

ALFA BK UNIVERSITY

Faculty of Information Technologies

STUDY PROGRAMME

Information and Communication Technologies

MASTER ACADEMIC STUDIES

Course: Research methods

Teacher: Striber Joakim

Course status: Mandatory, first year, first semester

Number of ECTS: 6

Precondition courses: None

Educational goal

Introduction to the basic elements of professional-scientific work, research methods in the field of technical and technological sciences, especially with the methodology of writing and presenting the results of research in the master's thesis.

Educational outcomes (acquired knowledge)

Training in the use of theoretical algorithms and the results of experimental analysis in computer simulation, for example, set models of heterogeneous physical processes.

Course content/structure

Theoretical classes: Disciplinary and multidisciplinary approaches in technical and technological research. Research methods and algorithms. Analysis and synthesis. Method of abstraction and concretization. Method of generalization and specialization. Inductive and deductive method. Observation. An experiment. Counting. Measurement. Fundamentals of statistical procedures for scientific analysis of experimental data. Methods of causal induction. Deductive method. Axiomatic method. Modeling method. Classification method. Comparative method. Generic method. Method of description. The method of ideal types. General system theory as a scientific method. Case study method. Content analysis method. Special methods of information sciences. Writing professional and / or scientific work: structure, content, composition, conclusion, references. Technique of making and defending a master's thesis.

Practical classes: Exercises, Other forms of teaching, Study research work:

Work in the PC classroom in the simulation analysis of the considered model.

Literature

- Richie J., Lewis J., (2003): *Qualitative Research Practice*, Sage Publications.
- Ristić, Ž., (2006): "O istraživanju, metodu i znanju", Institut za pedagoška istraživanja, Beograd

Number of act	ive teaching classes	Other classes		
Lectures:	Practical classes:	Other forms of	Study research work:	1
3	2	teaching:		1

Teaching methods

Lectures: methods of working with text, verbal methods, discussion methods, workshops. Exercises, seminars, SIR: dialogical methods, methods of practical activities, written papers, group seminar papers and discussions in the online environment.

Knov	wledge evaluation (n	naximum 100 points))		
Pre-examination	Points	Final exam	Points		
Lecture attendance and activity	10	Written exam			
Practical teaching	15	Oral exam	40		
Colloquium exam	20				
Seminars	15				

Course: Management of development of information systems

Teacher: Dejan Đukić

Course status: Mandatory, first year, first semester

Number of ECTS: 6

Precondition courses: None

Educational goal

Competency in managing IS (information system) projects. Ability to compile IS requirements, to evaluate IS performance, and to direct IS development.

Educational outcomes (acquired knowledge)

Understanding complexity and specificities of managing IS projects. Knowledge of various methodologies used in IS development, the ability to evaluate their advantages and risks, and the ability to make decisions with respect of their application. Ability to manage IS projests. Knowledge of current standars in IS development.

Course content/structure

Theoretical classes

IS project development management. Different models of IS development. Analysis of different IS development methodologies. IT service management. Standards in the field of software development process management and system documentation. Software metrics: Different models of software metrics. The role and characteristics of ERP systems: Presentation of ERP solutions of different vendors. IT economy. The role of IS in supply chains, IS security and business ethics. Content Management: View different content management ISs. Cloud and virtualization features. Green IT. The role of business analytics in IS development. Mass data management. New tendencies of IS development.

Practical classes

Exercises, Other forms of teaching, Study research work. Workshop. Selection of the best IS offer with respect to standards. Case study - analysis of business information system and simulation of development decisions. Research of new methods of IS development. Examples of using ERP systems. Application of ITIL in practice.

Literature

1. Paul, B. Davies, Business Information Systems, Palgrave Macmilan, 2009

2. Whitten Bentley Dittman, Systems analysis and design methods, McGraw-Hill, 2005

3. Laudon & Laudon, Management Information systems, Prentice Hall, 2004

4. Applegate, Austin, McFarlan, Corporate Information Strategy and Management, Mc Grow Hil,20035. Slides from lectures

Number of ac	Other classes			
Lectures:	Practical classes:	Other forms of teaching:	Study research work:	
2	2			

Teaching methods

Classical teaching methods with the use of modern technology are used in lectures and exercises. A significant part of the time is dedicated to an independent research project.

