MAJOR FIELD OF STUDY "INFORMATICS", MASTER OF SCIENCE, PERIOD OF STUDY 2 YEARS

QUALIFICATION CHARACTERIZATION
OF MAJOR FIELD OF STUDY "INFORMATICS"
FOR "MASTER OF SCIENCE" DEGREE
WITH PROFESSIONAL QUALIFICATION "MASTER OF SCIENCE IN
INFORMATICS", PERIOD OF STUDY 2 /TWO/ YEARS

I. Requirements to professional qualities and competences of enrolled students

Students enrolled in this major field of study have to submit diplomas for completed higher education acquired educational and qualification degree "Bachelor"/"Master" in specialties in another professional direction from areas of higher education 4. Natural sciences, mathematics and informatics, 5. Technical sciences and 3. Social, economic and legal sciences, regular form of education, duration of education – 4 semesters (2 years).

II. Requirements to professional qualities and competences of students, completed this major field of study

Neofit Rilski South-Western University prepares qualified experts in Informatics that can apply their knowledge and skills in the area of science, culture, education and economics in Bulgaria and abroad.

After completion of "Master in Informatics" degree they can successfully realize themselves as: programmers, system and network administrators and designers, graphic designers, scientists, experts in database design, experts in software technologies, etc.

At completion of Master of Science in Informatics degree, students obtain:
- ✓ profound knowledge in the area of Informatics;
- ✓ good preparation in the area of Informatics and Mathematics as well as solid practical skills conforming to modern European standards and requirements;
- ✓ formation of affinity and ability for independent research and design;
- ✓ basis for continuing education at PhD degree;
- ✓ good opportunities for realizing as experts in Bulgaria or abroad;
- ✓ thinking style and affinity to the quickly changing requirements of the information society.

III. Requirements to preparation of students completing this major field of study

Students completed MSc degree in Informatics have to possess following knowledge, skills and competences:
- ✓ to conduct independent research, to model real processes and make computer automation systems for information maintenance;
- ✓ to use mathematical models and software packages for solving real economic, engineering and management problems in continuous and discrete macrosystems;
- ✓ to take part in development of program products and packages;
- ✓ to adapt and introduce program products and systems;
- ✓ to solve various optimization problems.

IV. Professional development

The Masters graduates in this specialty can successfully work as: programmers, system and network administrators and designers, graphic designers, researchers, specialists in hardware and software technologies.

Qualification characterization of Major field of study "Informatics" for MSc degree is a basic document that determines rules for developing the curriculum. This qualification characterization is conformed with legislation in the area of higher education in Republic of Bulgaria.

STRUCTURE OF THE CURRICULUM
Field of Study: Informatics

First Year

First Semester	ECTS credits	Second Semester	ECTS credits
		Compulsory Courses	
Compulsory Courses	6.0	Operating systems	6.0
Computer mathematics 1	6.0	Databases	6.0
Introduction in programming	6.0	Probability and Statistics	6.0
Internet Programming	6.0	Optional 2 (Group II)	6.0
Network and System Administration	6.0	Optional 3 (Group II)	6.0
Optional 1 (Group I)		**Optional courses (Group II)**	
Optional courses (Group I)		(Choose 2 courses)	
(Choose 1 course)		Applied Mathematics (Numerical	
Mobile application development		Methods and Mathematical Optimization)	
Computer design		Computer mathematics 2	
Interactive multimedia technologies		Object-orientated programming	
		Coding Theory and Cryptography	
		Algorithms in graphs	
		Graphic design of printed and	
		promotional materials	
		Programming languages and	
		environments	
		Software Engineering	
	Total 30		Total 30

Second Year

First Semester	ECTS credits	Second Semester	ECTS credits
Compulsory Courses		**Compulsory Courses**	
Neural Networks	6.0	Deep learning	6.0
Component-Oriented Software Engineering	6.0	Information Systems with Client-Server	4.5
Applied statistics		Architecture	
Optional 4 (Group III)	6.0	Optional 6 (Group IV)	4.5
Optional 5 (Group III)	6.0	Written State Exam or Graduate Thesis	15.0
Optional courses (Group III)	6.0	Defense	
(Choose 2 courses)		**Optional courses (Group IV)**	
Training at IT Company (Institution)		(Choose 1 course)	
Web programming with Java		Server Administration	
Knowledge bases		Theory of Algorithms	
Theory, Algorithms and Technologies for		Data mining and big data	
Speech Recognition			
	Total 30		Total 30

Degree: Master of Science, Period of Study: 2 years (4 semesters)

TOTAL FOR 2 ACADEMIC YEARS: 120 CREDITS

Language of Instruction: English.

COMPUTER MATHEMATICS 1

Semester: 1 semester

Course Type: lectures and lab exercises

Hours per Week: 2 lecture hours and 2 lab hours per week/FS

ECTS Credits: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Ilinka Dimitrova, PhD

Course Status: Compulsory Course

Course Description: Computational Mathematics 1 (KM 1) is an up-to-date and useful scientific field - a set of theoretical, algorithmic and hardware programming tools designed to efficiently solve with the help of a computer mathematical problems with a high degree of visualization at each stage of the study of: sets and operations with them, elements of combinatorics, elements of analytical geometry - lines, planes, curves and surfaces of the second degree, elements of linear algebra – matrices, determinants, systems of linear equations, complex numbers and polynomials, functions of one variable. It aims to motivate and deepen students' knowledge of the possibilities of modern systems for computer mathematical calculations and visualization, as well as to build skills for independent modelling and solving applied mathematical problems using systems for mathematical calculations, providing speed, visibility and practical orientation of the course.

Course Objectives: Students should obtain knowledge and skills for computer solutions of mathematical problems using systems mathematical calculations.

Teaching Methods: lectures and lab exercises, discussions, practical work with mathematical computing systems WolframAlpha, Matlab, Mathematika, Maple, MathCad, Scilab, FreeMath, Maxima, Octave.

Requirements/Prerequisites: The assessment from current control is shaped by two control works developed using SCM, one course project and two home assignments. Students are admitted to the exam (written final test) minimum grade average / 3 / from current control. The final score takes into account the results of the current control (75%) and the score from the written exam (25%).

Registration for the Course: not necessary

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

Abbreviation:

FS: Fall Semester

SS: Spring Semester

INTRODUCTION IN PROGRAMMING

Semester: 1 semester

Type of Course: Lectures and tutorials in computer lab.

Hours per week: 2 hour lectures, and 2 hour tutorials in computer lab/FS

Credits Numbers: 6 credits

Department: Informatics

Lecturer: Prof. Daniela Tuparova, PhD

Course Status: core course.

Course description:

The course is first in area in programming for the students. The course includes topics related to syntax and semantics of programming languges, statements and operators in programming languages, arrays and functions. The course is based on the C++ programming language.

Objectives:

The student should obtain basic knowledge in area of programming and algorithms.

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

Pre - requirements: No

Assessment and Evaluation

Project- 50%

Final Test- 50%

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

Registration for the Course: No

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

References:

Core

1. Милен Петров, Увод в програмирането (C/C++), Университетско издателство СУ „Св. Климент Охридски", 2012

2. Азълов П., Ф. Златарова, C++ в примери, задачи и приложения, Просвета, 2011

3. Крушков Х., Програмиране на C++, 1 част - въведение в програмирането, 2012

4. Тодорова М., Програмиране на C++, 1 част, СИЕЛА, 2010

5. Тодорова М., и колектив, Сборник от задачи по програмиране на С++, Първа част, Увод в програмирането, Технологика ООД, 2008

6. Презентации и код на програмите dlearning.swu.bg

Additional

7. Скот Майерс, Ефективен С++, ИК „ЗестПрес", София 2003

8. Денис Колисниченко. С / С++ - практическо програмиране в примери, Асеневци, 2017

9. John Keyser, Introduction to C++: Programming Concepts and Applications, Series: The Great Courses, Publisher: The Teaching Company, Year: 2019-08

On-line resourses

URL http://dlearning.swu.bg

ARTIFICIAL INTELLIGENCE

Semester: I semester

Type of Course: Lectures and tutorials in a computer lab.

