systems and Processes *(graduate)*
4.00 CP (6.00 ECTS)
The goal of systems and process theory is to develop a general system structure and functioning description methods which are founded on system thinking that allows to consider all the relevant factors for the system operation. In this course students get acquainted with philosophical foundations of system theory as well as with general and specific system theories. They also acquire basic conceptions of the system structure, classification, laws, rules and principles, general characteristics of system functioning, mathematical models and analysis of system structure, and basics of structural modeling and multilevel flow modeling.

DSP700 Enterprise Architecture and Requirements Engineering *(graduate)*
4.00 CP (6.00 ECTS)
The course presents basic approaches to requirements engineering. Students learn to identify and design enterprise/business architectures and specify requirements for organisational information systems viewing people and computer systems as nodes of information processing. They learn to analyse and design information flows in organisations and organisational networks and how to develop the information logistics model. IBM requirements identification and management tools are used in the course. Acquired knowledge is beneficial not only for requirements identification for information and communication technology solutions; it is applicable also for the design of products and services in general.

DSP703 Systems Theory *(graduate)*
4.00 CP (6.00 ECTS)
The goal of systems theory is to develop general description methods of systems, based on systems thinking, providing inclusion of all critical factors that have influence on systems performance. In this course students acquire foundations of systems theory. The focus is on specific systems theories which represent relevant factors for business development. Students obtain understanding of principles of systems classification and system classes. Foundations of cybernetics are included into the course as well as theories of living systems and viable systems. Students learn to use set theory and graph theory which are needed for systems modelling and are used in other courses.

DSP708 Advanced data Technologies *(graduate)*
4.00 CP (6.00 ECTS)
Database is a backbone an information system. There is a large variety of information systems, therefore different types of database data models, query languages and architectures are needed.
In this course the following advanced data models are discussed:
- object database models;
- multidimensional database models;
- temporal database models;
- active database models;
- multimedia database models;
- deductive database models;
- intelligent database models.

In the course above-mentioned models are combined with well-known and very wide used relational database models.
The course includes main groups of query languages used in advanced database systems, such as SQL and its object and temporal extensions; multidimensional query languages for data warehousing systems and artificial intelligence languages.
The course concerns also issues on information systems architecture for large variety of possibilities to organize storing, searching and presenting data, information and knowledge: different client/server architectures with application servers and web servers, distributed database architectures and multibase architectures.

Databases are not only for data storage and retrieval, they can perform different algorithms to provide needed information and knowledge. To illustrate this database capability deductive databases, data mining, and intelligent databases are considered.

DOP700 Enterprise Information Technology Architecture, Applications and Integration *(graduate)*
4.00 CP (6.00 ECTS)
Commercially available enterprise information systems are often used in implementation and automation of enterprise business processes. The objective of the course is to master main principles of enterprise information systems, their deployment and modification. Main topics covered in the course are business process modeling, application of ERP, workflow and other enterprise systems in process automation, modification and deployment of enterprise information systems, integration of enterprise information systems and adoption service-oriented computing in enterprise systems. Technologies for the modification of enterprise systems are explored in laboratories.

DSP702 Research Methods in Business Informatics *(graduate)*
2.00 CP (3.00 ECTS)
Modern society is being moved towards a knowledge-based model within which innovative solutions are created that can be applied to enhancing the economy. However, innovative solutions can be created through synthesizing existing knowledge. Scientific methods have been designed and are applied specifically for this purpose, therefore being familiar with such methods should be of benefit to students of business informatics program. The main subject of the course is the introduction to and practical application of scientific methods that can be used in computer science research. Given that some of the students may not be familiar with the concept, the course presents the types of scientific methods and possibilities of application thereof. Quantitative and qualitative scientific methods are considered, the research process and its various steps are analyzed, and the stages of drafting a scientific publication are set out. To ensure a more efficient learning process, theoretical studies are complemented with a realistic research project of a nominal volume; the results of this project shall be presented in a written report. A number of lectures are dedicated to honing technical writing skills that can be applied to drafting course and final papers.

DSP701 Knowledge Management Systems *(graduate)*
4.00 CP (6.00 ECTS)
In this course students will learn about the concepts of organisational learning and knowledge, essential factors of organisational learning, knowledge flow and networks and technologies supporting them. Human-computer interaction and interface design will be discussed. Students will learn to define knowledge management strategy, to design knowledge management systems, to plan the development of these systems and will be familiar with different knowledge management technologies.

DSP707 Service Science, Management, and Engineering *(graduate)*
4.00 CP (6.00 ECTS)
The course is about service oriented approach in business and information systems and software engineering. It concerns vertical (inside the enterprise) and horizontal (inter-organisational) service provision situations. The emphasis is put on new innovative service development. The course comprises service design methods, basics of building service oriented architectures (SOA), and other topics of service engineering. Students will experiment with various service development and running technologies. They will learn approaches to service governance according to most popular service management methods and standards. Students are expected to have basic knowledge in business process modelling, systems theory and portfolio management. The course concerns also research advances in SOA.

DPI721 Business Analytics *(graduate)*
4.00 CP (6.00 ECTS)
Companies are making decisions across all functional areas. The role of information technology specialists is to develop infrastructure to provide decision makers with precise information at the right time and the right place.
First part of the course deals with the value chain and analyzes information sources of the main business processes. Accent will be put on the quality management and cost accounting.
Second part of the course deals with business intelligence architectures and tools available for enterprise information utilization.
Students will have to do a case study to analyze business processes of a particular company and develop metrics and specifications of business intelligence solution.