Kno	wledge evaluati	on (maximum 100 points)	s)		
Pre-examination	Points	Final exam	Points		
Lecture attendance and activity		Oral exam	40		
Practical teaching					
Research work	30				
Seminar paper	30				

Course: Technology Management and Innovation

Teacher: Stokić Aleksandar

Course status: Mandatory, first year, first semester

Number of ECTS: 5

Precondition courses: None

Educational goal

The course enables the introduction of techniques for information technology management (IT), information systems (IS) and information management (IM) at the tactical, operational and strategic level in the organization.

Educational outcomes (acquired knowledge)

By studying the course, students gain knowledge and ability to understand the strategic phenomenon of information technology in organizational, business, economic and cultural context, developing critical awareness of alternative strategies for information management and technology in modern organizations, understanding alternative directions of information technology management and their theoretical and historical basis, linking theoretical and applied knowledge in formulating information technology strategy-IT / information systems-IS / information management-IM for different types of organizations as well as identifying appropriate strategies for organizing, controlling and changing IT organizations and making decisions regarding proposed alternative strategies . Emphasis is placed on a variety of theoretical and applied approaches to the topics, enabling students to study a wide range of contextual factors of organization.

Course content/structure

Theoretical classes - Technology management and organization. The emergence and strategic importance of information technology. IT and their strategic advantage. The role of information management. Relationship of IT, IS and IM strategies. Methodology for formulating IT, IS and IM strategies. Building a strategic architecture for IT, IS and IM. IT strategy in application: economic, legal, social and ethical aspects. Organizing IT activities: centralization, specialization and contingency. Control of IT financing. Net present value. Cost-benefit analysis. Organizing and controlling IT activities. Strategic change management. *Practical classes* - Examples and analysis of case studies in the field.

Literature

1. Burgelman, R., Christensen, C. & Wheelwright, S. (2009). Strategic Management of Technology and Innovation, NY: Mc Graw-Hill/Irwin.

2. Harrison, N. & Samson, D. (2002). Technology Management: Text and International Cases, NY: Mc Graw-Hill.

3. Tidd, J. & Bessant, J. (2013). Managing Innovation: Integrating Technological, Market and Organizational Change (5th Ed.), John Wiley and Sons.

Number of acti	ve teaching classes			Other classes
Lectures: 2	Practical classes: 2	Other forms of teaching:	Study research work:	

Teaching methods

The course is performed according to standard methods of higher education, ie university teaching in the form of theoretical lectures, practical exercises, PowerPoint presentation of content through the presentation and analysis of selected case studies. By combining independent and team work, students are involved in research work by compulsory preparation of a seminar paper (alternatively a project assignment) during the semester with the mentorship of the teacher.

Knov	wledge evaluation (m	aximum 100 points)	
Pre-examination	Points	Final exam	Points
Lecture attendance and activity	5	Written exam	30
Practical teaching	5	Oral exam	20
Colloquium exam	20 (10+10)		
Seminar paper/Project	20		

Course:	Software	Engineer	ing Tools	and Methods
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Teacher: Nenad Gligorić, Radenković Milena

Course status: Mandatory, first year, first semester

Number of ECTS: 5

Precondition courses: None

Educational goal

Mastering modern tools and methods of software engineering.

Educational outcomes (acquired knowledge)

Ability of students to use current tools and methods of software engineering in working on practical projects.

Course content/structure:

Theoretical teaching MDA methodology and tools. Methods and tools for functional programming. Software maintenance tools and methods. Tools and methods for configuring software. Software project management tools and methods. Software process monitoring tools and methods (Process modeling tools, process management tools, integrated CASE environments). Software quality tools and methods. Other tools and methods (software integration tools and methods, meta tools and evaluation tools). Heuristic methods based on structure, data, functions, objects and specific domain. Formal methods. Prototype methods. Case study. Practical classes: Exercises, Other forms of teaching, Study research work Working with MDA, EMF, UML, CASE and other software tools in the laboratory. Practical project.

Literature:

1. Open-source software and documents, as well as a site of the subject with numerous links to completed software projects

Number of active teaching	Lectures:	Practical classes:	Study research work:
classes	2	1	

Teaching methods:

Lectures: slides and practical study examples related to certain techniques and software tools. Exercises: in the laboratory, students work on their own projects in cooperation with the assistant.