Credits Numbers: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Irena Atanasova, PhD

Course Status: A core course in the curriculum of major Informatics, MSc degree.

Course Description: The goals of Artificial Intelligence course are to present to students' theoretical background in artificial intelligence field through common terminology, approaches and formalisms; to present functional and logical paradigms and programming and to present widely known and practically used methods and algorithms which are proved their acceptance in practice. A main part of this course is the knowledge presentation and elaboration of data in both functional and logical programming languages. In this course, functional and logical programming languages constructions are discussed. Main approaches are illustrated with a rich set of decisions of practical problems in seminar exercises. Classical directions of the field of artificial intelligence are discussed: search in the state space, knowledge presentation and usage of knowledge, human computer interaction by using restricted natural language, planning of actions, computer learning and knowledge extraction, image recognition.

Course Goals: The main goals of the course are student should obtain knowledge and theoretical background about functional and logical programming and obtain practical skills in these two programming styles represented by Prolog and Scheme programming languages, respectively. Students will study classical notions and problems of artificial intelligence and some decisions and methods in artificial intelligence field.

Teaching Methods: The course uses classical forms of material presentation: lectures and seminars. The programming languages Prolog and Scheme will be used in practice for computer programming and problem decision descriptions.

Requirements/Prerequisites: Basic knowledge and experience in the following courses: Programming and Data Structures, Discrete Mathematics, Mathematical logic, etc.

Assessment: routine control 9usually 2 test-papers) and written final exam at the end of the semester.

Registration for the Course: by request at the end of the previous academic year

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

NETWORK AND SYSTEM ADMINISTRATION

Semester: 1 semester
Course Type: lectures and labs
Hours (weekly): 2 lecture and 2 labs per week / FS
ECTS Credits: 6 credits
Department: Informatics
Lecturer: Chief Assist. Prof. Ivo Damyanov, PhD
Course Status: Compulsory course from the Informatics Master Curriculum – 2 years.
Course Description:
In this course are discussed the basic actions and problems related to network and systems administration of Linux and Windows based systems. The course is aimed at providing the necessary skills needed to perform nearly all important administration activities required to manage a Linux and Windows network and systems configuration, the basic setup and management of the most commonly used Internet services.
Course Objectives: The course is aimed at introducing to students the common concepts in network and systems administration by discussing the basic activities regarding the administration of a Linux and Windows network configuration.
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
Registration for the Course: the course is compulsory
References:
1. Христов В. Киров Н.,"Основи на компютърните мрежи и интернет", ЮЗУ "Н.Рилски" – Благоевград, 2012
2. Боровска П., Компютърни системи. София, Сиела, 2010 г.
3. Боянов. К. и кол. Компютърни мрежи. Интернет, София, НБУ, 2003.
4. Олаф Кирх, Тери Доусън Linux Network Administrator's Guide, 2001
5. Алдениз Рашидов. Инсталиране и конфигуриране на Web сървъри под Linux и Windows (2012)
6. Генчо Стоицов, Компютърни мрежи и комуникации, ПУ, 2013 (http://kmk.fmi-plovdiv.org/LecturesKMK.pdf)
7. Делян Генков, Основи на компютърните мрежи, ТУ Габрово, 2014 (http://delian.genkovi.com/netbook/NetBookDGenkov.pdf)
8. Иван Цонев, Компютърни мрежи, ШУ, 2013 (http://shu.bg/tadmin/upload/storage/2202.pdf)
9. Александър Милев, Компютърни мрежи и комуникации, ШУ (http://info.fmi.shu-bg.net/skin/tfiles/milev_%D0%9A%D0%9C%D0%9A.pdf)
10. Александър Милев, Борислав Найденов, Администриране на мрежи, ШУ, 2010 (http://info.fmi.shu-bg.net/skin/pfiles/administration_book.pdf)
11. Боровска П., Компютърни системи. София, Сиела, 2010 г.
12. Боянов. К. и кол. Компютърни мрежи. Интернет, София, НБУ, 2003.
13. Гриша Спасов, Николай Каканаков, Митко Шопов, Ръководство за лабораторни упражнения по компютърни мрежи, ТУ София
14. Алдениз Рашидов. Инсталиране и конфигуриране на Web сървъри под Linux и Windows (2012)
15. Нина Синягина, Иван Мирчев, Иво Дамянов, Светослав Христов (2005) Защита на компютърната информация Университетско Издателство "Неофит Рилски", Благоевград, ISBN 954-680-345-6, COBISS.BG-ID – 1043270116
16. VirtualBox User Manual – безплатна книга - http://download.virtualbox.org/virtualbox/5.0.2/UserManual.pdf
17. Jordan Krause, Mastering Windows Server 2019, Packt Publishing, 2019

MOBILE APPLICATION DEVELOPMENT

Semester: 1 semester
Course Type: lectures and lab exercises
Hours per week: 2 lecture hours and 2 lab hours per week / FS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Associate Prof. Radoslava Kraleva, PhD
Course Status: Optional Course in Master of Science Curriculum of Informatics

Course Description: Over the past few years have seen a rapid development of the market share of mobile devices such as tablets, e-readers and smartphones. Application development gained new meaning as the keyboard and mouse are no longer the main means of managing computing devices. Therefore, appears the need to learn new technologies and programming to create applications with a brand-new ideology. This course is a practical introduction to developing applications for mobile devices. In seminars, students will learn about the different environments to develop mobile applications and acquire basic theoretical knowledge and skills. Details will be discussed and used development environment Microsoft Visual Studio with Xamarin.Forms. It allows students to develop their applications in laboratory work and individual coursework at the end of the course.

Course Objectives This course aims to provide students with knowledge and additional training in the theory and practice in the development of applications for mobile devices. They will learn about some of the environments to develop of mobile applications and will gain more practical knowledge by Android application development with Xamarin.Forms.

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: 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:

Basic Titles:
1. Paul Johnson (2018) Using MVVM Light with your Xamarin Apps, Apress.
2. Paul F. Johnson (2015) Cross-platform UI Development with Xamarin.Forms, Packt Publishing.

3. Janathan Peppers (2014) Xamarin Cross-platform Application Development, Packt Publishing.
4. David Britch (2017) Enterprise Application Patterns using Xamarin.Forms, Microsoft Press.
5. Jim Bennett (2018) Xamarin in Action. Creating native cross-platform mobile apps, Manning Publications.
6. Russell Fustino (2018) Azure and Xamarin Forms: Cross Platform Mobile Development, Apress.
7. Charlez Petzold (2016) Creating Mobile Apps with Xamarin.Forms, Microsoft Press.
8. Matthew Leibowitz (2015) Xamarin Mobile Development for Android Cookbook, Packt Publishing.
9. Mark Reynolds (2014) Xamarin Essentials, Packt Publishing.
10. Dan Hermes (2015) Xamarin Mobile Application Development, Apress.
11. Can Bilgin (2016) Mastering Cross-Platform Development with Xamarin, Packt Publishing
12. Christopher Miller (2017) Cross-platform Localization for Native Mobile Apps with Xamarin, Apress.
13. William Smith (2014) Learning Xamarin Studio, Packt Publishing.
14. Mathieu Nayrolles (2015) Xamarin Studio for Android Programming: A C# Cookbook, Packt Publishing.
15. Jonathan Peppers (2014) Xamarin Cross-platform Application Development, Packt Publishing.
16. Michael Williams (2016) Xamarin Blueprints, Packt Publishing.
17. Cesar de la Torre, Simon Calvert (2016) Microsoft Platform and Tools for Mobile App Development, Microsoft Press.
18. Ayan Chatterjee (2017) Building Apps for the Universal Windows Platform, Apress.
19. Benjamin Perkins, Jacob Vibe Hammer, Jon D. Reid (2016) Beginning Visual C#® 2015 Programming, John Wiley & Sons, Inc.
20. Maximiliano Firtman (2013) Programming the Mobile Web, Second Edition, O'Reilly.
21. Gail Rahn Frederick, Rajesh Lal (2009) Beginning Smartphone Web Development, Apress.
22. Gerald Versulius (2017) Xamarin Continuous Integration and Delivery, Apress.
23. Adam Nathan (2016) Universal Windows® Apps with XAML and C#, SAMS
24. Xamarin.Forms Notes for Professionals; https://books.goalkicker.com/XamarinFormsBook/

