QUALIFICATION CHARACTERISTICS

OF SPECIALTY "INFORMATION SYSTEMS AND TECHNOLOGIES"

FOR EDUCATIONAL-QUALIFICATION DEGREE "MASTER"

WITH PROFESSIONAL QUALIFICATION "MASTER OF INFORMATICS",

TRAINING PERIOD 2 YEARS

The specialty "Information Systems and Technologies" (IST) is from higher education area 4. Natural sciences, mathematics and informatics in the professional direction 4.6. Informatics and computer science. The training at this specialty for the Master's degree has a full time education form with a duration of 2 years (4 semesters). The graduates this specialty acquire the professional qualification "Master of Informatics".

Master's program corresponds to Vocational qualifications framework, developed by European education area.

The master's program corresponds of the developed framework for professional qualification in the European educational area. It outlines in detail the knowledge level and skills of graduate students, and their ability to cope with complex tasks.

The aim of the Master's program is to prepare qualified specialists in the field of IST, needed for both business, and science and society.

The specialty IST is with practical application. The curriculum includes compulsory basic courses providing basic multi-profile preparation in the field of information systems and technologies. Through elective courses, the students have opportunity to choose and enrich their knowledge and practical skills for specific areas of information technology and systems.

Practices and internships

The practical lessons that are included in the curriculum take place in the labs to Department - practical exercises to the compulsory and elective disciplines. In addition, students can participate in Erasmus+ mobility, which allows to get knowledge for European practices and to receive training for successful realization in international teams. They can participate in additional internships and practices in companies that are annual organized.

I. Requirements for the professional qualities and competencies of accepted students

For training at the specialty can applies persons who hold a Bachelor's degree / Master's degree in Informatics in professional direction 4.6. Informatics and computer science, specialty "Computer Systems and Technologies" in professional direction 5.3. Communication and computer technology, specialty "Mathematics" in professional direction 4.5. Mathematics, and specialty "Mathematics and Informatics" in professional direction 1.3. „Pedagogy of Teaching in …".

II. Requirements to professional skills and competencies of graduates the specialty

SWU "Neofit Rilski" prepares qualified specialists at Informatics, and Information Technologies and Systems that can apply their knowledge and skills in science, culture, education and business life in Southwest Bulgaria, country and abroad.

The Master's program prepares specialists who improve their knowledge in field of Information Systems and Technologies build on and expand knowledge and skills that are the basis for developing and implementing of new ideas. In training process, students receive in-depth knowledge in information processes and models area, modern technologies in computer science, use of different software, design, development and implementation of software products.

Learning highlights: Modern data processing technology; Development of Web application; Security and protection; Software development technology.

Students acquire following knowledge, practical skills and abilities:

- Development of modern software applications for computer systems with general and specialized use;

- using advanced technologies to design and study software applications;

- Application of program technology tools for databases design and implementation in different fields;

- Formation of affinity and ability for independently research and design activities;

- Basis for continuing education in the educational and scientific degree PhD;

- Good opportunities for realization in country and abroad;

- A way of thinking and affinity (openness) to the rapidly changing demands of the information society.

Masters graduates can work effectively both, independently and a team. They can make successful career as managers with in-depth analytical knowledge and skills at different levels of management in information technology field.

The Masters graduates at Informatics in information systems and technologies field can successfully realize as:

- professional designers and developers of software and software systems,

- researchers,

- specialists in the field of database design and management,

- software technology specialists,

- specialists in e-business and software industry and etc.

III. Requirements to the preparation of the graduates

The Master's degree graduates must have the following knowledge, skills and competencies:

- to conduct independent research, to model real processes and to create computer automated information systems.

- to use software packages to solve real business, engineering and management problems in uninterrupted and discrete macro systems.

- to participate in the development of basic software products and packages.

- to adapt and implement ready-made software products and systems.

- to solve problems with different application character in the software and the Internet space.

Qualification characteristic of the specialty "Information Systems and Technologies" for the Master's degree with a professional qualification "Master of Informatics" is a basic document, which determines the development of curriculum and curricula. It complies with the normative documents in higher education area in the Republic of Bulgaria.

CURRICULUM

FIELD OF STUDY: INFORMATION SYSTEMS AND TECHNOLOGIES,

PERIOD OF STUDY: 2 YEARC (4 SEMESTERS)

First Semester	ECTS	Second Semester	ECTS
Compulsory courses		**Compulsory courses**	
Fundamentals of programming	**6.0**	Databases	**6.0**
Introduction in information systems and technologies	**4.5**	Web Content Management	**4.5**
Web Systems and technologies	**4.5**	MATLAB – Part II	**6.0**
Development of expert systems	**6.0**	Knowledge management	**4.5**
Internet Programming	**4.5**	Optional 1 (Group I)	**4.5**
MATLAB – Part I	**4.5**	Optional 2 (Group II)	**4.5**
TOTAL :	**30**	**TOTAL :**	**30**
		Optional Courses (select one from each group)	
		Group I	
		Graphic design of printed and promotional materials	**4.5**
		Images recognition	**4.5**
		Software Quality Assurance	**4.5**
		Protecting intellectual property rights	**4.5**
		Group II	
		Computer Security	**4.5**
		Internet technologies	**4.5**
		Norms and Standards of Information Security	**4.5**
		Information retrieval and web search	**4.5**

Third Semester	ECTS	Forth Semester	ECTS
Compulsory courses		**Compulsory courses**	
Data mining	**5.0**	Information Systems in Bioinformatics	**4.0**
Component-Oriented Software Engineering	**5.0**	Business Process Management Systems	**4.0**
Semantic Web	**5.0**	Cross-platform application development	**4.0**
Stochastic simulation	**6.0**	Optional 3 (Group III)	**3.0**
Optional 1 (Group I)	**4.5**	Written State Exam or Graduate Thesis Defense	**15.0**
Optional 2 (Group II)	**4.5**		
TOTAL :	**30**	**TOTAL :**	**30**
Optional Courses		**Optional Courses**	
Group III		**Group V**	
JSP and Java servlet programming (Web programming)	**4.5**	Training at IT Company (Institution)	**3.0**
Neural Networks	**4.5**	Natural language processing systems	**3.0**
Cloud computing	**4.5**	Introduction in LATEX 2ε	**3.0**
Applications of databases in bioinformatics	**4.5**	Design of Information Systems with Client-Server Architecture	**3.0**
Group IV			
Digital Communications	**4.5**		
Cybersecurity	**4.5**		
Applied software for automatic translation	**4.5**		
Theory, Algorithms and Technologies for Speech Recognition	**4.5**		

DECRIPTION OF THE COURSES

Course Title: Fundamentals of Programming

Semester: 1st semester

Type of Course: lectures and tutorials in computer lab

Hours per week: 2 hours lecture and 2 hours tutorials in computer lab

Credits Numbers: 6.0 credits

Course Status: Core course.

Course description:

The course is an introduction in programming.Topics: data representation, algorithms, data types, variables, expressions, arrays, procedures, functions, as well as object-oriented programming and event-driven programming paradigm are covered. The course assumes no or little prior knowledge of programming.

Objectives:

The students should obtain basic knowledge and skills in problem solving using structured or object-oriented approaches in programming.

Methods of teaching: lectures, tutorials, discussions, project based method.

Requirements/Prerequisites: No

Assessment: written final exam

Registration for the Course: the course is compulsory

References

1. Schneider D., An Introduction to Programming Using Visual Basic Int. Ed., Prentice Hall, Pearson Education Inc., 9th Ed 2014, (8th Ed 2010).

2. Дамянов И., (2012) Увод в програмирането, УИ "Неофит Рилски", ISBN 978-954-680-830-1, COBISS.BG-ID – 1248729572

3. Conrod, P. & Tylee. L. (2019). Learn Visual Basic 2019 Edition: a step-by-step programming tutorial. S.l.: KIDWARE SOFTWARE.

4. Zak, D., Programming with Microsoft Visual Basic 2012, Course Technology, Cengage Learning, 6th Ed. 2014

Course Title: Introduction in information systems and technologies

Semester: 1st semester

Type of Course: Lectures and tutorials in computer lab.

Hours per week: 2 hours lectures and 1 hours tutorials in computer lab.

Credits Numbers: 4,5 credits

Course Status: Core course in curriculum of major Information Systems and Technologies

Course description:

The course involves basic concepts as information, data, knowledge, information system, business information systems, hardware and software components of IS etc. The problems related to ICT jobs, copyrights and law issues in ICT.

Objectives:

The student should obtain basic knowledge in area of IT and IS:

Methods of teaching: lectures, tutorials, discussions, project based method.

Pre - requirements: No (Introductory course)

Assessment and Evaluation

> Project- 50%

> Final Test- 50%

The course is successful completed with at least 65% of all scores.

Registration for the Course: not required (core course)

Registration for the Exam: coordinated with the lecturer and the Student Service Office

References:

1. Ralph M. Stair, George W. Reynolds, Fundamentals of Information Systems, Sixth Edition, 2012 Course Technology, Cengage Learning
2. BRIAN K. WILLIAMS,| STACEY C. SAWYER, Using Information Technology. A Practical Introduction to Computers & Communications, McGraw-Hill, 2011
3. URL http://www.e-learning.swu.bg

Course Title: Web Systems and Technologies

Semester: 1st semester

Course Type: lecture and lab exercises

Hours per week: 1 lecture hour and 2 labs hours per week

ECTS credits: 4.5 credits

Course Status: Compulsory Course in the Information Systems and Technologies in Master of Science Curriculum

Short Description: The proposed curriculum, issues and techniques in the field of modern web systems and technologies. Presented are techniques related to the construction of static and dynamic web pages, and their integration into comprehensive sites. Consider the following topics: Introduction to Web technology; Introduction to the language HTML. HTML document structure; Types of symbols and their formatting. Structuring and shaping of texts. Lists; Use of multimedia objects and formatting in HTML with CSS. Designing a logo; Creating and layout of tables with HTML and CSS; Working with containers. Positioning objects. Align Objects; Selection of colors. Color schemes. Fonts and Typography. Textures; Creating web forms; Hyperlinks. Maps of images. Anchors. Menus; JavaScript and JQuery. XML; Creating web graphics in a browser; Adaptive web design. Design Principles of the Web interface; Web services, blogs and social networks. Databases on the web; Semantic web and metadata.

Course Aims: The course aims to provide students with a comprehensive idea about the structure and capabilities of modern web technologies. Free to use the terminology and have practical experience in the development of static websites.

After completion of the course students should be able to:

- Use language HTML, DHTML, CSS, and through them to create Web sites;

- Knowledge of current development environments for the Web.

Teaching Methods: Seminars, demonstrations, exercises and project work.

Requirements/Prerequisites: Needed basic knowledge of information technology.