Knowledge evaluation (maximum 100 points):

Pre-examination – 40 points (homework, seminar paper, participation in projects). Final exam - 60 points.

Course: Quality Management and Information Systems

Teacher: Dražen Jovanović

Course status: Elective, first year, first semester

Number of ECTS: 8

Precondition courses: None

Educational goal

The aim of this course is for students to master the knowledge of quality (which includes all areas of human activity: product-service quality, management, government and life), metrology, standardization, accreditation and standardization, quality management systems and information systems, their implementation and certification.

Educational outcomes (acquired knowledge)

By studying the subject, knowledge is acquired that can be successfully applied in all business organizations. Their application would improve business and the organization would thus gain a competitive advantage in both domestic and foreign markets.

Course content/structure

The roots of thought are about quality and management. Scientific approach to quality. Quality gurus. Quality history. Basic elements of quality. Metrology. Standardization. Accreditation. Certification. Market control. National accreditation system. Regional and world accreditation system. Quality to the single market. World quality control. Concepts of quality management system. PDCA cycle. QMS according to the ISO 9000 series of standards. EMS according to the ISO 14000 series of standards. Integrated management systems. Standards and points of standards on training and education. Tools and methods for quality improvement. Quality and education. Concepts of quality management system. Implementation and certification of QMS. The role of quality management in the implementation of information systems. Information systems quality management. Information systems certification. ISO / IEC 20000 standard. Information security standards. ISO / IEC 27000.

Literature

- 1. Vulanović V., Kamberović B., Stanivuković D., Sistem kvaliteta 9001:2000 FTN, ITC, Novi Sad, 2002.
- 2. Denić M Nebojša, Upravljanje kvalitetom VTŠSS Uroševac, 2013.godine
- 3. Majstorović, V., Model menadžmenta totalnim kvalitetom, Poslovna politika, Beograd, 2000.
- 4. Đorđević D., Ćoćkalo D., Osnove Osnove upravljanja kvalitetom, Teagraf, Beograd, 2001

5. Standards ISO

Number of act	tive teaching classe	Other classes		
Lectures:	Practical classes:	Other forms of teaching:	Study research work:	
2	2	-	-	
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Teaching methods

The course is performed according to standard methods of higher education, ie university teaching in the form of theoretical lectures and practical exercises, combined with examples from practice, independent and team work and mandatory preparation of seminar paper (project assignment) during the semester.

Knowl	Knowledge evaluation (maximum 100 points)		
Pre-examination	Points	Final exam	Points
Practical tasks		Written exam	30
Lecture attendance and activity		Oral exam	40
Laboratory exercises			
Colloquium exam	30		

Course: Data Mining

Teacher: Crvenković Siniša, Bogdanić Duško

Course status: Elective, first year, first semester

Number of ECTS: 8

Precondition courses: Mathematical knowledge from the previous level of study

Educational goal

The aim of the course is to present the application of mathematical methods in the field of linear algebra, differential and difference equations, probability and statistics, and others, as well as special methods in the field of shape recognition, machine learning, etc., to find useful data in data sets that are too large or too diverse, in which even the existence of such data is not obvious; to get acquainted with the ways of graphical - visual representation of data sets in order to highlight and view useful data in them.

Educational outcomes (acquired knowledge)

Upon successful completion of the course, the student will be able to:

- applies methods of linear and nonlinear transformation and projection in vector spaces to large numerical data sets;

- applies methods in the field of statistics and statistical machine learning, in order to remove uncertainties and noise from numerical data sets;

- designs and implements programs for searching and recognizing shapes on given data sets;

- purposefully displays data in visual, graphic or animated form.

Course content/structure

Theoretical classes. Vector spaces, dimensionality, functions, mappings, projections; differential and difference equations, notion of path, convergence, sensitivity of the solution to the parameter; statistical methods of interpolation, machine learning, optimization of model parameters; graphic presentation and visual animation of multidimensional data;

Practical teaching. Computational exercises. Laboratory exercises. Project.