Additional Titles:
1. Free ebook: Creating Mobile Apps with Xamarin.Forms; https://blogs.msdn.microsoft.com/microsoft_press/2016/03/31/free-ebook-creating-mobile-apps-with-xamarin-forms/
2. Xamarin.Forms; https://docs.microsoft.com/en-us/xamarin/xamarin-forms/
3. Xamarin; https://docs.microsoft.com/en-us/xamarin
4. Microsoft Visual Studio; https://visualstudio.microsoft.com/

Abbreviation:
FS: Fall Semester

COMPUTER DESIGN

Semester: I semester
Course type: lectures and lab exercises
Hours per week: 1 lecture hour and 3 lab hours per week / FS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Associate Prof. Radoslava Kraleva, PhD
Course Status: Optional Course in Master of Science Curriculum of Informatics

Course Description: The course aims to introduce students to the theoretical foundations of graphic design and its importance to information technology. Software for creating and editing raster and vector images are used to illustrate the studied theory. The knowledge that students will gain will help them create and edit various graphic objects, create graphic galleries, know the rules for good design, and can select appropriate colours and fonts. It is a continuation of the courses in Graphic Design of Printed and Promotional Materials, Mathematical Foundations of Computer Graphics, and Mobile Applications Development.

Course Objectives This course aims to provide students with knowledge and additional training in the theory and practice of graphic design. They will learn about the methods of digital image processing, how to create vector and raster graphics and animation.

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

Requirements: Needed basic knowledge of information technology.

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. M. Monteiro (2012) "Design is a job", A Book Apart
2. P. Whitt (2016) "Pro Photo Colorizing with GIMP", Apress.
3. J. M. Ferreyra (2011) "GIMP 2.6 Cookbook", Packt Publishing.
4. T. Bah (2017) Inkscape: Guide to a Vector Drawing Program, 5th Edition; http://tavmjong.free.fr/INKSCAPE/MANUAL/html/.
5. B. Hiitola (2016) "Inkscape 0.48 Starter", Packt Publishing.
6. M. Jurkovic R. Di Scala (2011) "Inkscape 0.48 Illustrator's Cookbook", Packt Publishing.
7. W. Jackson (2015) "Digital Illustration Fundamentals", Apress.
8. L. Mathis (2016) "Designed for Use", 2nd Edition, Pragmatic Programmers.
9. J. Shariat, and C. S. Saucier (2017) "Tragic Design", O'Reilly Media.

10. D. Walsh (2015) "2D Game Art", AtomicVertex.com.
11. J. DiMarco (2010) "Digital Design for Print and Web", Wiley.
12. N. Iliinky, J. Steele (2011) "Designing Data Visualizations", O'Reilly Media.
13. J. Jatz (2012) "Designing Information. Human factors and common sense in information design", Wiley.
14. P. Shirley, S. Marschner (2009) "Fundamentals of Computer Graphics", CRC Press.
15. К. Уилкинсън (редактор) (2014) „Знаци и символи. Илюстрован справочник за техния произход и значение", Книгомания.
16. Ст. Малешков, В. Георгиев (2014) „Компютърна графика и фотореалистична визуализация", Нов български университет.
17. В. Гличка (2016) Основи на векторната графика, Алекс Софт.
18. J. M. Blain (2016). The Complete Guide to Blender Graphics: Computer Modeling & Animation. AK Peters/CRC Press.
19. L. Flavell (2011). Beginning Blender: Open Source 3D Modeling, Animation, and Game Design. Apress.

Abbreviation:
FS: Fall Semester

INTERACTIVE MULTIMEDIA TECHNOLOGIES

Semester: 1 semester

Type of Course: Lectures and tutorials in computer lab.

Hours per week: 2 lecture hour and 2 tutorial hours in computer lab/autumn semester.

Credits Number: 6 credits

Department: Informatics

Lecturer: Prof. Daniela Tuparova, PhD

Course Status: elective course in curriculum of major Informaticd, Master degree.

Course description:

The course is proposed for students from specialties "Informatics" and "Mathematics and informatics"". The main aim of the course is students to master basic methods and technics for design, development and integration of different multimedia objects.

The course topics cover basic concepts of interactive multimedia, characteristics of authoring tools for development of interactive multimedia content. Also basic technologies for development of interatctive mobile applications and virtual reality are considered. The practical implementation is related to design and development of serious games.

Objectives:
- Students have to be able to:
- Create, edit, and integrate different multimedia objects;
- Develop multimedia content;
- Design and develop interactie educational games

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

Pre - requirements: No

Assessment and Evaluation

Formative assessment - 50%

Final Practical assessment- 50%

The course is successful completed with at least 51 % of all scores. In case of minimum grade 4.50 for formative assessment, students can escape the final practical assessment.

Registration for the Course: The students apply in Department of Informatics

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

References:
1. Иванов И. Интерактивни презентации, Изд. "Обучение", София, 2010
2. Иванов И. С. Николов, Цифрови видеопродукции, Изд. "Обучение", София, 2012
3. Марков А., М. Тодорова, М. Петров, Мултимедийни технологии, Фабер, Велико Търново, 2006
4. Тодорова М, Хр. Монева, " Мултимедийни технологии", УИ „Св. св. Кирил и Методий", Велико Търново, 2006 год. ,
5. Adobe Flash Professional CS6. Официален курс на Adobe Systems
6. Audacity Manual, http://manual.audacityteam.org/o/

7. Captivate 8 Maual, helpx.adobe.com/pdf/captivate_reference.pdf
8. Technical Support VideoPad Video Editor, http://www.nchsoftware.com/videopad/support.html
9. Минковска Д., МУЛТИМЕДИЯ И ВИРТУАЛНА РЕАЛНОСТ – ПРЕДИЗВИКАТЕЛСТВО ЗА НОВИТЕ ИНЖЕНЕРНИ ТЕХНОЛОГИИ http://www.tu-sofia.bg/faculties/mf/adp/nntk_files/konf-12/Materials/NAPRAVLENIE-8/10-8-D.Minkovska.pdf
10. Interactive Multimedia, Edited by Ioannis Deliyannis, ISBN 978-953-51-0224-3, 312 pages, Publisher: InTech, 2012, URL: http://www.intechopen.com/books/interactive-multimedia
11. Inteactive Multimedia, Multimedia Production and Digital Storytelling, ED. by Dragan Cvetkovic, Published: September 25th 2019, DOI: 10.5772/intechopen.77566, ISBN: 978-1-78923-912-6, Print ISBN: 978-1-78923-911-9, eBook (PDF) ISBN: 978-1-78984-980-6,: https://www.intechopen.com/books/interactive-multimedia-multimedia-production-and-digital-storytelling

OPERATING SYSTEMS

Semester: II semester

Type of Course: lectures and exercises in computer lab

Hours per week: 2 hours lecture and 2 hours exsersices in computer lab / SS

Credits Number: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Radoslav Mavrevski, PhD

Course Status: Compulsory course.

Course description:
The course is introduction in area of operation systems. Basic knowledge and skills in Linux and Microsoft Windows are covered. C programs and Bash scripts are also made for process management and file system operation. The topics of input and output organization, disk planning, file system organization a required part of any operating systems course.

Objectives:
The student should obtain knowledge of:
- Basic principles of operation systems.
- Basic administration skills in area of operation systems.

Methods of teaching: lectures, tutorials, discussions.