Assessment: Evaluating the student shall be carried out in the sixth grad scale. During the laboratory sessions the student receives n-assessments on current projects - CP_1-CP_n and protects the end of the semester individual course project - ICP. The final evaluation - FE is calculated as the average of those assessments and assessment received the ultimate test - UT, according to the formula:

$FE = (((CP_1 + ... + CP_n) / n + ICP) / 2 + UT)/2$

Registration for the Course: Not necessary

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Bill Scott, Theresa Neil (2009) *Designing Web Interfaces*, O'Reilly Publishing

2. O'Reilly (2005) *What Is Web 2.0, Design Patterns and Business Models for the Next Generation of Software*, 09/30/2005, http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html

3. Ian Pouncey, Richard York (2011) *Beginning CSS. Cascading Style Sheets for Web Design*, Wiley Publishing

4. Jennifer Niederst Robbins (2012) *Learning Web Design, Fourth Edition, A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics*, O'Reilly Media

5. Leslie F. Sikos (2013) *Web Standars. Masterig HTML5, CSS3, and XML*, Apress

6. Brain P. Hogan (2009) *Web Design for Developers. A Programmer's Guide to Design Tools and Techniques*, The Pragmatic Bookshelf

7. Michael Bowers, Dionysios Synodinos, Victor Sumner (2011) *Pro HTML5 and CSS3 Design Patterns*, Apress

8. Benjamin LaGrone (2013) *HTML5 and CSS3 Responsive Web Design Cookbook*, Packt Publishing

9. Jason Beaird (2010) *The Principles of Beautiful Web Design*, SitePoint

10. Peter Gasston (2015) *The book of CSS3, 2nt Edition*, No Starch Press

11. Sandro Paganotti (2013) *Design Next Generation Web Projects with CSS3. A practical guide to the usage of CSS3 - a journey through properties, tools and techniques to better understand CSS3*, Packt Publishing

12. Antonio Pratas (2014) *Creating Flat Design Websites. Design and develop your own flat design websites in HTML*, Packt Publishing

13. Brian P. Hogan (2013) *HTML5 and CSS3. Second Edition. Level Up with Today's Web Technologies*, The Pragmatic Bookshelf

14. Mark D. Hawker (2011) *The Developer's Guide to Social Programming. Building Social Context Using Facebook, Google Friend Connect, and the Twitter API*, Addison-Wesley

15. W3Schools, http://www.w3schools.com/

1. *W3C: HTML 5.1* – http://www.w3.org/html/wg/drafts/html/master/

2. Aidan Temple (2013) *HTML5 2D. Learn how to develop a 2D HTML5 platformer that is capable of running in modern browsers*, Packt Publishing

3. Jason Gonzales (2013) *Mobile First Design with HTML5 and CSS3. Roll out rock-solid, responive, mobile first designs quickly and reliable*, Packt Publishing

4. Lara Callender Hogan (2015) *Designing for Performance*, O'Reilly Media

5. Tom Barker (2015) *High Perfomance Responsive Design*, O'Reilly Media

6. *Сайт с учебни материали* по дисциплината *„Практикум по уеб дизайн"*- http://timetable.swu.bg/lecture/rkraleva/LetenSem/WebDesign/yprWebDesign.html

Course Title: Development of Expert Systems

Semester: 1st semester

Course Type: lecture and lab exercises

Hours per week: 2 lecture hours and 2 lab hours per week

ECTS credits: 6.0 credits

Course Status: Compulsory Course in the Information Systems and Technologies in Master of Science Curriculum

Course description:

Artificial Intelligence has come out of the closets of the scientists and has found increasing application in the engineering and business world. While design and manufacture of hardware is generally associated with the engineering attribute, the concept of engineering of knowledge has only recently come under discussion. Principles of engineering have been applied to the planning and development of software, i.e. software engineering has evolved as a discipline in computer science that uses such methods as analysis of requirements, specifications, planning and modular design, prototyping, and implementing the design in appropriate programming languages, and finally, operational application. Knowledge Engineering goes beyond software engineering in that Knowledge bases are created that incorporate know-how and knowledge of experts in domain-specific knowledge stores which, in contrast to simple data bases, have learning and reasoning power. This course develops two parallel approaches to knowledge engineering: For one, the lecture is designed to discuss the fundamentals of artificial intelligence as it applies to knowledge engineering and the development of expert systems. The second part of this course is devoted to the practical application of the concepts: The students, under the guidance of the professor, will learn to develop mini-expert systems of their choice that will incorporate the concepts of expert systems and the techniques of knowledge engineering to assist practitioners in different fields (e.g. auto mechanic, medical doctors, etc.) in diagnosing malfunctions and/or projecting potential solutions to problem.

This course presents an in-depth examination of expert or knowledge-based systems. Topics to be covered include architectures, knowledge representation structures, building techniques, and design tools and shells for constructing expert systems; the life-cycle of expert systems; and evaluating expert systems. Details of specific expert systems and expert system shells will be covered.

Basic objectives and tasks:

The main objective of this course is to provide the students with an understanding of the principles of knowledge engineering and the design and development, planning, and management of an expert system.

- To explain what Expert System (ES) is: Definition, history, and general concept; Characteristic, advantages and limitations; Types and examples; Architecture and components; Development process; Inference engine; Knowledge base; Uncertainty factor; Knowledge acquisition; Expert system's development tools

- To give students opportunity to be creative on applying their ability by developing an ES. There will be a final task completed in a group

Methods of teaching: lectures, projects, other methods

Pre- requirements: Basic knowledge in Informatics, Mathematical logic, and Programming languages.

Exam: Test and discussion at the end of the semester, individual tasks and the general student's work during the semester.

Registration for the Course: not necessary

Registration for the Exam: Coordinated with the lecturer and the Student Service Office

References:

1. Jackson, P. Introduction to Expert Systems (3rd ed.). Addison-Wesley, 1998

2. Russell, S., P. Norvig. Artificial Intelligence: A Modern Approach (3rd ed.). Pearson Education Ltd., 2010.

3. Joseph C. Giarratano, Gary D. Riley, Expert Systems: Principles and Programming, Course Technology, 2005

Course Title: Internet Programming

Semester: 1st semester

Course Type: lecture and lab exercises

Hours per week: 2 lectures hour and 1 lab hour per week

ECTS credits: 4.5 credits

Course Status: Compulsory Course in the Information Systems and Technologies in Master of Science Curriculum

Course description:

The course is introduction in design and programming of Internet/Intranet Web-based information systems. Combination of HTML, Java-applets and MySQL/PHP/Apache technologies is considered in practical aspects.

Objectives: Basic objectives and tasks:

- The students give knowledge for algorithm thinking.
- to give knowledge for Data structures, that can process with computer.
- to give knowledge for methods and skills in programming.
- to give knowledge for good style in programming.
- to give knowledge for basic principles when develop applications.
- to give knowledge for design and programming of Internet/Intranet Web-based information systems.
- to give knowledge to practical aspects of HTML, Java-applets, and MySQL/PHP/Apache technologies.

Methods of teaching: lectures, tutorials, discussions, project-based method.

Pre - requirements: "Introduction to programming", "Object oriented programming", "Programming and data structures" and "Database systems".

Assessment and Evaluation: Written examination and discussion at the end of the semester, individual tasks, and the general student's work during the semester.

Registration for the Course: not necessary

Registration for the Exam: Coordinated with the lecturer and the Student Service Office

References:

1. Larry Ullman, PHP for the Web: Visual quickstart guide, Peachpit Press, 2016.
2. Денис Колисниченко, PHP 7 & MySQL - практическо програмиране, Асеневци, 2016
3. Саймън Стобърт, Дейвид Парсънс, Динамични уеб приложения с PHP и MySQL, DuoDesign, 2010
4. Мери Милхолън, Джеф Кастрина, Създаване на Web страници – бързо и ефективно. СофтПрес, 2014.
5. Нина В. Комолова, Елена С. Яковлева, HTML – самоучитель. Питер, 2011.
6. Сергей Соколов, CSS 3 в примери, Асеневци, 2009.

7.   Adobe Dreamweaver CS – официален учебен курс. СофтПрес, 2008.

8.   Дори Смит, Java за World Wide Web. ИнфоДАР, 2008.

9.   BrianP. Hogan, HTML5 and CSS3. Develop with Tomorrow's Standards Today, Pragmatic Programmers, 2010

10. BrianP. Hogan, Web Design for Developers. A Programmer's Guide to Design Tools and Techniques, Pragmatic Programmers, 2010

11. Robin Nixon, Learning PHP, MySQL, and JavaScript, O'Reilly Media, 2009

Course Title: MATLAB – I

Semester: 2nd semester

Form of the course: lectures/exercises

Hours per week: 1 lecture; 2 exercises per week

Credits: 4, 5 credits

Course Status: Compulsory course in the Information Systems and Technologies M.S. Curriculum

Course Description:

This course introduces components of MATLAB, graphical interface, system commands, basic operations with vectors, matrices and polynomials, the most frequently used graphical commands and functions for numerical and symbolic calculations, possibilities for analytical transformations, numerical calculations and high quality visualization of the obtained results.

Course Aims:

The course aim is to give students good basic theoretical knowledge and practical experience in MATLAB and become familiar with the system and its application in modeling real processes and tasks, to expand the acquired knowledge and skills by developing and directing them in a purely applied aspect.

The main task is for the student to gain knowledge, skills to deal with specific tasks related to the use of applied, and system software for solving applied mathematical problems.

Teaching Methods: lectures, seminars, discussions, practical work and homework.

Requirements/Prerequisites:

Basic knowledge in Analytic Geometry, Linear Algebra, Analysis, Numerical Methods, Optimization. Advance knowledge in Discrete Mathematics, Graph Theory, Programming, Formal Languages and Grammars, Pattern Recognition.

Exam: course project and final exam.

Registration for the course: not required.

Registration for exam: coordinated with the lecturer and Students Service Department.

References:

1. MATLAB. The Language of Technical Computing. Getting Started with MATLAB. The Math Works, Inc. USA, 2000
2. Дьяконов В. П. Компьютерная математика. Теория и практика. – М.: Нолидж, 2000.
3. Дьяконов В.П. MATLAB. Полный самоучитель. – М.: ДМК Пресс, 2012
4. Йорданов Й. Тончев, Приложение на MATLAB в инженерните изследвания, Част I-III, Русенски Университет 2004
5. Тренчев И., Въведение в MATLAB
6. Kattan Peter MATLAB for Beginners: A Gentle Approach, Revised Edition, https://www.researchgate.net/publication/301358471_MATLAB_for_Beginners_A_Gentle_Approach
7. https://docs.exponenta.ru/matlab/index.html
8. https://www.mathworks.com/academia/student_center/tutorials/index.html?link=body

Course Title: Databases

Semester: 2nd semester

Course Type: lecture and exercise

Hours per week: 2 lectures 2 exercises per week

ECTS credits: 6.0

Status of discipline in the curriculum: compulsory discipline

Course Description:

This course relies on primary readings from the database community to introduce graduate students to the foundations of database systems, focusing on basics such as the relational algebra and data model, schema normalization, query optimization, and transactions.

