QUALIFICATION CHARACTERISTICS
OF SPECIALTY "INFORMATION SYSTEMS AND TECHNOLOGIES"
FOR EDUCATIONAL-QUALIFICATION DEGREE "MASTER"
WITH PROFESSIONAL QUALIFICATION "MASTER OF INFORMATICS",
TRAINING PERIOD 1 YEAR

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 1 year (2 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: 1 YEAR (2 SEMESTERS)

First Semester	ECTS credits	Second Semester	ECTS creditcs
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 (избира се една от всяка група)		**Optional Courses**	
First group		Training at IT Company (Institution)	3.0
JSP and Java servlet programming (Web programming)	4.5	Natural language processing systems	3.0
Neural Networks	4.5	Introduction in LATEX 2ε	3.0
Cloud computing	4.5	Design of Information Systems with Client-Server Architecture	3.0
Database Applications in Bioinformatics	4.5		
Second group			
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: Data Mining

Semester: 1st 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: 1st 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: 1st 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. Frank Manola, Eric Miller, RDF Primer, http://www.w3.org/TR/rdf-primer/, 2004.
7. Bijan Parsia, Peter F. Patel-Schneider, OWL Primer, http://www.webont.org/owl/documents/primer-exp.html, 2008.
8. 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: 1st 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: 1st 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: 1st 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: 1st 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: 1st 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: 1st 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: 1st. 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. Kockaert, Hendrik; Steurs, Frieda (2015). Handbook of Terminology. 1. Amsterdam: John '|
6. Benjamins Publishing Company. p. 225
7. DePaIma, Donald A. (July 2005). "SDL-TRADOS: Language Service Provider Reaction to ' SDlz's'Purchase of TRADOS"
8. 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: 1st. 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: 2nd 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. Преслав 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.

INFORMATION SYSTEMS AND TECHNOLOGIES

Course Title: Business Process Management Systems

Semester: 2nd 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: 2nd 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: 2nd 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: 2nd 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:

1. Dan Jurafsky and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, 2019.
2. Alexander Clark, Chris Fox, and Shalom Lappin, The Oxford Handbook of Computational Linguistics, Oxford University Press; 1 edition (March 10, 2005).
3. Christopher D. Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing, The MIT Press Cambridge, Massachusetts, May 1999
4. Yoav Goldberg, Graeme Hirst, Neural Network Methods in Natural Language Processing (Synthesis Lectures on Human Language Technologies), Morgan & Claypool Publishers (April 17, 2017).
5. Grant Ingersoll, Thomas Morton and Drew Farris., Taming Text, Manning Publications; 1 edition (January 24, 2013).
6. 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: 2nd 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: 2nd 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.
4. A.Jorgensen, P. LeBlanc, J. Chinchilla, J. Segarra, A. Nelson. Microsoft SQL Server 2012 Bible. John Wiley & Sons, Inc. 2012.

5. O. Thomas, P. Ward, B. Taylor. Administering Microsoft SQL Server 2012 Databases. Microsoft Press. 2012.
6. P. Atkinson, R. Vieira. Beginning Microsoft® SQL Server® 2012 Programming. John Wiley & Sons, Inc. 2012
7. R. Dewson. Beginning SQL Server for Developers. Fourth Edition. Apress. 2015.