Pre- requirements: Computer architectures, Database systems

Assessment and Evaluation
Pre-exam test – 50%
Final Test - 50%

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

Registration for the Course: Compulsory course

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

References
1. Лилян Николов, Операционни системи, ИК "Сиела", София, 2009.
2. Thomas Anderson, Michael Dahlin, Operating Systems: Principles and Practice, Volume 4, Amazon Media EU, United States, 2015.
3. Operating Systems: Three Easy Pieces. Remzi H. Arpaci-Dusseau, Andrea C. Arpaci-Dusseau., CreateSpace Independent Publishing Platform, USA, 2020.

Abbreviation:
SS: Spring Semester

DATABASES

Semester: II semester

Course Type: lectures and exercises

Classes (weekly): 2 lectures and 2 exercises in computer lab / SS

ECTS Credits: 6.0 credits

Department: Informatics

Lecturer: Assoc. Prof. Velin Kralev, PhD

Course Status: Compulsory course from the Curriculum.

Short Description:
In the proposed curriculum, basic questions from the theory of "Databases" are considered, such as: conceptual model of databases - it includes the main tasks that solve the problems posed by the contracting authority; logical model of the database - includes the logical connections between the various data that are the basis of the developed database; physical model of the databases - represents their physical implementation (location, connections and information management).

Teaching Methods: lecture, discussion, exercises.

Requirements/Prerequisites: Knowledge in Mathematics and Programming.

Exam:
- Current control - 60% of the assessment
- Written exam - 40% of the grade

Registration for the course: Compulsory course

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

References:

1) Basic
1. Записки от лекции.
2. Павел Азълов. Бази от данни. Релационен и обектен подход, техника, 1991 г.
3. Юлиана Пенева, Бази от данни. I част. София, ИК "Регалия " 6, 2003 г.
4. Ullman, J., Widom, J., DATABASE SYSTEMS The Complete Book (2rd ed), Upper Saddle River, 2009, New Jersey.
5. S. K. Singh. Sing Database Systems: Concepts, Design and Applications, 2009, Pearson India.
6. Rex Hogan. (2018) A Practical Guide to Database Design, CRC Press, USA.

2) Additional
1. Shepherd J.C. Database management: Theory and Application. Irwin Inc.,USA 1990.
2. Мейер Д.р Теория реляционных баз данных. Издательство "Мир". 1987.
3. Vidya Vrat Agarwal, Beginning C Sharp 5.0 Databases, 2012 New York Press.
4. Alapati and Bill Padfield, Expert Indexing in Oracle Database, 2011, New York Press.
5. Henry H. Liu, Oracle Database Performance and Scalability A Quantitative Approach, 2011 A Jon Wiley and Son, US.

Abbreviation:
SS: Spring Semester

PROBABILITY AND STATISTICS

Semester: II semester

Type of Course: lectures and tutorials in computer lab

Hours per week: 2 lecture hours and 2 tutorial hours in computer lab/SS

Credits Number: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. E. Karashtranova, PhD

Course Status: obligatory course in curriculum of major Informatics, Master degree.

Course description:
The course is designed as a basic course in probability and statistics.
The aim of the course is to acquaint the students with some basic ideas and methods of probability theory, with a view to their use in the modeling of processes and phenomena in the field of natural science and computer analysis, as well as in the elementary modeling of social processes and phenomena in society and life. With the help of the present course, students will acquire knowledge of stochastics useful for their academic work, as well as for their future experimental or scientific work;
The course includes laboratory exercises with the aim of visualizing the learning process and acquiring practical skills for working with MS-Excel extensions, as well as with application packages.

Objectives:
The students should obtain knowledge and understanding that the intercourse character needs to discover the connection Mathematics- Informatics- Physics- Economics and much more other sciences.

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

Pre- requirements: It is helpful the students have some knowledge in Analysis and Information Technology

Assessment and Evaluation
Two tests during the semester, the results of which are part of the final grade

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

Registration for the Course: obligatory course

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

VI. Literature

1. Ангелова Й., В. Радева, Вероятности основни понятия, елементарна теория, вероятностни разпределения, УИ „Епископ Констатин Преславски", Шумен 2020

2. Велева Е., П. Йорданова, Статистическо моделиране на вероятностни разпределения с Excel, УИ „Епископ Констатин Преславски", Шумен 2017

3. Божкова М., Н. Янев, Разклоняващи се стохастични процеси, УИ "Св. Климент Охридски", 2018

4. Димитров Б. Зависими случайни събития. Измерения на зависимостта., сп. Проблеми на образованието по стохастика, бр.1, 2015

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

6. Димитров, Б., Янев, Н., Вероятности и статистика, 2007, издателство Софтех

7. Калинов К.,Статистически методи в поведенческите и социалните науки, НБУ, 2013

8. П. Копанов, В. Нончева, С. Христова, Вероятности и статистика, ръководство за решаване на задачи,Университетско издателство „Паисий Хилендарски", 2012

9. Пол Глендининг, Математиката накратко: Ясни дефиниции на 200 ключови термина, 2019

10. http://www.teststat.hit.bg

11. http://www.math.uah.edu/stat/- Kyle Siegrist, Jason York

APPLIED MATHEMATICS (NUMERICAL METHODS AND MATHEMATICAL OPTIMIZATION)

Semester: 2

Course Type: lectures and seminars

Hours per Week: 2 lecture hours and 2 seminar hours per week/SS

ECTS Credits: 6.0 credits

Department: Informatics

Lecturer: Prof. Stefan Stefanov, PhD

Course Status: Optional Course in the Informatics M.S. Curriculum, period of study 4 semesters

Course Description: The course in Numerical Analysis and Mathematical Optimization includes basic results and methods in the area of Numerical Analysis and Mathematical Programming: part Numerical Analysis: basic methods for approximating functions – interpolation (Lagrange interpolating formula, interpolation error, divided differences, Newton from of interpolating polynomial) and least squares data fitting; numerical differentiation and numerical integration (Newton-Cotes quadrature formulas: midpoint rule and rectangular rule, trapezoidal rule, Simpson's rule); basic methods for numerical solution of nonlinear equations (false position method, secant method, Newton-Raphson method); numerical methods for solving systems of linear equations (Gauss and Gauss-Jordan methods, method of LU decomposition, etc.); part Mathematical Optimization: theory and methods of Linear Programming (general and canonical form of the linear programming problem, graphical solution of two-dimensional linear programs, simplex method, the big M method, duality in linear programming); linear transportation problem (finding starting solution, method of potentials); matrix games (minimax theorem of John von Neumann, graphical solution of games *2* x *2, 2* x *m, m* x *2*, relationship between matrix games and linear programming).

Course Objectives: Students should obtain knowledge about basic numerical methods and basic results and methods of linear programming.

Teaching Methods: lectures

Requirements/Prerequisites: Mathematical Analysis, Linear Algebra, Analytic Geometry

Assessment: written final exam

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

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

References:

Basic Titles:

1. Bl. Sendov, V. Popov – "Numerical Analysis", Part I, Kliment Ohridski Sofia University Press, Sofia, 1996; Part II, Nauka and Izkustvo Publishing House, Sofia, 1978 (in Bulgarian).

2. B. Boyanov – "Lectures on Numerical Analysis", Darba Publishing House, Sofia, 1995 (in Bulgarian).

3. "Numerical Analysis Problem Book", 2-nd ed., Kliment Ohridski Sofia University Press, Sofia, 1994 (in Bulgarian).

4. M. Kaschiev – "Numerical Analysis Handbook", Martilen Publishing House, Sofia, 1994 (in Bulgarian).

5. V. Pasheva – "Introduction to Numerical Analysis", Technical University, Sofia, 2009 (in Bulgarian).

6. S.M. Stefanov – "Quantitative Methods of Management", Heron Press, 2003 (in Bulgarian). Additional Titles:

7. R. L. Burden, J. D. Faires – "Numerical Analysis", 9-th ed., Cengage Learning, Stamford, CT, USA, 2011.

8. J. D. Faires, R. L. Burden – "Numerical Methods", 4-th ed., Brooks/Cole Publishing Company, Pacific Grove, CA, USA, 2013.