Teaching Methods: lectures, demonstrations and work on project

Assessment: course project and exam

Registration for the Exam: coordinated with the lecturer and Student Service Department

References:

1. Павел Азълов. Бази от данни. Релационен и обектен подход, техника, 1991 г.
2. Юлиана Пенева, Бази от данни. I част. София, ИК "Регалия " 6, 2003 г.
3. Ullman, J., Widom, J., DATABASE SYSTEMS The Complete Book (2rd ed), Upper Saddle River, 2009, New Jersey.
4. Toby J. Teorey , Sam S. Lightstone , Tom Nadeau, H.V. Jagadish, Database Modeling and Design Database Modeling and Design, 2012, Morgan Kaufmann Press.
5. Rex Hogan. (2018) A Practical Guide to Database Design, CRC Press, USA.
6. Shepherd J.C. Database management: Theory and Application. Irwin Inc.,USA 1990.
7. Мейер Д.р Теория реляционных баз данных. Издательство "Мир". 1987.
8. Vidya Vrat Agarwal, Beginning C Sharp 5.0 Databases, 2012 New York Press.
9. Alapati and Bill Padfield, Expert Indexing in Oracle Database, 2011, New York Press.
10. Henry H. Liu, Oracle Database Performance and Scalability A Quantitative Approach, 2011 A Jon Wiley and Son, US.

Course Title: Web Content Management

Semester: 2nd semester

Course Type: lectures and labs

Hours (weekly): 2 lectures and 1 lab per week

ECTS Credits: 4.5 credits

Course Status: Compulsory course from the Information Systems and Technologies Master Curriculum.

Short Description:

Modern ways of organizing and building of content on the web - blogs, wikis, social media requires more organized content management. Integration of web sites with features from social networks and building shared content through various Web services are important elements of the management of any modern website. This course will examine the important activities related to the promotion of content through indexing and search engine optimization. Presented are theoretical methods based on formal concept analysis, adaptive ontologies and programming for the organization of the structure and content sites. The course discusses specific systems for content management (CMS) - Sitecore, Umbraco, WordPress, Joomla and others.

Course Aims: To familiarize students with various activities tasks in content management and website building.

Teaching Methods: Lectures, Labs, Discussions, Project Based Methods

Requirements/Prerequisites: Knowledge in Programming Basics and HTML.

Exam: final exam

Course enrolment: the course is compulsory

Registration for the exam: Coordinated with lecturer and Students Service Department

References:

1. Денис Колисниченко, Да направим собствен сайт, Асеневци, 2015
2. Тим Киберман, На първо място в Google - 2015, Франчайзинг БГ, 2015
3. Michael Kuhlmann, Social Media for Wordpress, Packt Publishing, 2012
4. Hawker, Mark D., The developer's guide to social programming : building social context using Facebook, Google friend connect, and the Twitter API / Mark D. Hawker, Addison-Wesley, 2010
5. Dan Zarrella, The Social Media Marketing Book, O'Reilly Media, 2009
6. Brad Williams, David Damstra, Hal Stern, Professional WordPress, 3rd Edition, Wrox Publishing, 2015
7. John West, Professional Sitecore Development, Wrox Publishing, 2012
8. Alan Harris, Pro ASP.NET 4 CMS, Apress, 2010
9. Amanda Perran, Shane Perran, Jennifer Mason, Laura Rogers, Beginning SharePoint 2013, Wrox Publishing, 2013
10. Nik Wahlberg, Paul Sterling, Umbraco User's Guide, Wrox Publishing, 2011

Course Title: MATLAB II

Semester: 2nd semester

Course Type: lectures/lab exercises

Hours per week: 2 lecture hours 2 lab exercises

Credits: 6,0 credits

Course Status: Compulsory course in the Information Systems and Technologies M.S. Curriculum

Course Description: Basic results and capabilities of MATLAB in the area of numerical methods, optimization and statistics are considered.

Course Aims: Students should obtain basic knowledge about capabilities of MATLAB in the area of numerical methods, optimization and statistics and obtain skills for using MATLAB and its applications for solving problems in these areas.

Teaching Methods: lectures, lab exercises, discussions, practical work and homework.

Requirements/Prerequisites: MATLAB I

Assessment: course project and final exam.

Registration for the Course: not required.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

References:

1. Иван Тренчев, Петър Миланов – "Въведение в MATLAB", УИ „Неофит Рилски, Благоевград (http://newweirdscience.com/matlab%20rakovodstvo.pdf). (in Bulgarian)
2. Иван Гарванов, Магдалена Гарванова – „Въведение в MATLAB И SIMULINK", изд. „За буквите", София, 2014. (in Bulgarian)
3. Стоян Капралов, Павлина Стефанова – „Приложение на MATLAB, MAPLE И LPSOLVE в обучението по линейно оптимиране", в: „Математика и математическо образование", СМБ, София, 2013, стр. 394-398 (статия). (in Bulgarian)
4. Иван Георгиев – „Решаване на транспортна задача с MATLAB", Русенски университет, 2009 (http://staff.uni-ruse.bg/skarakoleva/ivan_georgiev_sns2009-last.pdf) (статия). (in Bulgarian)
5. Rizwan Butt – "Introduction to Numerical Analysis using Matlab", Jones and Bartlett Publishers, Sudbury, MA, USA, 2009.
6. Kevin Carlberg – "Optimization in Matlab", Stanford University, 2009 (https://kevintcarlberg.net/files/opt_class/OPT_Matlab.pdf).
7. S. R. Otto, J. P. Denier – "An Introduction to Programming and Numerical Methods in MATLAB", Springer, London, 2005.
8. John H. Mathews, Kurtis D. Fink – "Numerical Methods Using MATLAB", 4-th ed., Pearson, 2004 (издание на руски език: Джон Г. Мэтьюз, Куртис Д. Финк – „Численные методы: Использование MATLAB", 3-ье изд., Вильямс, Москва–Санкт Петерберг–Киев, 2001).
9. "Tutorial 5: Numerical Analysis with MATLAB", Math 475/CS 475 (https://paginas.fe.up.pt/~em00021/tutorial5.pdf).
10. P. Venkataraman – "Applied Optimization with MATLAB Programming", 2-nd ed., John Wiley & Sons, USA, 2009.
11. Won Young Yang, Wenwu Cao, Tae-Sang Chung, John Morris – "Applied Numerical Methods Using MATLAB", John Wiley & Sons, NJ, USA, 2005.
12. Todd Young, Martin J. Mohlenkamp – "Introduction to Numerical Methods and MATLAB Programming for Engineers", Ohio University, 2018 (http://www.ohiouniversityfaculty.com/youngt/IntNumMeth/book.pdf).

Course Title: Knowledge Management

Semester: 2nd semester

Type of Course: lectures and labs

Hours per week: 2 lectures, 1 lab per week

Credits Numbers: 4,5

Department: Informatics

Course Status: Fundamental course from the Computer Science Master Curriculum.

Course description: The contents covered in this course have three major parts. The first part introduces the fundamental concepts of Knowledge Management, including what knowledge is about and Knowledge Management systems' life cycle. The second focuses on the knowledge creation and acquisition, and the third aims at the Knowledge Management system and implementation. Varied materials with respect to current published articles in KM related fields are added when necessary.

Fundamental concepts of Knowledge Management can be read from the book authored by Elias M. Awad & Hassan M. Ghaziri. Students are encouraged to pick up and find some self-interested papers from those listed below and read them in advance whenever possible during summer break.

Basic objectives and tasks: The goal of the course is to prepare students to become familiar with the current theories, practices, tools and techniques in knowledge management, and to assist students in pursuing a career in the information sector for profit and not for profit organizations. In addition, students will learn to determine the infrastructure requirements to manage the intellectual capital in organizations. Specifically, at the end of the course students will be able to:

- Define KM, learning organizations, intellectual capital and related terminologies in clear terms and understand the role of knowledge management in organizations.

- Demonstrate an understanding of the history, concepts, and the antecedents of management of knowledge and describe several successful knowledge management systems.

- Identify and select tools and techniques of KM for the stages of creation, acquisition, transfer and management of knowledge.

- Analyze and evaluate tangible and intangible knowledge assets and understand current KM issues and initiatives.

- Evaluate the impact of technology including telecommunications, networks, and Internet/intranet role in managing knowledge.

- Identify KM in specific environments: managerial and decision making communities; finance and economic sectors; legal information systems; health information systems and others.

- Demonstrate an understanding of the importance of intellectual capital to benefit the competitive advantage in organizations.

- Develop a working knowledge in the area through focused projects. • Articulate various career options in the field.

Methods of teaching: lectures, projects, other methods

Pre- requirements: Basic knowledge in Foundation of informatics, mathematical logic, Data base.

Exam: Test and discussion at the end of the semester, individual tasks and the general student's work during the semester.

Registration for the Course: not necessary

Registration for the Exam: Coordinated with the lecturer and the Student Service Office

References:

1. Shelda Debowski, Knowledge Management, John Wiley & Sons Australia Ltd., Sidney, 2006.

2. Bergeron B., Essentials of Knowledge Management, John Wiley & Sons, Inc., Hoboken, New Jersey, 2003.

3. Ackerman M., Pipek V., and Wulf V., Sharing Expertise: Beyond Knowledge Management, Cambridge Ma: MIT Press, London, 2003.

4. Elias M. Awad & Hassan M. Ghaziri (2004), Knowledge Management, New Jersey: Pearson Education, Inc.

5. Amrit Tiwana (2002), The Knowledge Management Toolkit, New Jersey: Pearson Education, Inc.

6. Bensoussan, B., C. S. Fleisher, The Financial Time Guide to Analysis for Managers, Pearson Education Ltd.,2009

7. Strategic Management, Theory and Application, Adrian Haberberg & Alison Rieple, Oxford University Press, New York, 2008

8. TRAINMOR KNOWMORE, Handbook on organizational knowledge management, 2008, Greece, http://www.trainmor-knowmore.eu/

9. Paul Bocij, Andrew Greasley, Simon Hickie, Business Information Systems, Technology Development & Management, Pearson Education Ltd, Harlow, 2008

Course Title: Graphic Design of Printed and Promotional Materials

Semester: 2nd semester

Course Type: lecture and lab exercises

Hours per week: 1 lecture hour and 2 lab hours per week

ECTS credits: 4.5 credits

Course Status: Optional Course in the Information Systems and Technologies in Master of Science Curriculum

Course Description: The course is a practical introduction to desktop publishing systems. Students learn the best practices in the development of print and electronic materials, such as brochures, leaflets, posters, magazines, newspapers and more. Studied are the principles of working with the software used in publishing. Discussed are typical problems in the field of publishing and advertising activities.