Literature

1. Glenn J. Myatt : Making Sense of Data: A Practical Guide to Exploratory Data Analysis and Data Mining : Wiley-Interscience, 2006

2. Glenn J. Myatt, Wayne P. Johnson : Making Sense of Data II: A Practical Guide to Data Visualization, Advanced Data Mining Methods, and Applications : Wiley, 2009

3. Glenn J. Myatt, Wayne P. Johnson : Making Sense of Data III: A Practical Guide to Designing Interactive Data Visualizations : Wiley,2011

4. Brian S. Everitt, Graham Dunn : Applied Multivariate Data Analysis : Wiley, 2009

Number of active teaching classes

Lectures:	Practical classes:	Other forms of teaching:	Study research work:
2	2	_	

Teaching methods

Classical teaching methods with the use of modern technology are used in lectures and exercises. The seminar paper is performed in the form of an individual or group project.

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Knowledge evaluation (maximum 100 points)			
Pre-examination	Points	Final exam	Points
Lecture attendance and		Written exam	35
activity			
Practical teaching			
Colloquium exam	25		
Seminar papers	40		

Course: Software design

Teacher: Nenad Gligorić

Course status: Elective, first year, second semester

Number of ECTS: 8

Precondition courses: None

Educational goal

The aim of the course is to process the methodology of development of modern software within larger business projects; to explain ways to describe business processes, and establish the information needs of the software client; to describe the ways of designing and planning the implementation of software; to describe classical and modern methods of performing software and organizing and managing a software project.

Educational outcomes (acquired knowledge)

The students completing the Software design course will:

- have the ability to apply the process of problem definition and description of business process and the need for use of information technology

- describe methods for execution of the software project

- design software taking into account defined requirements and arranged commitments

- estimate and plan design and execution of the organised management support for the project

Course content/structure

Theoretical clases

Development of software for business systems, scope, components and systems activities; team composition, roles of the team members; methods of software project management, classic, agile; software reliability, methods for testing of software systems; approached for project design, methodologies for development of project plan; design of programme support for decentralized systems,

clients, servers, cloud infrastructure systems.

Practical clases

Computer exercises. Laboratory course. Development project.

Literature

1. Len Bass, Paul Clements, Rick Kazman : Software Architecture in Practice (3rd Edition) Addison-Wesley, 2012

2. Martin Fowler, Rebecca Parsons : Domain Specific Languages : Addison-Wesley, 2010

3. Mike Cohn : Agile Estimating and Planning : Prentice Hall, 2005

4. Nicolai M. Josuttis : SOA in Practice: The Art of Distributed System Design : O'Reilly, 2009

Number of active teaching classes				Other
Lectures: 2	Practical classes: 2	Other forms of teaching:	Study research work:	classes

Teaching methods

Classical teaching methods with the use of modern technology are used in lectures and exercises. The seminar paper is performed in the form of a group development project.

Knowledge evaluation (maximum 100 points)			
Pre-examination	Points	Final exam	Points
Lecture attendance and activity	10	Oral exam	30
Practical teaching	20		
Colloquium exam	30		
Seminar papers	10		

Course: Knowledge management

Teacher: Đorđević Milan, Budimir Ninković Gordana

Course status: Elective, first year, second semester

Number of ECTS: 8

Precondition courses: None

Educational goal

The aim of the course is to enable students to understand the theory, practice, tools and techniques of knowledge management and to help students achieve successful careers in for-profit and non-profit organizations. In addition, students will learn to determine the infrastructural requirements for intellectual capital management in organizations.

Educational outcomes (acquired knowledge)

The student is able to analyze and evolve types of knowledge and existing KM (Knowledge management) problems and initiatives. The student will understand the role of knowledge management in organizations. The student also understands the impact of semantic modeling.

Course content/structure

Theoretical classes

Introduction to knowledge management. From information management to knowledge management (KM). Principles of knowledge management. The nature of knowledge. KM solutions. Organizational influence of KM. Factors affecting KM. Elements of knowledge management implementation. Business strategy. Knowledge and innovation

Cycle in the process of creating and using knowledge. Semantic modeling. Modeling problem. Concept. Conceptual network. Classification. Generalization. Reasoning about knowledge. A model of possible worlds. General knowledge. Distributed knowledge. Properties of knowledge. Characterization of organizations. Knowledge about knowledge: O1 [we know what we know], O2 [we know what we don't know], O3 [we don't know what we know], O4 [we don't know what we don't know]. Intelligent organization. Organizations and environments. Organizational learning. Organizational forgetting. Adaptability of the organization. Creative reasoning. Theoretical and practical need for creative reasoning. Knowledge and creativity. Lateral reasoning. Lateral reasoning techniques.