9. S.M. Stefanov – "Numerical Analysis", MS4004-2203, Limerick, 1998.

10. Hamdy A. Taha – "Operations Research: An Introduction", Prentice Hall, 10-th ed., 2017.

Abbreviation:
FS: Fall Semester
SS: Spring Semester

COMPUTER MATHEMATICS 2

Semester: 2 semester

Course Type: lectures and lab exercises

Hours per Week: 2 lecture hours and 2 lab hours per week/SS

ECTS Credits: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Vasil Grozdanov, DSc

Course Status: Optional Course

Course Description: Computerer mathematics 2 (CM 2) is a topical and useful scientific field - a set of theoretical, algorithmic and hardware programming tools designed to effectively solve with the help of a computer mathematical problems with a high degree of visualization at any stage of the study of integral and differential calculus, elements of higher algebra, number theory, analysis of algorithms. It aims to motivate and deepen students' knowledge of the possibilities of modern systems for computer mathematical calculations and visualization, as well as to build skills for independent modelling and solving applied mathematical problems using WolframAlpha and open source mathematical computing systems, providing speed, visibility and practical orientation of the course.

Course Objectives: Students should obtain knowledge and skills for computer solutions of mathematical problems using systems mathematical calculations.

Teaching Methods: lectures, discussions, independent work, practical work with mathematical computing systems WolframAlpha, Matlab, Mathematika, Maple, MathCad, Scilab, FreeMath, Maxima, Octave.

Requirements/Prerequisites: Students should obtain knowledge and skills of Computer Mathematics 1, Introduction in Information Systems and Technologies, Fundamentals of Programming, Web Systems and Technologies

Assessment: The assessment from current control is shaped by two control works developed using SCM, one course project and two home assignments. Students are admitted to the exam (written final test) minimum grade average / 3 / from current control. The final assessment takes into account the results of the current control (75%) and the score from the written exam (25%).

Registration for the Course: not necessary

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

Abbreviation:
SS: Spring Semester

OBJECT-ORIENTATED PROGRAMMING

Semester: 2 semester
Course Type: lectures, lab exercises
Hours per week: 2 lecture hours per week and 2 labs hour per week/SS
ECTS credits: 6 credits
Department: Informatics
Lecturer: Assoc. Prof. Radoslav Mavrevski, PhD
Course Status: Optional course from the Informatics Master Curriculum
Course Description:
In the course students are introduced with methods and means of Object-oriented programming The course is providing basic knowledge in development of algorithms, their programming using particular programming language and running and testing of the programs under certain operation system. The structure and the main operational principles of the computer systems are given. The means and accuracy of information presentation are also considered. Some of the key classes of algorithms and data structures are studied. The main techniques of the structural approach of programming and their application using C++ programming language are introduced. The aim of the course is to teach the students with the techniques in development of algorithms and programs using C++ programming language. The knowledge will be used in the general theoretical, technical and some special courses.

Course Objectives:
Basic objectives and tasks:
- The students give knowledge for algorithum thinking;
- to give knowledge for methods and skils in Object-oriented programming in integrated development environment for visual programming;
- 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

Teaching Methods: lectures, tutorials, group seminars or workshops, projects, and other methods.

Requirements/Prerequisites: The course is continued of the course "Introduction in programming".

Assessment: Evaluating the student shall be carried out on the sixth-grade scale. Current control is performed during the semester's laboratory sessions through two practical tests and one homework. The course ends with a written exam on the material according to the attached syllabus. When shown a weak exam score, the student appears on the makeup exam and retains the information received from the coursework assessment.

Registration for the Course: not necessary.

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

References:

1. Майерс, Скот, По-ефективен C++: 35 начина да подобрите своите програми и проекти. София: ЗеСТ Прес. ISBN 954-9341-03-8, 2004.
2. Meyers, S., Effective C++: 55 specific ways to improve your programs and designs, 3rd Edition. Addison-Wesley Professional. ISBN 978-0321334879, 2005.
3. Meyers, S., More effective C++: 35 new ways to improve your programs and designs. Addison-Wesley Professional. ISBN 978-0201633719, 1996.
4. Overland, Brian, C++ Without Fear: A Beginner's Guide That Makes You Feel Smart, 2nd Edition. Prentice Hall. ISBN 978-0132673266, 2011.
5. Stroustrup, Bjarne, Programming: Principles and Practice Using C++, 2nd Edition. Addison-Wesley. ISBN 978-0321992789, 2014.
6. Stroustrup, Bjarne, The C++ Programming Language, 4th Edition. Addison-Wesley. ISBN 978-0321563842, 2013.
7. Reese, Richard M, Understanding and Using C Pointers. Core Techniques for Memory Management. O'Reilly Media. ISBN 978-1-4493-4418-4, 2013.
1. Vandevoorde, David; Josuttis, Nicolai M., C++ Templates: The Complete Guide. Addison-Wesley. ISBN 0201734842, 2002.

CODING THEORY AND CRYPTOGRAPHY

Semester: 2 semester

Course Type: Lectures and exercises

Hours per week: 2 lecture hours and 2 hours exercises per week/SS

ECTS credits: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Yuri Borisov, PhD, and Miroslav Markov, PhD

Course Status: Optional course

Course Description: The course starts with introduction of the main notions of the Coding theory – error-correcting codes, Hamming distance, code parameters and equivalency of codes. Then the necessary algebraic background (finite fields and vector spaces over finite fields) is developed and encoding and decoding with linear codes (including syndrome decoding) are studied. In the cryptographic part the classical ciphers are considered and followed by the modern systems for secret and public keys.

Course Objectives Obtaining knowledge of the theoretical backgrounds and practical abilities for applications of the Coding theory and the cryptography. Development of abilities for work with (linear) codes over finite field with special emphasis of their algebraic and combinatorial properties.

Teaching Methods: lectures, discussions, practical exercises of the codes under consideration

Requirements: The students must have basic knowledge from the Number theory and algebra.

Assessment: permanent control during the semester (two written exams) and exam in the semester's end in two parts – problems solving and answering theoretical questions.

Registration for the Course: by application in the Educational Office in the end of the semester.

Registration for the Exam: up to agreement with the teacher and the Educational Office.

Abbreviation:
FS: Fall Semester
SS: Spring Semester

ALGORITHMS IN GRAPHS

Semester: 2 semester
Course Type: lectures and labs
Hours per week: 2 lecture hours and 2 laboratory hours per week / SS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Assoc. Prof. Velin Kralev, PhD, e-mail: velin_kralev@swu.bg
Course Status: Optional Course in Master of Science Curriculum of Informatics
Course Description:
In this course are considered some elements of the following main topics: introduction in graph theory (essential concepts and definitions. modeling with graphs and networks, data structures for networks and graphs; computational complexity; heuristics; tree algorithms (spanning tree algorithms. variations of the minimum spanning tree problem. branchings and arborescences); shortest-path algorithms (types of shortest-path problems and algorithms, shortest- paths from a single source, all shortest-path algorithms, the k- shortest-path algorithm, other shortest paths).
Course Aims: Students should obtain basic knowledge and skills for solving optimization problems for graphs and networks.
Teaching Methods: lectures, demonstrations, problem solving.
Requirements/Prerequisites: needed basic knowledge of programming, data structures, databases, and other.
Assessment: written final exam
Registration for the Course: not necessary
Registration for the Exam: coordinated with the lecturer and Student Service Department

References:
1. Nicos Christofides. Graph Theory an algorithmic approach. Academic Press, New York, London, San Francisco, 1975.
2. Wilson RJ. Introduction to graph theory, 5th ed. Prentice Hall, 2010.
3. James R. Evans, Edward Minieka. Optimization Algorithms for Networks and Graphs, 2nd Edition. New York, 1992.
4. Наков П, Добриков П. Програмиране = ++ Алгоритми. Пето издание, София, 2015.
5. Evans J., Minieka, E., Optimization Algorithms for Networks and Graphs, Second Edition, Inc., New York and Basel, 1992.
6. Erciyes K. Guide to Graph Algorithms: Sequential, Parallel and Distributed, Springer, 2018.
7. Goldengorin B. Optimization Problems in Graph Theory, In Honor of Gregory Z. Gutin's 60th Birthday Springer International Publishing AG, 2018.
8. Ronald Gould. Graph Theory (Dover Books on Mathematics. 2012. US Cafifornia.
9. Lih-Hsing Hsu , Cheng-Kuan Lin, Graph Theory and Interconnection Networks. 1420044818.