The course prepares students for the future development of different types of designs of promotional materials, web sites and more.

Course Objectives This course aims to provide students with knowledge and additional training in the theory and practice of publishing systems. They will learn about the methods of digital image processing, how to create vector graphics and prepress of promotional materials with different purpose.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements: Needed basic knowledge of operating systems, information technology, graphics editors and working with multimedia files.

Assessment: Evaluating the student shall be carried out in the sixth grad scale – 2, 3, 4, 5, 6. Evaluation of current control is obtained by taking the average of the assessment of coursework and paper. Students who have a minimum average estimate /3/ of the current control is not allowed to test the regular session. They must present additional development and evaluation after receiving at least medium /3/ be admitted to the written examination of supplementary or liquidation session. The final estimate is derived from the average of the current control and evaluation of the written exam.

Registration for the Course: Submitted an application to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department.

References:

1. Graphic Communications Open Textbook Collective (2015) "Graphic Design and Print Production Fundamentals", Victoria, B.C.: BCcampus. Retrieved from https://opentextbc.ca/graphicdesign/

2. Clement, R. W. (1997) "Medieval and Renaissance book production", Library Faculty & Staff Publications. Paper 10. Retrieved from https://digitalcommons.usu.edu/lib_pubs/10

3. Halligan, B., & Shah, D. (2009). "Inbound Marketing: Get Found Using Google, Social Media, and Blogs". John Wiley & Sons.

4. Mathis, L. (2016). "Designed for use: Create usable interfaces for applications and the web". Pragmatic Bookshelf.

5. Mandic, L., Grgic, S., & Srdic, I. (2002, June). Data formats in digital prepress technology. In International Symposium on VIPromCom Video/Image Processing and Multimedia Communications (pp. 437-440). IEEE. Retrieved from: https://www.researchgate.net/publication/3963565_Data_formats_in_digital_prepress_technology

6. Pettersson, R. (2019). "Image design. Drawings. Photographs", Institute for Infology. Sweden, Tullinge. Retrieved from: https://www.researchgate.net/publication/ 281810640_4_Information_Design-Image_Design

7. Vlajo, K. (2019) "Designing a Socialist Man." AM Journal of Art and Media Studies, vol. 19, pp. 15-27. Retrieved from: https://fmkjournals.fmk.edu.rs/index.php/AM/article/view/314/pdf

8. Макуейд, Дж. (2007) Професионален дизайн на печатни материали, СофтПрес.

9. Паркър, Р. (2006) Професионален дизайн в рекламата, СофтПрес.

10. Katz, J. (2012). Designing information: Human factors and common sense in information design. John Wiley & Sons.

11. DiMarco, J. (2010) Digital Design for Print and Web. An Introduction to Theory, Principles, and Techniques, Wiley Publishing.

12. Alvarez, C. (2017). "Lean customer development: Building products your customers will buy." O'Reilly Media, Inc.

13. McCawley, R. (2016) Go Design Now! Print Production; Available: http://www.godesignnow.com/

14. Jurković, M., & Di Scala, R. (2011). Inkscape 0.48 Illustrator's Cookbook. Packt Publishing Ltd. Available: http://thuvienso.bvu.edu.vn/bitstream/TVDHBRVT/19453/1/Inkscape-0.48-Illustrators-Cookbook.pdf

15. Whitt, P. (2016). Pro Photo Colorizing with GIMP. Apress.

16. *SCRIBUS: Open Source Desktop Publishing*, http://www.scribus.net/canvas/Scribus, 2012

17. *GIMP: GNU Image Manipulation Program*, http://www.gimp.org/, 2012

18. *INSCAPE: Open Source Scalable Vector Graphics Editor*, http://inkscape.org/, 2012

Course Title: Image Recognition

Semester: 2nd semester

Form of the course: lectures/exercises

Hours (per week): 1 lecture hours, 2 lab exercises per week

Credits: 4,5 credits

Course Status: Optional course in the Information Systems and Technologies MSc Curriculum

Course Description:

This course introduces computer vision including fundamentals of image formation, camera imaging geometry, feature detection and matching, multiview geometry including stereo, motion estimation and tracking, and classification. We will develop basic methods for applications that include finding known models in images, depth recovery from stereo, camera calibration, image stabilization, automated alignment (e.g. panoramas), tracking, and action recognition. The focus of the course is to develop the intuitions and mathematics of the methods in lecture, and then to learn about the difference between theory and practice in the problem sets.

Course Aims:

The course aim is to give students good basic theoretical knowledge and practical experience in pattern recognition. To become familiar with building mathematical models which they should use to solve different problems.

Teaching Methods: lectures, seminars, discussions, practical work and homework.

Requirements/Prerequisites:

Basic knowledge in Analytic Geometry, Linear Algebra, Analysis, Numerical Methods, Optimization. Advance knowledge in Discrete Mathematics, Graph Theory, Programming, Formal Languages and Grammars, Pattern Recognition.

Exam: course project and final exam.

Registration for the course: students make a request at the end of the current semester.

Registration for exam: coordinated with the lecturer and Students Service Department

References:

1. Duda R.,Hart P.,Stork D., Pattern Classification

2. Gonzalez R., Woods R., Digital Image Processing, Fourth Edition, Pearson Education, Inc , 2018, ISBN-13: 978-9353062989

3. Image Recognition and Classification. Algorithms, Systems, and Applications edited by Bahram Javidi , Copyright © 2002 by Marcel Deckkeerr, http://www.dekker.com

4. Petrou Maria, Costas Petrou, Image Processing: The Fundamentals, 3nd Edition, Wiley, 2010, ISBN 978-0470745861

5. Sonka Milan, Vaclav Hlavac, Roger Boyle, Image Processing. Analysis. and Machine Vision. International Student Edition, 2008

6. Solomon, Chris and Breckon, Toby, Fundamentals of digital image processing : a practical approach with examples in Matlab, 2011 by John Wiley & Sons, ISBN 978-0-470-84472-4, http://www.fundipbook.com

7. Theodoridis S, K. Koutroumbas, Pattern Recognition,IV edition,Elsevier, 2009

8. Theodoridis S., A. Pikrakis, K. Koutroumbas, D. Cavouras, Introduction to Pattern Recognition. A MATLAB Approach, Academic Press, 2012

9. Theodoridis S., Koutroumbas K. Pattern Recognition. Academic Press. 1999.

10. Гонсалес Р., Вудс Р. Цифровая обработка изображений. М.: Техносфера. 2006.

11. Синягина Н., М.Тодорова; Разпознаване на образи, ISBN 978-954-680-453-2, Университетско издателство „Неофит Рилски", Благоевград, 2007

12. Форсайт Д., Понс Ж. Компьютерное зрение. Современный подход. М.: Издательский дом «Вильямс». 2004.

13. Шапиро Л., Стокман Дж. Компьютерное зрение. М.: БИНОМ. Лаборатория знаний. 2006

14. https://www.onlinebooksreview.com/articles/best-digital-image-processing-books

15. Гренандер У. Лекции по теории образов. Синтез образов, том1,"Мир", Москва, 1978

16. Гренандер У. Лекции по теории образов. Анализ образов, том 2, "Мир", Москва, 1981

17. Гренандер У. Лекции по теории образов. Регулярные структуры, том 3."Мир", Москва, 1983

18. Журавлев Ю., Рязанов В.В., Сенько О.В., РАСПОЗНАВАНИЕ. Математические методы. Программная система. Практические применения, Фазис, Москва, 2005

Course Title: Software Quality Assurance

Semester: 2nd semester

Course Type: lectures

Hours (weekly): 1 lecture and 2 labs per week

ECTS Credits: 4,5 credits

Course Status: Optional course from the Information Systems and Technologies Master Curriculum.

Course Description:

The course consider the role of QA in the process of software development. The course covers basic ideas, views and major trends on the concept of software quality regarding to standards. Various QA methods such as White Boxes, Black Boxes, Gray Boxes are introduced as well as principles, stages and types of software testing. Various tools for automated testing and bug tracking platforms are studied. Some metrics statistical and probabilistic methods and approaches for assessing the quality of the software product are introduced.

Course Objectives: The course aims to expand the training of students majoring in "CST" in the field of quality control software.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements/Prerequisites: Needed basic knowledge of operating systems, programming, computer architectures, computer networks and communications.

Assessment: written final exam

Course enrolment: the course is compulsory

References:

1. Иванов М.П., И. Момчев, Принципи и проблеми на многокритериалната оценка на качеството на софтуерния продукт, сп."Автоматика и информатика", 2006
2. Мартин Иванов, Принципи и перспективи за оценка на качеството на софтуерните продукти (http://eprints.nbu.bg/505/1/PRINCIPLES_AND_PERSPECTIVES.pdf)
3. ISO, International Organization for Standardization, "ISO 9126-1:2001, Software engineering – Product quality, Part 1: Quality model", 2001.
4. Stephen Kan H. , Metrics and Models in Software Quality Engineering, 2nd Edition, AddisonWesley Professional., 2002.
5. J. Kuruvilla, JIRA 5.x Development Cookbook, Packt Publishing, 2013
6. Elfriede Dustin, Jeff Rashka, John Paul, Automated Software Testing: Introduction, Management, and Performance, Addison-Wesley Professional, 1999
7. James D. McCaffrey, Software Testing: Fundamental Principles and Essential Knowledge, 2009
8. Patrik Berander, Software quality attribute and trade-offs, Editors: Lars Lundberg, Michael
9. Mattsson, Claes Wohlin, Blekinge Institute of Technology , June 2005
10. Dick S., A. Kandel, Computational Intelligence In Software Quality Assurance, Series in Machine Perception and Artificial Intelligence - Vol. 63, 2005.

Course Title: Protecting Intellectual Property Rights

Semester: 2nd semester

Type of Course: lectures

Hours (weekly): 1 lecture and 2 labs per week

Credits Numbers: 4,5

Course Status: Compulsory course in the Information System and Technologies Master of Science Curriculum.

Course Title: Computer Security

Semester: 2nd semester

Course Type: lectures and labs

Hours (weekly): 1 lectures and 2 lab per week

ECTS Credits: 4.5 credits

Course Status: Optional course from the Information Systems and Technologies MasterCurriculum.

Course Description:

This course is an introduction to computer security. Course topics cover risks of storing and sharing information and methods for its protection (hardware and software) from destruction and unauthorized access. The course makes a brief theoretical introduction to error correction codes and cryptographic systems. The focus is on programming and technical means and methods of access control, computer security at different levels - personal and corporate network, including security in social networks and cloud platforms.

Course Objectives: To provide the necessary basic knowledge about the computer security and to acquire knowledge and skills to identify possible risks in specific systems and apply different protection techniques. Acquisition of special training in computer systems and information protection.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements/Prerequisites: Needed basic knowledge of operating systems, programming, computer architectures, and opearating systems.