Practical teaching

Exercises, Other forms of teaching, Study research work

In classroom and computer exercises, students solve case studies by expanding the acquired theoretical knowledge about organization, strategy, organizational structure, human resources and the like.

Literature

Becerra-Fernandez, I., et al. (2004): "Knowledge Management: Challenges, Solutions, and • *Technologies*", Prentice Hall Other classes

Number of active teaching classes

rumber of active reaching classes				Other clusses
Lectures:	Practical classes:	Other forms of	Study research work:	
2	2	teaching:		

Teaching methods

Lectures: methods of working with text, verbal methods, discussion methods, workshops. Exercises, seminars, methods of practical activities, written papers, group seminar papers and discussions in the online environment.

Knowledge evaluation (maximum 100 points)			
Pre-examination	Points	Final exam	Points
Lecture attendance and activity	15	Written exam	
Practical teaching	15	Oral exam	30
Colloquium exam	25		
Seminars	15		

Course: Study Research Work (SRW)

Teacher: Mentor

Course status: Mandatory, first year, second semester

Number of ECTS: 8

Precondition courses: Passed the exam in whose field the SRW is defined

Educational goal

Preparation of the student for independent professional and / or scientific-research work on the preparation of the study-research work, as well as on the preparation of the following master's thesis. With the help of a mentor, the student observes, presents the methodology and solves a specific current problem with scientific research methods, with the application of theoretical and applied knowledge acquired during the study.

Educational outcomes (acquired knowledge)

Successful first steps have been taken in training students for independent professional and / or scientific research work in the elected field of information systems and technologies.

Course content/structure

Theoretical and practical teaching: With the support of a mentor, the student uses the acquired applied and theoretical knowledge, but still studies and researches the selected professional and / or scientific field, the content of which depends on the specific problem.

Literature

Relevant literature should indicate the systematic approach of the student in writing a study research paper, which should be the starting point in the definition of the topic and area in the development of the master's thesis.

Number of active teaching classes				Other classes
Lectures:	Practical classes:	Other forms of teaching:	Study research work:	
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Teaching methods

Consultations with the mentor in all phases of the study research work: collection of references, their systematic study, definition of the field of work and the preparation of the study research work itself.

Knowledge evaluation (maximum 100 points)			
Pre-examination	Points	Final exam	Points
Lecture attendance and activity		Completed and accepted work	45
Practical teaching		Oral defense	55
Colloquium exam			
Seminars			

Course: Master's thesis

Teacher: All teachers in the study program

Course status: Mandatory, first year, second semester

Number of ECTS: 14

Precondition courses: Registration during the second semester, and submission and defense is possible after passing all exam obligations in master studies.

Educational goal

The aim of the master's thesis is for the student to show the ability to engage in professional (or scientific) research, apply adequate methods of data collection and processing, the ability to independently write professional or scientific papers, as well as the student's ability to independently present professional problems and represent certain professional ideas.

Educational outcomes (acquired knowledge):

By preparing and defending a master's thesis, students are able to solve real application problems, as well as to consider and analyze theoretical solutions. This includes developed critical thinking, the ability to analyze problems, synthesize solutions, predict the consequences of the chosen solution, using scientific methods and procedures. Especially important is the ability to adopt relevant innovations in the profession, their connection with basic knowledge, application in practice and clear transfer to the professional and general public.

Course content/structure

The supervisor - mentor of the master's thesis assigns a topic from the area covered by the curriculum, which the candidate can successfully process within three months, based on the acquired knowledge, literature studies, practical or experimental work.

Literature

• Relevant literature in the field of research, which is directly related to the topic of the master's thesis.

Teaching methods

The student can take a master's thesis from all already professional subjects passed with the lowest grade 8. The Rulebook on taking master's thesis at undergraduate and master's studies at Alfa BK University in Belgrade defines the procedure for applying, writing and defending a master's thesis.

Knowledge evaluation (maximum 100 points)

The Master's thesis and oral defense are evaluated by the Commission (mentor and two members) with a single grade.