Abbreviation:
FS: Fall Semester
SS: Spring Semester

GRAPHIC DESIGN OF PRINTED AND PROMOTIONAL MATERIALS

Semester: 2 semester
Course Type: lecture and lab exercises
Hours per week/SS: 2 lecture hours and 2 lab hours per week / SS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Associate Prof. Radoslava Kraleva. PhD
Course Status: Optional Course in Master of Science Curriculum of Informatics

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. Rebecca Gagen, Kim Golombisky (2010) *White Space is Not Your Enemy: A Beginner's Guide to Communicating Visually through Graphic, Web and Multimedia Design*, Focal Press.
2. John McWade (2005) *Before & after graphics for Business*, Peachpit Press.
3. Roger C. Parker (2006) *Design to Sell: Use Microsoft® Publisher to Plan, Write and Design Great Marketing Pieces*, Microsoft Press.
4. Brian P. Lawler (2005) *Official Adobe Print Publishing Guide, Second Edition: The Essential Resource for Design, Production, and Prepress*, Adobe Press.

5. Elizabeth Eisner Reding (2013) *Microsoft Publisher 2013: Illustrated*, Cengage Learning Publishing

6. Joy L. Starks (2014) *Microsoft Publisher 2013: Complete*, Cengage Learning Publishing

7. Tamara Weinberg (2009) *The new community rules. Marketing on the social web*, O'Reilly Media

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

9. Wayne Collins, Alex Hass, Ken Jeffery, Alan Martin, Roberto Medeiros, Steve Tomljanovic (2018) *Graphic Design and Print Production Fundamentals*; https://openlibrary-repo.ecampusontario.ca/jspui/bitstream/123456789/252/1/Graphic-Design-and-Print-Production-Fundamentals-1447356112.pdf

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

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

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

Abbreviation:
SS: Spring Semester

PROGRAMMING LANGUAGES AND ENVIRONMENTS

Semester: 2 semester
Course Type: lectures and labs
Hours per week: 2 lecture hours and 2 labs hours per week / SS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Assoc. Prof. Velin Kralev, PhD, e-mail: velin_kralev@swu.bg
Course Status: Optional Course in Master of Science Curriculum of Informatics
Course Description: The course introduces students to some of the most commonly used modern languages for object-oriented programming, as well as the most commonly used modern environments for visual design and event-oriented programming. The aim of the course is to acquaint students with the basic principles of application development with modern programming languages and the principles of organization of the most popular development environments. The most important practical topics covered are related to basic software development tools, version control, basic language tools and libraries that are available and distributed with the relevant environments. The course looks at the capabilities of some of the modern programming languages, discussing approaches focused on object-oriented programming, including. inheritance and polymorphism, creation of event-oriented applications and other basic capabilities.
Course Aims: The aim of the course is to familiarize students with the principles of application development with modern programming languages and principles of the organization of the most popular development environments.
Teaching Methods: lectures, demonstrations, work on project and teamwork.
Requirements/Prerequisites: needed basic knowledge of programming, operating systems and computer architectures.
Assessment: written final exam
Registration for the Course: not necessary
Registration for the Exam: coordinated with the lecturer and Student Service Department
References:
1. C++Builder Developer's Guide (2020). Retrieved from: docwiki.embarcadero.com/RADStudio/Rio/en/C%2B%2BBuilder_Developer%27s_Guide.
2. Windows Developer's Guide (2020). Retrieved from: docwiki.embarcadero.com/RADStudio/Rio/en/Windows_Developer%27s_Guide_Index
3. Marc Gregoire, Van Weert Peter. C++17 Standard Library Quick Reference, 2nd Edition. A PocketGuide to Data Structures, Algorithms, and Functions. Apress, 2019.
4. Mike McGrath. C++ Programming in easy steps, 5th Edition. Easy Steps Limited, 2017.
5. Ray Lischner. Exploring C++. The Programmer's Introduction to C++. Apress, 2008.
6. Marc Gregoire, Peter Van Weert. C++ Standard Library Quick Reference. Apress, 2016.
7. Bjarne Stroustrup. The C++ Programming Language, 4th Edition. Pearson Education, Inc., 2013.
8. David M. Mount, Michael T. Goodrich, Roberto Tamassia. Data Structures and Algorithms in C++, 2nd Edition. John Wiley & Sons, Inc., 2011.
9. Component Writer's Guide (2020). Retrieved from: docwiki.embarcadero.com/RADStudio/Rio/en/Component_Writer%27s_Guide_Index.
Abbreviation:
SS: Spring Semester

SOFTWARE ENGINEERING

Semester: 2 semester
Course Type: lectures and lab exercises
Hours per week: 2 lectures and 2 lab hours per week / SS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Associate Prof. Radoslava Kraleva, PhD
Course Status: Optional Course in Master of Science Curriculum of Informatics

Course Description: Software engineering associate with the development of software using well-defined scientific principles, methods, and procedures. The outcome of software engineering is an efficient and reliable software product. The result of software engineering is an effective and reliable software product. The innovations observed today are the result of well-designed and quality developed software products. This course is a theoretical and practical introduction to the management of software engineering. During the lectures, the students will become acquainted with the necessary theoretical material, and during the laboratory sessions, they will apply the acquired knowledge in practical projects.

Course Objectives This course aims to provide students with knowledge of basic theoretical concepts and practical approaches related to software engineering.

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:
Basic Titles:

1. Capers Jones (2010) "Software Engineering Best Practices Lessons from Successful Projects in the Top Companies", McGraw-Hill Companies.
2. Rob Stephens (2015) "Beginning Software Engineering", Wrox.
3. John Dooley (2011) "Software Development and Professional Practice", Apress.
4. Henry H. Liu (2009) "Software Performance and Scalability. A Quantitative Approach", John Wiley & Sons, Inc.
5. Per Runeson, Martin Höst, Austen Rainer, Björn Regnell (2012) "Case Study Research in Software Engineering. Guidelines and Examples", John Wiley & Sons, Inc.

6. Stephen R. Schach (2011) "Object-Oriented and Classical Software Engineering", 8th Edition, McGraw-Hill Companies, Inc.
7. Coral Calero, Mario Piattini, Editors (2015) "Green in Software Engineering", Springer.
8. Sam Guckenheimer, Neno Loje (2012) "Agile Software Engineering with Visual Studio (Microsoft Windows Development Series)", 2nd Edition, Addison-Wesley
9. Caitlin Sadowski, Thomas Zimmermann, Editors (2019) "Rethinking Productivity in Software Engineering", Apress Open.
10. Josh Tyler (2015) "Building Great Software Engineering Teams", Apress.
11. Priyadarshi Tripathy, Kshirasagar Naik (2015) "Software evolution and maintenance: a practitioner's approach", John Wiley & Sons, Inc.
12. Olga Filipova, Rui Vilão (2018) "Software Development from A to Z: A Deep Dive into all the Roles Involved in the Creation of Software", Apress.
13. Douglas Bell (2005) "Software Engineering for Students: A Programming Approach", 4-th Edition, Addison-Wesley.
14. Simple Easy Learning (2018) "Software Engineering Tutorial: Absolute Beginners"; https://www.tutorialspoint.com/software_engineering/index.htm
15. Ronald J. Leach (2016) "Introduction to Software Engineering", 2nd Edition, CRC Press.
16. Susan Lincke (2015) "Security Planning: An Applied Approach", Springer.