Assessment: written final exam

Registration for the Course: the course is compulsory

References:

1. Олаф Кирх и Тери Доусън, 2001, Linux Network Administrator's Guide, SoftPress, разпространява свободно под GNU FDL.
2. Mark Rhodes-Ousley, Information Security (Second Edition), The complete reference, McGraw-Hill, 2013
3. Нина Синягина, Иван Мирчев, Иво Дамянов, Светослав Христов, Защита на компютърната информация, УИ „Неофит Рилски", 2005
4. Zlatogor Minchev, Cyber Threats in Social Networks and Users' Response Dynamics, ЦМСО, 2012, (http://it4sec.org/article/cyber-threats-social-networks-and-users-response-dynamics)
5. Zlatogor Minchev, Cyber Threats Analysis In On-Line Social Networks With A Study On User Response, ЦМСО, 2014, (http://it4sec.org/article/cyber-threats-analysis-line-social-networks-study-user-response)
6. Ronald L. Krutz, Russell Dean Vines, Cloud Security. A comprehensive guide to secure cloud computing, Wiley, 2010
7. Христо Тужаров, 2010, Архитектура на информационната сигурност, Асеневци
8. Ст.Станев, Ст.Железов, Хр. Параскевов, Хр.Христов, Ръководство за упражнения по стеганография, Университетско издателство „Епископ Константин Преславски" Шумен, 2015
9. Цветан Семерджиев, Николай Митев. Норми и стандарти за управление на информационните системи. – София, изд. Софттрейд, 2014 г., ISBN 978-954-334-162-7

Course Title: Internet Technologies

Semester: 2nd semester

Course Type: lectures and tutorials in computer lab.

Hours (weekly): 1 lectures and 2 lab per week

ECTS credits: 4.5 credits

Course Status: Elective course.

Course Description:

The course is introduction in design of Web-based Internet/Intranet information systems based on Oracle Application Express technology.

Course Objectives The student should obtain knowledge of:

- Design of Internet/Intranet Web-based information systems.

- Practical aspects of Internet/Intranet Web-based information systems development.

Teaching Methods: lectures, tutorials, discussions, project-based method.

Requirements: Database systems (core course), Internet Programming (core course)

Assessment:

- Project- 50%

- Final Test- 50%

The course is successful completed with at least 51% of all scores.

Registration for the Course: by request at the end of the current semester

Registration for the Exam: coordinated with the lecturer and the Student Service Office

References:

1. Oracle Corporation, Oracle Database® Database Concepts 19c, February 2020

2. Oracle Corporation, Oracle® Application Express Application Builder User's Guide, Release 19.2, December 2019

3. Oracle Corporation, Oracle® Application Express SQL Workshop Guide, Release 19.2, December 2019

4. Oracle Corporation, Oracle® Application Express Administration Guide, Release 19.2, October 2019

5. Rick Greenwald, Beginning Oracle® Application Express, ISBN 9780470388372.

Course Title: Norms and Standards of Information Security

Semester: 2nd semester

Course Type: lectures

Hours (weekly): 1 lectures and 2 labs per week

ECTS Credits: 4.5 credits

Course Status: Optional course from the Information Systems and Technologies Master Curriculum.

Course Description:

The development of e-business require secure infrastructure. Adopting a policy of compliance with world standards allows companies and organizations to implement best practices. Information systems protection requires special regulations. Therefore criteria, standards, and in some cases, legislation on information security are set up. This ensure an adoption of best practices and adequate level of information security.

Course Objectives: Students gain knowledge and skills to cope with everyday and specific tasks related to the implementation of norms and standards related to information security. Get acquainted with the various policies and regulations for information security.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements/Prerequisites: Needed basic knowledge of operating systems, programming, computer architectures, computer networks and communications.

Assessment: written final exam

Course enrolment: Students should submit an application at the academic affairs department at the end of the current semester

References:

1. Mark Rhodes-Ousley, Information Security (Second Edition), The complete reference, McGraw-Hill, 2013
2. Brady Orand, Foundations of IT Service Management with ITIL 2011: ITIL Foundations Course in a Book, 2011
3. Edward Humphreys, Implementing the ISO/IEC 27001 Information Security Management System Standard, Artech House, 2007
4. Jule Hintzbergen, Foundations of Information Security Based on ISO27001 and ISO27002, Van Haren Publishing, 2010
5. Cybercrime Exposed, McAfee White paper (http://www.mcafee.com/us/resources/white-papers/wp-cybercrime-exposed.pdf)
6. Сайт на Националният Център за Действие при Инциденти в Информационната Сигурност (https://govcert.bg/)
7. Нина Синягина, Иван Мирчев, Иво Дамянов, Светослав Христов, Защита на компютърната информация, УИ „Неофит Рилски", 2005
8. https://www.pcisecuritystandards.org/security_standards/documents.php
9. http://www.itil-officialsite.com/
10. http://www.iso.org/iso/standards_development/processes_and_procedures/iso_iec_directives_and _iso_supplement.htm

Course Title: Information Retrieval and Web Search

Semester: 2nd semester

Course Type: lectures and labs

Hours (weekly): 1 lecture and 2 labs

ECTS Credits: 4.5 credits

Course Status: Optional course from the Information Systems and Technologies Master Curriculum.

Course Description:

This course provide summary on databases, NoSQL databases, metadata, and through skillful application of domain specific languages to consider actions for data analysis and data mining. Discussed are topics related to: processing of large data storage, search on the web, indexing information using Solr, crawl and collect information on the web. The course will also address developments of search engines. Additionally will be discussed options of knowledge extraction with ontologies and algorithms for patterns recognition.

Course Aims: Provide specialized training for analyzing data, generation of indexes, creation of modules for site search and tools to crawl and collect information

Teaching Methods: Lectures, Labs, Discussions, Project Based Methods

Requirements/Prerequisites: Knowledge in Programming Basics, Object Oriented Programming, Operating Systems and Databases.

Exam: final exam

Course enrolment: Students should submit an application at the academic affairs department at the end of the current semester

Registration for the exam: Coordinated with lecturer and Students Service Department

References:

1. Stefano Ceri at al., Web Information Retrieval, Springer-Verlag, 2013
2. Peter Morville and Jeffery Callender, Search Patterns, O'Reilly Media, Inc.,2010
3. Rafal Kuc, Apache Solr 4 Cookbook, Packt Publishing, 2013
4. J. Cho, N. Shivakumar, H. Garcia-Molina. Finding replicated web collections. ACM SIGMOD Record, Vol. 29, No. 2, pp. 355-366, 2000.
5. S. Chakrabarti, B. Dom, D. Gibson, J. Kleinberg, S.R. Kumar, P. Raghavan, S. Rajagopalan, A. Tomkins, Hypersearching the Web. Scientific American, June 1999.
6. S. Brin, L. Page. The anatomy of a large-scale hypertextual Web search engine. Computer Networks and ISDN Systems. Vol. 30, No. 1-7, pp. 107-117, 1998.

Course Title: Data Mining

Semester: 3rd semester

Course Type: lectures, lab exercises

Hours per week: 2 lecture hour per week and 1 labs hour per week

ECTS credits: 5.0 credits

Course Status: Compulsory Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The course consists of several modules, such as business analysis, knowledge extraction and dependency extraction from various sources. In the classroom, students learn to define meaningful business questions, choose an appropriate method of data analysis and apply it, use open source software for business analysis, interpret the result and publish the result in a scientific publication. The study of the module related to knowledge extraction aims to learn the methods for extracting implicit and potentially useful connections from structured information sources. New skills for work in the field of artificial intelligence are formed, as well as with statistical and mathematical methods. Students' knowledge of analysis and derivation of dependencies is expanding as the applied sources are mostly unstructured and located in the global network. The course uses a real set of data and free software to extract knowledge.

The aim of the course is to train students in new skills for analysis of different data sets and for detecting dependencies that are not visible with traditional means of reporting. Modern methods of solving business issues are applied.

The main task is for the student to acquire knowledge of the techniques for extracting knowledge and data relations.

The expected results are the mastering by the students of the modern techniques for extracting knowledge and data relations.

Registration for the Course: The course is compulsory and is not applied for its study.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Berkhin P, Survey of Clustering Data Mining Techniques.

2. Jiawei Han and Micheline Kamber,Data Mining: Concepts and Techniques, Second Edition, 2006.

3. Jiawei Han, Jian Pei and Micheline Kamber, Data Mining: Concepts and Techniques, Third Edition, 2012.

4. Daniel T. Larose , Discovering knowledge in data. An Introduction to Data Mining, John Wiley & Sons, Inc., Hoboken, New Jersey, 2005.

5. Murthy S., Automatic Construction of Decision Trees from Data: A Multi-Disciplinary Survey. Journal of Data Mining and Knowledge Discovery, vol. 2, num. 4, 1998.

6. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Second Edition, 2003.

7. Ruth Dilly, Data Mining - An Introduction. The Queen's University of Belfast - OHP Slide Material, Student Notes.

Course Title: Component-Oriented Software Engineering

Semester: 3rd semester

Course Type: lectures, lab exercises

Hours per week: 2 lecture hour per week and 1 labs hour per week

ECTS credits: 5.0 credits

Course Status: Compulsory Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The basic principles for creating and using components in the development of software solutions are presented in the course. The topics to be discussed are as follows: programming fundamentals. Understanding the component library; introduction to component creation2. Introduction to component creation; object-oriented programming for component writers; creating properties; creating events; creating methods; using graphics in components; handling messages; making components available at design time; modifying an existing component; creating a graphic component; customizing a grid; making a control data aware; making a dialog box a component; extending the IDE;

Course Objectives: The aim of the course is to teach students some of the basics in creating component-oriented software solutions, using visual design environments and event-oriented programming.

After completion of the course students should be able to create and use different types of components in the development of software products.

Teaching Methods: Lectures, demonstrations, work on project.

Requirements/Prerequisites: Needed basic knowledge of object-oriented programming. Desirable knowledge of visual design environments and event-oriented programming, such as RAD Studio or/and Visual Studio.

Assessment: Evaluating the student shall be carried out in the sixth grad scale. Current control is performed during the laboratory sessions during the semester through two courseworks, one control test and one course project (50% of final grade). Course ends with a written exam on the material according to the attached syllabus (50% of final grade). When shown a weak exam score, the student appears on the makeup exam and retain the information received from the course work assessment.

Registration for the Course: The course is compulsory and is not applied for its study.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Embarcadero Technologies. (2020). Component Writer's Guide: Embarcadero Technologies. Retrieved from Embarcadero Technologies Web Site: docwiki.embarcadero .com/ RADStudio/Seattle/en/Component_Writers_Guide_Index.

2. John Barrow, Linda Miller, Katherine Malan, Helene Gelderblom. (2005). Introducing Delphi Programming: Theory through Practice 4th Edition. Publisher: Oxford University Press.

3. Danny Thorpe. (1996). Delphi Component Design Paperback. Publisher: Addison-Wesley.

4. Marco Cantu. (2003). Mastering Delphi 7. Publisher Sybex.

5. Marco Cantu. (2010). Delphi 2010 Handbook: A Guide to the New Features of Delphi.

6. Nick Hodges. (2015). More Coding in Delphi. Publisher: Nepeta Enterprises.

Course Title: Semantic web

Semester: 3rd semester

Course Type: Lectures and tutorials in computer lab.

Hours per week: 2 lecture hour per week and 1 labs hour per week

ECTS credits: 5 credits

Course Status: Compulsory Course in curriculum of major Information Systems and Technologies, Master degree.

Course Description:

The Semantic Web is a vision about an extension of the existing World Wide Web, which provides software programs with machine-interpretable metadata of the published information and data. The course discusses the basic concepts and layered architecture of the semantic web.

Course Objectives:

The student should obtain knowledge of:

- How Semantic Web technology fits in to the past, present, and future evolution of the Internet.
- How Semantic Web technology differs from existing data-sharing technologies, such as relational databases and the current state of the World Wide Web.
- The international standards that help define the Semantic Web.

Teaching Methods: lectures, tutorials, discussions, project based method

Requirements: Basic knowledge of Informational Technologies, Operating Systems, Databases, Programming.

Assessment:

- Project- 50%
- Final Test- 50%

The course is successful completed with at least 50% of all scores.

Registration for the Course: not required (core course)

Registration for the Exam: coordinated with the lecturer and the Student Service Office

References:

1. Pascal Hitzler, et al. Foundations of the Semantic Technologies. Springer, Heidelberg, 2012.

2. Dean Allemang, Jim Hendler, Semantic Web for the Working Ontologist. Effective modeling in RDFS and OWL, Morgan Kaufman Publishing, Elsevier, Burlington, MA, 2008.

3. Michael C. Daconta, Leo J. Obrst, Kevin T.Smith, The Semantic Web. A Guide to the Future of XML, Web Services, and Knowledge Management, Wiley Publishing, Indianapolis, Indiana, 2003.

4. Toby Segaran, Colin Evans and Jamie Taylor, Programming the Semantic Web, O'Reilly Media, Inc. Sebastopol, CA, 2009.

5. Eric Prud'hommeaux, Andy Seaborne, SPARQL Query Language for RDF, http://www.w3.org/TR/rdf-sparql-query, 2008.

6. Damova, M., Kiryakov, A., Bergman, M.K., Giasson, F., Simov, K. Creation and Integration of Reference Ontologies for Efficient LOD Management In: Semi-Automatic Ontology Development: Processes and Resources, IGI Global, Hershey PA, USA, 2012.

7. Frank Manola, Eric Miller, RDF Primer, http://www.w3.org/TR/rdf-primer/, 2004.

8. Bijan Parsia, Peter F. Patel-Schneider, OWL Primer, http://www.webont.org/owl/documents/primer-exp.html, 2008.

9. Pascal Hitzler, Markus Krotzsch, Bijan Parsia, Peter F. Patel-Schneider, Sebastian Rudolph, OWL 2 Primer, http://www.w3.org/2007/OWL/wiki/Primer, 2008-2009

Course Title: Stochastic Simulation

Semester: 3rd semester

Course Type: lecture and exercise

Hours per week: 2 lecture; 2 exercise

ECTS credits: 6.0

Status of discipline in the curriculum: compulsory discipline

Course Description:

The Stochastic Simulation course aims to familiarize students with the possibilities of conducting computer experiments with mathematical models of complex real-world systems. Includes basic methods and tools for implementing computer simulations.

Teaching Methods: lectures, demonstrations and work on project

Assessment: course project and exam

Registration for the Exam: coordinated with the lecturer and Student Service Department

References:

1. Калинов К.,Статистически методи в поведенческите и социалните науки, НБУ, 2016

2. Johnson, Richard A.; Wichern, Dean W. (2007). Applied Multivariate Statistical Analysis (Sixth ed.). Prentice Hall. ISBN 0-13-187715-1, ISBN 978-0-13-187715-3.

3. Richard G. Bereton, Data analysis for the laboratory and Chemical Plant, University of Bristol, UK, 2009

4. The Statistics Homepage - http://www.statsoft.com/textbook/stathome.html ©1984-2018

5. Computational Chemistry, A Practical Guide for Applying Techniques to Real-World Problems David C. Young, 2001, Copyright by John Wiley & Sons, Inc.

6. Wolfgang Karl Härdle, Léopold Simar, Applied Multivariate Statistical Analysis, Springer, 2019.

7. Каращранова Е. Интерактивно обучение по вероятности и статистика, ЮЗУ, 2010г.

Course Title: JSP and Java servlet programming (Web programming)

Semester: 3rd semester

Course Type: lecture and exercise

Hours per week: 2 lectures 1 lab per week

ECTS credits: 4.5

Course Status: Optional course

Course Description:

The course is designed for students who are interested in Java programming and development of Internet-oriented applications and aims to introduce students to the following technologies:

- • Socket programming - development of Java applications that communicate over the Internet / Intranet via TCP / IP protocols, such as Chat client / servers, Web servers, Mail client / servers, etc.

- • Java applets - development of small Java applications that can be embedded in Web pages and run from the client's Web browser.

- • Web applications - development of Web applications with Servlets and Java Server Pages (JSP) technologies, creation and deployment of Web applications according to Sun standards for J2EE, work with Tomcat server.

In order to understand the material, it is necessary for students to have basic knowledge of Internet organization, programming, Java and HTML. Due to its large volume, the topic will be divided into several modules.

Objectives: The course aims to provide new knowledge related to web programming.

The main task is for the student to acquire knowledge of web programming.

Referemces:

1. Светлин Наков, Борис Червенков, Интернет програмиране с Java, http://www.nakov.com
2. The Java EE 5 Tutorial - http://java.sun.com/javaee/5/docs/tutorial/doc/JavaEETutorial.pdf
3. Java API документация - http://java.sun.com/javase/6/docs/api/
4. Eclipse - www.eclipse.org
5. Apache Tomcat - http://tomcat.apache.org/
6. Step-by-step tutorial: http://www.java-tips.org/java-tutorials/tutorials/introduction-to-java-servlet.

Course Title: Neural Networks

Semester: 3rd semester

Course Type: lecture and exercise

Hours per week: 2 lecture; 1 exercise week

ECTS credits: 4.5

Course Status: Optional course

Course Description:

The course will present the main types of networks such as ordinary perceptron, Hopfield networks, Coheren networks. The basic methods of neural network training will be explained in detail. Examples will illustrate the application of neural networks in various fields such as economics, medicine and others. The course will use modern software packages for the design of neural networks such as Matlab.

Teaching Methods: lectures, demonstrations and work on project

Assessment: course project and exam

Registration for the Exam: coordinated with the lecturer and Student Service Department

References:

1. Kevin Byron, Katherine G. Herbert, Jason T. L. Wang. (2017). Bioinformatics Database Systems, Taylor & Francis Group, LLC.

2. Martin J. Bishop. (1999). Genetics Databases, Academic Press A Harcourt Science and Technology Company 24-28 Oval Road, London.

3. Веселин Баев, Елена Апостолова, Евелина Даскалова, Георги Минков. (2013). Ръководство по Биоинформатика, Първо електронно издание, Пловдивски Университет "Паисий Хилендарски", ISBN:978-954-423-835-3.

Course Title: Cloud Computing

Semester: 3rd semester

Course Type: lectures, lab exercises

Hours per week: 1 lecture hour per week and 2 lab hour per week

ECTS credits: 4.5 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The course in cloud technologies aims to acquaint students with the basic concepts and characteristics of cloud computing.

For a better understanding of the exhibition, prior preparation in the basics of computer science, mathematical logic and programming languages is required. The content is structured in a way that clarifies the basic concepts and characteristics related to cloud technologies; basics of cloud technologies SaaS, PaaS, IaaS; virtualization and hosting in cloud technologies; Cloud application lifecycle.

Assessment: written exam

References:

1. Blain Barton — "Microsoft Public Cloud Services: Setting up Your Business in the Cloud", Microsoft Press, 2015.

2. Thomas Erl, Ricardo Puttini, Zaigham Mahmood - "Cloud Computing: Concepts, Technology & Architecture", Prentice Hall, Upper Saddle River, NJ, Fourth Printing, 2014.

3. Michael J. Kavis - "Architecturingthe Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)", Wiley, 2014.

4. Michal Tomasz Jakobczyk- "Practical Oracle Cloud Infrastructure" ,Oracle, 2020

5. Стоян Велев, Христо Добчев. SAP Labs Bulgaria 2013

Course Title: Database applications in bioinformatics

Semester: 3rd semester

Course Type: lecture and exercise

Hours per week: 2 lecture; 1 exercise week

ECTS credits: 4.5

Course Status: Optional Course

Course Description:

The main types of biological data bases and bioinformatics tools will be presented in the course. Various highly effective data sources in bioinformatics will be explained in detail. Examples will illustrate the application databases in different areas of bioinformatics. The course will use modern software tools for working with biological databases.

Teaching Methods: lectures, demonstrations and work on project

Assessment: course project and exam

Registration for the Exam: coordinated with the lecturer and Student Service Department

References:

1. Kevin Byron, Katherine G. Herbert, Jason T. L. Wang. (2017). Bioinformatics Database Systems, Taylor & Francis Group, LLC.

2. Martin J. Bishop. (1999). Genetics Databases, Academic Press A Harcourt Science and Technology Company 24-28 Oval Road, London.

3. Веселин Баев, Елена Апостолова, Евелина Даскалова, Георги Минков. (2013). Ръководство по Биоинформатика, Първо електронно издание, Пловдивски Университет "Паисий Хилендарски", ISBN:978-954-423-835-3.

Course Title: Digital Communications

Semester: 3rd semester

Course Type: lectures, lab exercises

Hours per week: 2 lecture hour per week and 1 lab hour per week

ECTS credits: 4.5 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The course discuses the problems concerning design, building and application of Digital Communication networks. The lectures begin with introduction to Digital Communications, principles of building, historical development and their contemporary classification. Open system interconnection model of ISO is presented. Teaching course includes basic principles of building and functioning of PDH, SDH, ISDN, B-ISDN and ATM networks. The lectures on the most popular in the world computer network Internet present its basic characteristics, principles of functioning and application. The laboratory work helps to better rationalization of lecture material and contribute to formation of practical skills.

Course Objectives:

The aim of the course is to acquaint students with the basic principles, standards and tendencies of development in the field of Digital Communications. This will help them in future to professionally solve system tasks in the area of network communications.