Additional Titles:
1. António Miguel Rosado da Cruz, Sara Paiva Editors (2018) "Modern Software Engineering Methodologies for Mobile and Cloud Environments", IGI Global, USA.
2. Laurent Bossavit (2015) "The Leprechauns of Software Engineering", Leanpub.
3. David J. Parker (2016) "Mastering Data Visualization with Microsoft Visio Professional 2016", Packt Publishing Inc.
4. Gregg D. Richie (2017) "Microsoft Project 2016. Microsoft Official Academic Course", WILEY.
5. Leon Starr, Andrew Mangogna, Stephen Mellor (2017) "Models to Code: With No Mysterious Gaps", Apress.

Abbreviation:
SS: Spring Semester

NEURAL NETWORKS

Semester: III semester

Type of Course: lectures and exercises in computer lab

Hours per week: 2 hours lecture and 2 hours exsersices in computer lab / FS

Credits Number: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. Radoslav Mavrevski, PhD

Course Status: Compulsory 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.

Objectives:
The student should obtain knowledge of:
- Basic concepts in neural network theory.
- to design and train a neural network.

Methods of teaching: lectures, tutorials, discussions.

Pre- requirements: Programming, Database systems

Assessment and Evaluation
- Current control - 60% of the assessment
- Written exam - 40% of the grade

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

Registration for the Course: Compulsory course

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

References
1) Basic
1. Anthony L. Caterini, Dong Eui Chang. (2018) Deep Neural Networks in a Mathematical Framework, Springer, Switzerland.
2. V. Alluru B. Rao., C++ Neural Networks and Fuzzy Logic, London IDG Books Worldwide, Inc. 1998.
2) Additional
3. Patricia Melin, Modular Neural Networks and Type 2 Fuzzy Systems for Pattern Recognition, 2012, Springer.
4. R.B. Macy. Pattern recognition with Neural networks in C++, CRC Press, 1994.

Abbreviation:
FS: Fall Semester

COMPONENT-ORIENTED SOFTWARE ENGINEERING

Semester: 3 semester
Course Type: lectures, lab exercises
Hours per week: 2 lecture hours per week and 2 labs hours per week/FS
ECTS credits: 6.0 credits
Department: Informatics
Lecturer: Assoc. Prof. Velin Kralev, PhD, e-mail: velin_kralev@swu.bg
Course Status: Compulsory Course in Master of Science Curriculum of Informatics
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. (2021). 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.

Abbreviation:
FS: Fall Semester

APPLIED STATISTICS

Semester: III semester

Type of Course: lectures, tutorials in computer lab

Hours per week: 2 hours lectures and 2 hours tutorials in computer lab/FS

Credits Numbers: 6 credits

Department: Informatics

Lecturer: Assoc. Prof. E. Karashtranova, PhD

Course Status: Obligatory course in curriculum of major Informatics. Master degree.

Course description:
The course is introduction in nonparametric statistic and possibilities to apply IT in this area.

Objectives:
The students should obtain knowledge of:
- To apply the methods of nonparametric statistics in practice;

- To realize concrete applications with tools of IT.

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

Pre- requirements: Probability and Statistics, Information Technology

Assessment and Evaluation
Project- 70%
Final Test- 30%

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

Registration for the Course: obligatory

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

TRAINING AT IT COMPANY (INSTITUTION)

Semester: III semester

Hours per week: 1 seminar hour and 3 tutorial hours in computer lab/FS

ECTS Credits: 6 credits

Department: Informatics

Instructor: Psrt-time Assist. Prof. Ivan Zhdrapanski

Course Status: An elective course in the curriculum of major Informatics, 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, that 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 and Programming.

Assessment: report; journal of the conducted practical training;

Registration for the Course: not required (core course)

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

WEB PROGRAMMING WITH JAVA

Semester: III

Course Type: lectures and exercises

Hours (weekly): 2 lecture hours and 2 hours exercises / FS

ECTS Credits: 6.0

Department: Informatics

Lecturer: Assoc. Prof. Nadezhda Borisova, PhD

Course Status: Elective course

Course Description: The course "Web Programming with Java" is intended for students interested in Java programming and the development of web-oriented applications. Its goal is to familiarize students with the following technologies:

- Socket programming: Developing Java applications that communicate over the Internet/Intranet using TCP/IP protocols, such as Chat clients/servers, web servers, mail clients/servers, and more.
- Java applets: Creating small Java applications that can be embedded in web pages and executed by the client's web browser.
- Web applications: Developing web applications using technologies like Servlets and Java Server Pages (JSP), creating and deploying web applications according to Sun's J2EE standards, and working with the Tomcat server.

Teaching Methods: lecture, exercises, discussion.

Requirements/Prerequisites: For the material to be understood, it is necessary for students to have basic knowledge of internet organization, programming, Java, and HTML. Due to its extensive content, the topic will be divided into several modules.

Exam: Current assessment and written exam.
- Current assessment - 60% of the assessment
- Written exam - 40% of the grade

Registration for the course: Necessary
Registration for the exam: Coordinated with lecturer and Students Service Department
References:
  A. Primary:
  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/
  B. Additional:
  1. Step-by-step tutorial (http://www.java-tips.org/java-tutorials/tutorials/introduction-to-java-servlet).

Abbreviation: FS - Fall Semester

KNOWLEDGE BASES

Semester: 3

Type of Course: lectures and exercises

Hours per week: 2 lecture hours and 2 laboratory hours /FS

Credits Number: 6.0 credits

Course Status: Elective course in curriculum of major Informatics, Magister degree.

Course description: The course is introduction in main aspects of knowledge bases and application.

Objectives: The student should obtain knowledge of:

- Knowledge bases approach.
- Application of knowledge bases.

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

Pre- requirements: Functional and Logical programming, Artificial Intelligence, and Mathematical Logics (core courses)

Assessment and Evaluation Project- 50%, Final exam- 50%

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. Нишева, М., Д. Шишков, Изкуствен интелект, Изд. „Интеграл, Добрич, 1995
2. Ирена Атанасова, Създаване на експертни системи (Expert Systems Development), Издателство на ЮЗУ „Н. Рилски", онлайн издание, 2018
3. Knowledge-Based Systems. Rajendra Akerkar , Priti Sajja, 2009 , ISBN10: 0763776475.
4. Engineering of Knowledge-Based Systems. Avelino J. Gonzalez, Douglas D. Dankel, Prentice Hall (2000), ISBN-10: 0130189731.
5. Expert Systems: Principles and Programming, Fourth Edition.Joseph C. Giarratano, Gary D. Riley, 2004, ISBN-10: 0534384471.

THEORY, ALGORITHMS AND TECHNOLOGIES FOR SPEECH RECOGNITION

Semester: 3 semester
Course Type: lectures and exercises
Hours per week: 2 lecture hours per week and 2 lab hours per week / FS
ECTS credits: 6.0 credits
Department: Informatics
Lecturers: Assoc. Prof. Radoslava Kraleva, PhD

Course Status: Optional Course in Master of Science Curriculum of Informatics

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

DEEP LEARNING

Semester: IV

Course Type: lectures and exercises

Hours (weekly): 2 lecture hours and 2 hours exercises / SS

ECTS Credits: 6.0

Department: Informatics

Lecturer: Assoc. Prof. Irena Atanasova, PhD

Course Status: compulsory course

Short Description:

The discipline "Machine Learning" (ML) aims to give students fundamental knowledge in the field of theory and application of different types of machine learning in artificial intelligence systems. The discipline provides students with the necessary practical knowledge in order to create, validate, and test image recognition systems.

Teaching Methods: lecture, exercises, discussion.

Requirements/Prerequisites: Knowledge in Mathematics.

Exam:
- Current control - 60% of the assessment
- Written exam - 40% of the grade

Registration for the course: it is not necessary

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

References:

А.Основна:
1. Alpaydin, E. (2020). Introduction to machine learning. MIT press.
2. Marsland, S. (2015). Machine learning: an algorithmic perspective. CRC press.
3. Bishop, C. M. (2006). Pattern recognition and machine learning. Springer.
Б. Допълнителна:
1. Shukla, N. (2018). Machine learning with TensorFlow. Manning Publications Co..
2. Gulli, A., & Pal, S. (2017). Deep learning with Keras. Packt Publishing Ltd.
3. McClure, N. (2017). TensorFlow machine learning cookbook. Packt Publishing Ltd.