Teaching Methods: Lectures, demonstrations, work on project.

Requirements/Prerequisites: Needed basic knowledge of communications technology, operating systems and computer architectures.

Assessment: Evaluating the student shall be carried out in the sixth grad scale. Current control is performed during the laboratory sessions during the semester through two courseworks, one control test and one course project (50% of final grade). Course ends with a written exam on the material according to the attached syllabus (50% of final grade). When shown a weak exam score, the student appears on the makeup exam and retain the information received from the course work assessment.

Registration for the Course: Submitted an application to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Мерджанов П., Телекомуникационни мрежи, Нови знания, С., 2010 г.
2. Мирчев С., АТМ комуникации, Нови знания, С., 2001 г.
3. Христов В. Цифрови комуникации, ЮЗУ "Н.Рилски" –Благоевград, 2004 г.
4. Христов Х., Мирчев С., Основи на телекомуникациите, Нови знания, С., 2001 г.
5. Lee, R.; Chiu, M.; Lin, J. Communications Engineering:Essentials for Computer Scientists and Electrical Engineers, Wiley-IEEE Press, 2007 г.

Course Title: Applied software for automatic translation

Semester: 3rd semester

Course Type: Optional Course

Hours per week: 1 lecture hours per week and 2 lab hour per week

ECTS credits: 4.5 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description: The course of the course Applied Software for Automatic Translation, included as an elective in the curriculum of the specialty Information Systems and Technologies aims to build students the necessary skills for their future development as technical assistants, programmers, assistants supporting the software and more. and increasing their competitiveness in the labor market. The course on the subject Applied Software for Automatic Translation contains a short theoretical introduction, with an emphasis on the ideology and application of computer-assisted translation tools. The emphasis is on practical work, each student performs and stores the tasks assigned by the teacher on a separate computer equipped with the necessary software.

Objectives: The course aims to provide students with basic theoretical knowledge of the basic components that make up such software and practical skills for applying modern tools for computer-assisted translation (Computer Assisted Translation Tools (CAT) Tools). The possibilities for creating and working with terminological dictionaries and databases of multilingual translation memories (TM) are considered. The training is focused on mastering the specialized translation software SDL Trados Studio, which is an indispensable assistant to the modern translator, and in addition its use is mandatory for all translations for the needs of the European Union bodies.

Expected results: Students who have completed their training in the discipline should acquire: basic knowledge of the architecture of modern automatic translation programs, knowledge of fuzzy logics, fuzzy databases and translation reliability factor, practical skills in the application of automatic software translation.

Prerequisites: Students must be fluent in at least one foreign language (B2 / C1) and have a basic knowledge of information technology and programming.

Registration for the Course: Applied to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Fuzzy sets and fuzzy logic: theory and applications. Prentice Hall, 1995. ISBN 978013101 1717.

2. Hans—Jilrgen Zimmermann. Fuzzy set theory—and its applications. 4th. Kluwer, 2001. ISBN 9780792374350.

3. Fundamentalsof fuzzy sets. T. 7. Springer, 2000. ISBN 9780792377320.

4. Beynon—Davies, Paul (2003). Database Systems (3rd ed.). Palgrave Macmillan. ISBN 978—1403916013

5. DePaIma, Donald A. (July 2005). "SDL-TRADOS: Language Service Provider Reaction to ' SDlz's'Purchase of TRADOS"

6. Ullman, Jeffrey; Widom, Jennifer (1997). A First Course in Database Systems. Prentice—Hall. ISBN 0138613370

Course Title: Theory, algorithms and technologies for speech recognition.

Semester: 3rd semester

Course Type: Optional Course

Hours per week 2 lecture hours per week and 1 lab hour per week

ECTS credits: 4.5 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description: In this course, the theoretical foundations of modern speech processing technologies will be discussed. Some speech recognition software and using them to Bulgarian speech recognition will be viewed.

Course Objectives: This course aims to provide the students with the knowledge and practical experiences for the modern technology of natural speech processing.

After the course completed, the students should know and understand:

- The methods of speech signal processing and retrieve their features.

- The methodology of the construction of a phonetic and language model in a given language.

Teaching Methods: Browsing the Web, work on coursework and essay.

Requirements/Prerequisites: The knowledge by the courses "Programming and Data Structures", "Object-Oriented Programming", "Database", "Discrete Mathematics", "Linguistics", "Pattern Recognition" and "Neural Networks", are necessary.

Assessment: Evaluating the student will be carried out by the six-point marking scale. The final assessment is in the form of a test that covers the whole teaching material including theoretical questions and practical cases. The final mark presents 50% of the final test and 50% of the mark of the course work.

Registration for the Course: Applied to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. Xuedong Huang, Alex Acero, Hsiao-Wuen Hon, Spoken Language processing – A Guide to Theory, Algorithm, and System Development, Prentice Hall PTR, 2001

2. Xuedong Huang, Alex Acero, Hsiao-Wuen Hon (2001) Spoken Language processing – A Guide to Theory, Algorithm, and System Development, Prentice Hall PTR

3. Stephen E. Leinson (2005) Mathematical Models for Speech Technology, John Wiley & Sons

4. Wu Chou, Bing Hwang Juang (2003) Pattern Recognition in Speech and Language Processing, CRC Press

5. Joseph Keshet, Samy Bengio (2009) Automatic Speech and Speaker Recognition – Large Margin and Kernel Method, John Wiley & Sons

6. Lawrence Rabiner, Ronald Schafer (2010) Theory and Application of Digital Speech Processing, Prentice Hall

7. Daniel Jarefsky, James Martin (2008) Speech and Language Processing (2nd Edition), Prentice Hall

8. Dong Yu, Li Deng (2014) Automatic Speech Recognition: A Deep Learning Approach, Springer

9. James R. Lewis (2011) Practical Speech User Interface Design, CRC Press

10. Homayoon Beigi (2011) Fundamentals of Speaker Recognition, Springer

11. Willi-Hans Steeb (2005) Mathematical Tools in Signal Processing with C++ and Java Simulations, University of Johannesburg, South Africa

12. K. R. Rao, D. N. Kim, J. J. Hwang (2010) Fast Fourier Transform: Algorithms and Apllications, Springer

13. Р. Кралева (2019) Разпознаване на реч: Корпус от говорима детска реч на български език, ISBN: 978-954-00-0199-9, УП „Неофит Рилски", Благоевград.

14. Data Exchange System, http://childes.psy.cmu.edu/

15. Praat: doing phonetics by computer, http://www.fon.hum.uva.nl/praat/

16. WaveSurfer, http://www.speech.kth.se/wavesurfer/

17. The International Phonetic Association, http://www.langsci.ucl.ac.uk/ipa/index.html

Course Title: Information systems in bioinformatics

Semester: 4th semester

Type of Course: lectures and tutorials in computer lab

Hours per week: 2 hours lecture and 1 hours tutorials in computer lab

Credits Numbers: 4.00 credits

Department: Department of Computer Science (Informatics)

Course Status: Elective course in the curriculum of the specialty "Information Systems and Technologies"

Course description: The course "Information Systems in Bioinformatics" is an elective course for students of the specialty Information Systems and Technologies (1st year students, 2nd semester) in the fields of programming, algorithms and bioinformatics in the fields of programming, algorithms and bioinformatics. Topics data representation in computer, algorithms, data types, syntax and semantics of programming languages, tools for developing and testing information systems in bioinformatics.

Objectives: The students should obtain basic knowledge and skills in programming of information systems in bioinformatics.

Methods of teaching: lectures, tutorials, discussions, project based method.

Requirements/Prerequisites: Students in this course need to have basic knowledge of algebra, probability theory, analysis, etc.

Assessment: written final exam

Registration for the Course: the course is compulsory

References

1. Увод в BioJava. http://biojava.org/wiki/Main_Page

2. Прееслав Наков. Въведение в програмирането с Java. 2012, http://www.introprogramming.info /intro-java-book/read-online/

3. Talarida J. Jacobs. Jacobs L. The dose –response relationship in pharmacology. Springer – Verlag. New York 1979

4. Jose Maria Lagaron, Antimicrobial Polymers, 0470598220, Publisher : Wiley, 2013

5. Approved drug products with therapeutic equivalence evaluations, u.s. department of health and human services, 2013

6. Knuth D.E. Postscript about NP-hard Problems, SIGACT News, 1974.

7. Reingold E.M., Neivergelt J., Deo N. Combinatorial algorithms (Theory and Practice), 1980.

Course Title: Business Process Management Systems

Semester: 4th semester

Course Type: lectures and lab exercise

Hours per week: 2 lecture hours and 1 lab hours per week

ECTS credits: 4.0 credits

Course Status: Compulsory Course in the Information Systems and Technologies in Master of Science Curriculum

Course Description

The course gives a general idea of business process management as a scientific discipline and its relationship with the strategic management of organizations. Basic concepts of the discipline, basic processes and models for process management, methods of business process management, design and control of a business process management system are considered.

Special attention in the course is paid to quantitative and qualitative analysis of the processes.

The course examines practical methods for managing processes in terms of human resources and information technology that support them. The practical classes are related to the real practice in business process management.

For the course it is necessary for the students to have knowledge of information technologies and experience with their use.

The main goal of the course is to acquaint students with the theory of business process management and its application in organizations and companies. The course provides new knowledge about processes and business process management models.

The main task is for the student to acquire knowledge about the nature of business processes, business process design and business process management models, process management methods and process analysis.

The expected results are the mastery by the students of the modern general formulations for a business process management system and business process management practice.

References:

1. Mathias Weske, Business Process Management Concepts, Languages, Architectures, Second Edition, Springer-Verlag Berlin Heidelberg 2007, 2012.

2. Marlon Dumas, Marcello La Rosa, Jan Mendling, Hajo A. Reijers, Fundamentals of Business Process Management, Springer-Verlag Berlin Heidelberg 2013.

3. Business Process Management For Dummies®, 4th IBM Limited Edition, John Wiley & Sons, Inc, 2017.

4. http://fbm.uni-ruse.bg/d/bsa/bsa-L1.pdf.

5. http://tuj.asenevtsi.com/BIS09/BIS30.htm , Христо Тужаров , Бизнес процеси

6. http://www.uni-svishtov.bg/dialog/2013/INI/05-statia-2013.pdf - Кремена Маринова

7. http://www.antipodes.bg/bg/cubes/what_is_bpm/ - , BPM

Course Title: Cross-platform application development

Semester: 4th semester

Course Type: lectures and lab exercise

Hours per week: 2 lecture hours and 1 lab hours per week

ECTS credits: 4.0 credits

Course Status: Compulsory Course in the Information Systems and Technologies in Master of Science Curriculum

Course Description:

Over the last few years, various new mobile computing devices with different operating systems such as tablets, e-readers and smartphones are developed. This leads to the need for software applications that are compatible with different hardware and software specifications. Development of many applications with the same functions for different mobile devices is a hard task. Therefore, cross-platform applications development is important for modern software engineers. This saves time and effort of developers. This course is an introduction to the cross-platform applications development for various computing devices. During the lectures, students will understand the different development environments, types of hardware and software architectures will acquire basic theoretical knowledge and skills for developing various software applications.