Abbreviation:
SS: Spring Semester

INFORMATION SYSTEMS WITH CLIENT-SERVER ARCHITECTURE

Semester: 4 semester
Course Type: lectures and lab exercises
Hours per week: 2 lecture hours per week and 1 lab hour per week/SS
ECTS credits: 4.5 credits
Department: Informatics
Lecturer: Assoc. Prof. Velin Kralev, PhD, e-mail: velin_kralev@swu.bg
Course Status: Compulsory Course in Master of Science Curriculum of Informatics
Course Description:
The course teaches methods for developing client-server and multi-layer databases applications through object-oriented integrated development environments (IDEs) for visual design and event-oriented programming. Various aspects of design databases applications using various objects: a datasets, tfield objects and data bound controls. Developed different applications to access data depending on their architecture: client-server and multi-layer (client-application server-server). Students learn different technologies for data access by: ADO, dbExpress, IBExpress, DataSnap, Cloud applications and others.

Course Objectives:
The course objective is to give students an idea of some of the main technologies used for developing client-server and multi-layer applications for databases and their methods of use.

After completion of the course students should be able to:
- use different technologies when developing client-server and multi-layer applications for databases with different architecture.

Teaching Methods: Lectures, demonstrations, work on project.

Requirements/Prerequisites: Needed basic knowledge of databases and object-oriented programming. Desirable knowledge of programming languages C + +, Object Pascal (Delphi) and C #.

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. Embarcadero Technologies. Developing Database Applications: Embarcadero Technologies. Retrieved from Embarcadero Technologies Web Site. 2021.

2. Marco Cantu. Mastering Delphi 7. Publisher Sybex. 2003.
3. Marco Cantu. Delphi 2010 Handbook: A Guide to the New Features of Delphi 2010. 2010.
4. Mario Szpuszta, Ingo Rammer. Advanced .NET Remoting. Publisher: Apress; 2nd ed. 2005.
5. Bob Swart. Delphi XE DataSnap Development Essentials. Bob Swart Training & Consultancy. 2011.
6. Cary Jensen Ph,D. Delphi in Depth: ClientDataSets, Publisher CreateSpace Independent Publishing Platform. 2011.
7. Andrew Troelsen. Pro C# 5.0 and the .Net 4.5 Framework, Apress. 2012.
8. Tim Patrick. Microsoft ADO.NET 4 Step by Step. Publisher: Microsoft Press. 2010.
9. Xavier Pacheco. Delphi for .NET Developer's Guide. Publisher: Sams Publishing. 2004.

Abbreviation:
SS: Spring Semester

SERVER ADMINISTRATION

Semester: 4
Course Type: lectures and labs
Hours per week: 2 lecture hours and 1 labs hour per week /SS
ECTS Credits: 4.5 credits
Course Status: Optional course in MSc Curriculum of Informatics
In this course are discussed the basic actions and problems related to network administration of Linux based systems. The course is aimed at providing the necessary skills needed to perform nearly all-important administration activities required to manage a Linux/Windows network configuration, the basic setup and management of the most commonly used Internet services.
Course Objectives: The course is aimed at introducing to students the common concepts in network administration by discussing the basic activities regarding the administration of a Linux/Windows network configuration.
Teaching Methods: Labs, 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
Registration for the Course: a request is made by students at the end of the previous semester
Registration for the Exam: coordinated with lecturer and Student Service Department
References:
1. Олаф Кирх, Тери Доусън, Ръководство на мрежовия администратор.
2. Мат Уелш, Матиас Далхаймер, Ръководство за LINUX.
3. Алдениз Рашидов. Инсталиране и конфигуриране на Web сървъри под Linux и Windows (2012)
4. Microsoft SQL ServerNotes for Professionals book
5. Ronald Bardford. Effective MySQL Backup and Recovery (2012)
6. Shijimol Ambi Karthikeyan (2018) Practical Microsoft Azure IaaS: Migrating and Building Scalable and Secure Cloud Solutions Paperback
7. Gabriel N. Schenker (2018) Learn Docker - Fundamentals of Docker 18.x: Everything you need to know about containerizing your applications and running them in production, PACKT Publishing
8. Greg D. Moore (2016) IT Disaster Response: Lessons Learned in the Field, APress
9. Lawrence E. Hughes. The Second Internet: Reinventing Computer Networking with IPv6 (2010)
10. Raphaël Hertzog, Roland Mas. The Debian Administrator's Handbook (2012)
11. Ron Aitchison. Pro DNS and BIND 10 (2011)
12. Ronald Bardford, Chris Schneider. Effective MySQL Replication Techniques in Depth (2013)

THEORY OF ALGORITHMS

Semester: IV

Course Type: lectures and exercises

Hours (weekly): 2 lecture hourss and 2 hours exercises / SS

ECTS Credits: 4.5

Department: Informatics

Lecturer: Assoc. Prof. Radoslav Mavrevski, PhD

Course Status: Elective Course

Short Description:

The course introduces students to the basic elements of algorithm theory and their complexity. Special attention is given to the question of analysis of algorithms concerning their various aspects. The considered algorithms for different classes of tasks allow students to take the next step: to construct (synthesize) new algorithms for specific tasks assigned to them.

Teaching Methods: lecture, exercises, discussion.

Requirements/Prerequisites: Knowledge in Mathematics.

Exam:
- Current control - 60% of the assessment
- Written exam - 40% of the grade

Registration for the course: by application in the Educational Office in the end of the semester

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

References:

1) Basic
1. Cormen, Thomas H.; Leiserson, Charles E., Rivest, Ronald L., Stein, Clifford (2009). Introduction to Algorithms (3rd ed.). MIT Press and McGraw-Hill.
2. Umut A. Acar, Guy E. Blelloch. (2018). Algorithms - Parallel and Sequential, www.parallel-algorithms-book.com.
3. П. Наков, П. Добриков. Програмиране = ++ Алгоритми. TopTeam Co, София, 1999
   2) Additional
4. Introduction to Algorithms http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/lecture-videos/ 2015 MIT
5. Design and Analysis of Computer Algorithms
   https://www.cs.umd.edu/~mount/451/Lects/451lects.pdf 2015.

Abbreviation:
SS: Spring Semester

DATA MINING AND BIG DATA

Semester: IV

Course Type: lectures and exercises

Classes (weekly): 2 lecture hours and 1 hour exercises / SS

ECTS Credits: 4.5

Department: Informatics

Lecturer: Assoc. Prof. Irena Atanasova, PhD

Course Status: optional course

Short Description:
The course is comprised of several modules, including business analysis, knowledge extraction, and extracting dependencies from various sources. In the instructional sessions, students learn to define meaningful business questions, select an appropriate method for data analysis and apply it, use open-source software for business analysis, interpret the results, and publish the findings in a scientific publication.

Teaching Methods: lecture, exercises, discussion.

Requirements/Prerequisites: Knowledge in Mathematics.

Exam:

- Current control - 60% of the assessment
- Written exam - 40% of the grade

Registration for the course: by application in the Educational Office in the end of the semester

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

References:

1. Jiawei Han and Micheline Kamber,Data Mining: Concepts and Techniques, Second Edition, 2006.
2. Jiawei Han, Jian Pei and Micheline Kamber, Data Mining: Concepts and Techniques, Third Edition, 2012.
3. DANIEL T. LAROSE , DISCOVERING KNOWLEDGE IN DATA An Introduction to Data Mining, John Wiley & Sons, Inc., Hoboken, New Jersey, 2005.
4. 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.
5. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, Second Edition, 2003.
6. Ruth Dilly, Data Mining - An Introduction. The Queen's University of Belfast - OHP Slide Material, Student Notes.
7. Kurt Thearling - "An Introduction to Data Mining".

Abbreviation:
SS: Spring Semester