Course Objectives This course aims to provide students with knowledge and additional training in the theory and practice in the development of cross-platform applications for various mobile devices. They will learn about some of the environments to develop of cross-platform mobile applications and will gain more practical knowledge in development environment Xamarin.Forms with Microsoft Visual Studio.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements: Needed basic knowledge of operating systems, computer programming and Data structures, object-oriented programming, databases and DBMS.

Assessment: Evaluating the student shall be carried out in the sixth grad scale – 2, 3, 4, 5, 6. Evaluation of current control is obtained by taking the average of the assessment of coursework and paper. Students who have a minimum average estimate /3/ of the current control is not allowed to test the regular session. They must present additional development and evaluation after receiving at least medium /3/ be admitted to the written examination of supplementary or liquidation session. The final estimate is derived from the average of the current control and evaluation of the written exam.

Registration for the Course: Not necessary

Registration for the Exam: Coordinated with the lecturer and Student Service Department.

References:

1. Hermes, D., & Mazloumi, N. (2019) "Building Xamarin. Forms Mobile Apps Using XAML: Mobile Cross-Platform XAML and Xamarin. Forms Fundamentals", Apress.

2. Johnson, P. F. (2015) "Cross-platform UI Development with Xamarin. Forms", Packt Publishing Ltd.

3. Durano, S., Durano, V. M. S., & Srivastava. (2019) "Understanding Game Application Development", Apress.

4. Chatterjee, A. (2017) "Building Apps for the Universal Windows Platform: Explore Windows 10 Native, IoT, HoloLens, and Xamarin", Apress.

5. Troelsen, A., & Japikse, P. (2017) "Pro C# 7: With. NET and. NET Core", Apress.

6. Williams, M. (2016) "Xamarin Blueprints", Packt Publishing Ltd.

7. Smith, W. (2014) "Learning Xamarin Studio", Packt Publishing Ltd.

8. Freeman, A. (2017) "Essential Angular for Asp. Net Core MVC", Apress.

9. Hermes, D. (2015) "Xamarin mobile application development: Cross-platform C# and Xamarin.Forms fundamentals", Apress.

10. Peppers, J. (2015) "Xamarin cross-platform application development", Packt Publishing Ltd.

11. Bennett, J. (2018) "Xamarin in Action: Creating native cross-platform mobile apps", Manning.

12. Reynolds, M. (2014) "Xamarin Essentials", Packt Publishing Ltd.

13. Petzold, C. (2016) "Creating Mobile Apps with Xamarin.Forms", Microsoft Press.

14. Fustino, R.(2018) "Azure and Xamarin Forms: Cross Platform Mobile Development", Apress.

15. Patterson, D. A., & Hennessy, J. L. (2016) "Computer Organization and Design ARM Edition: The Hardware Software Interface", Morgan Kaufmann.

16. Microsoft (2019) Cross-Platform Guidance. Available: https://docs.microsoft.com/en-us/xamarin/cross-platform/

17. Perkins, B., Hammer, J. V., Reid, J. D. (2016) "Beginning Visual C#® 2015 Programming", John Wiley & Sons, Inc.

18. Firtman, M. (2013) "Programming the Mobile Web, Second Edition", O'Reilly.

19. Frederick, G. R., Lal, R. (2009) "Beginning Smartphone Web Development", Apress.

20. Versulius, G. (2017) "Xamarin Continuous Integration and Delivery", Apress.

21. de la Torre, C., Calvert, S. (2016) "Microsoft Platform and Tools for Mobile App Development", Microsoft Press.

22. Bilgin, C. (2016) "Mastering Cross-Platform Development with Xamarin", Packt Publishing.

Title: Training in IT Company (Organization)

Semester: 4th semester

ECTS Credits: 3 credits

Department: Informatics

Course Status: Elective course in curriculum of major Information Systems and Technologies, Master degree.

Course description:

The course is designed for acquiring practical skills and habits and the acquisition of expertise through introduction and participation in the activities of companies and organizations, who design, implement, deploy and use modern IT.

Objectives:

This course aims to bind the knowledge gained from university education with hands-on activities performed in different IT companies (organizations).

Methods of teaching: Work in a real work environment.

Pre-requirements: Basic knowledge of Informational Technologies, Operating Systems, Databases, Programming.

Assessment: report; journal of the conducted practical training;

Registration for the Course: by request at the end of the current semester

Registration for the Exam: coordinated with the lecturer and the Student Service Office

Course Title: Natural Language Processing Systems

Semester: 4th semester

Hours per week: 1 lecture hour per week and 1 lab hours per week

ECTS credits: 3.0 credits

Course Status: Elective course in curriculum of major Information Systems and Technologies, Master degree.

Course Description: Natural Language Processing, usually shortened as NLP, is is a subfield of artificial intelligence that deals with the interaction between computers and humans using the natural language. NLP systems capture meaning from an input of words (sentences, paragraphs, pages, etc.) in the form of a structured output

Course Objectives: The purpose of the course is to introduse students with the basic principles, algorithms and techniques that underpin modern natural language automatic processing (NLP) technologies.

Teaching Methods: lectures, tutorials, discussions, project based method

Requirements: Basic knowledge of Informational Technologies, Operating Systems, Databases, Programming.

Assessment:

- Project- 50%
- Final Test- 50%

The course is successful completed with at least 50% of all scores.

Registration for the Course: by request at the end of the current semester

Registration for the Exam: coordinated with the lecturer and the Student Service Office

References:

19. Dan Jurafsky and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, 2019.

20. Alexander Clark, Chris Fox, and Shalom Lappin, The Oxford Handbook of Computational Linguistics, Oxford University Press; 1 edition (March 10, 2005).

21. Christopher D. Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing, The MIT Press Cambridge, Massachusetts, May 1999

22. Yoav Goldberg, Graeme Hirst, Neural Network Methods in Natural Language Processing (Synthesis Lectures on Human Language Technologies), Morgan & Claypool Publishers (April 17, 2017).

23. Grant Ingersoll, Thomas Morton and Drew Farris., Taming Text, Manning Publications; 1 edition (January 24, 2013).

24. Li Deng, Yang Liu, Deep Learning in Natural Language Processing, Springer; 1st ed. 2018 edition (May 24, 2018).

Course Title: Introduction to LATEX-2ε

Semester: 4th semester

Course Type: lectures, lab exercises

Hours per week: 1 lecture hour per week and 1 lab hours per week

ECTS credits: 3.0 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The Course is an Introduction to LATEX 2e used as a word processor when preparing text in mathematical, computer and other sciences.

Course aims: Non-trivial introduction in some important for Mathematicians and Computer scientists system for writing text with high quality.

Teaching methods: lectures, group discussions or workshops, projects

Requirements/ Prerequisites: Basic knowledge in Mathematics and Programming.

Evaluation: Written examination, individual tasks and the general student's work during the semester.

Registration for the course: not necessary

Registration for the exam: in the department office, co-ordinated with the lecturer.

References:

1. Leslie Lamport, A document Preparation System LATEX user's guide and reference
1. manual, Addison-Wesley, 1998.
2. 2Till Tantau, Joseph Wright, Vedran Miletić (2010) User's guide – The BEAMER class,
3. manual for version 3.07,
   http://www.ctan.org/texarchive/macros/latex/contrib/beamer/doc/beameruserguide.pdf
4. Norm Matloff', Quick Tutorial on the Beamer Package for Slide Making in LaTeX,
5. http://heather.cs.ucdavis.edu/~matloff/beamer.html
1. T. Oetiker, H. Partl, I. Hyna, E. Schlegel, Не много кратко въведение в LATEX 2e, 2004,
6. http://www.download.bg/?cls=program&id=446489, http://fmi.uni-sofia.bg/fmi/or/TeX/

Course Title: Design of Information Systems with Client-Server Architecture

Semester: 4th semester

Course Type: lectures, lab exercises

Hours per week: 1 lecture hour per week and 1 lab hours per week

ECTS credits: 3.0 credits

Course Status: Optional Course in Master of Science Curriculum of Information Systems and Technologies

Course Description:

The course includes basics of database management systems and related topics: introduction to the database management systems, requirements, architecture and basic principles of operation; comparison between the most widely used database management systems; basics of planning, installing, configuring and managing components of a DBMS and its instances; tools for working with database management systems, familiarization with the tools SQL Server Management Studio and IBConsole; design of relational databases and create a physical diagram of database scheme in the DBMS; create and modify tables in the DBMS, use types, expressions and functions; defining keys and restrictions when creating relationships between tables, creating and using indexes, working with diagrams in the DBMS; working with SQL statements INSERT, DELETE, and UPDATE with insert, delete and update data; working with the SQL statement SELECT retrieving data; working with joins in extracting information from multiple tables, creating and using views; create and work with stored procedures in the DBMS, define custom functions; working with transactions and locks in the DBMS; create and use triggers in the DBMS; security system DBMS, working with logins, roles and users, authentication and authorization; exporting and importing data, DBMS capabilities for backup and restore databases;

Course Objectives:

Students should obtain basic knowledge and skills for database management systems.

Teaching Methods: Lectures, demonstrations, work on project.

Requirements/Prerequisites: Needed basic knowledge of databases.

Assessment: Evaluating the student shall be carried out in the sixth grad scale. Current control is performed during the laboratory sessions during the semester through two courseworks, one control test and one course project (50% of final grade). Course ends with a written exam on the material according to the attached syllabus (50% of final grade). When shown a weak exam score, the student appears on the makeup exam and retain the information received from the course work assessment.

Registration for the Course: Submitted an application to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department

References:

1. C. J. Date. An Introduction to Database Systems. Eighth Edition. Pearson. 2003.

2. Elmasri, R., Navathe, S. Fundamentals of Database Systems. Sixth Edition. Pearson. 2013.

3. C. J. Date. SQL and Relational Theory: How to Write Accurate SQL Code. Second Edition. O'Reilly Media. 2011.

    A. Jorgensen, P. LeBlanc, J. Chinchilla, J. Segarra, A. Nelson. Microsoft SQL Server 2012 Bible. John Wiley & Sons, Inc. 2012.

4. O. Thomas, P. Ward, B. Taylor. Administering Microsoft SQL Server 2012 Databases. Microsoft Press. 2012.

5. P. Atkinson, R. Vieira. Beginning Microsoft® SQL Server® 2012 Programming. John Wiley & Sons, Inc. 2012

6. R. Dewson. Beginning SQL Server for Developers. Fourth Edition. Apress. 2015.