Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Cloud infrastructure and services

Teacher:Radenković LJ. Božidar,Despotović-Zrakić S. Marijana,Krčo M. Srđan

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective

Aim of this subject is that introduce technical and organizational aspects of *cloud computing* to students through analysis of models, technical solutions, risks and security aspects of *cloud* technology. Besides services for virtualization resources, attention is especially paid on *cloud* services for collecting, searching and processing big data in e-business.

Learning outcomes

The students are capable for projecting *cloud* infrastructure and implementation of e-business applications using *cloud* services. Through practical exercises, students should become capable to use *open source* and commercial solutions for cloud computing. Using the technology students should design and implement e-business application in *cloud computing* environment.

Course structure and content

Theoretical instruction:

Introduction in cloud computing. Virtualization of resources. Standards in cloud computing. Projecting cloud infrastructure. Private, public and hybrid cloud. Infrastructure as a service. Platform as a service. Software as a service. Managing cloud infrastructure. Services for collecting, search, processing and using big data in e-business. Parallel and distributed search of data. Map reduce algorithm. Security in cloud environment. Risk management of e-business on cloud infrastructure. Development of e-business applications in cloud computing environment. Migration from traditional to cloud infrastructure. Examples of using cloud computing services in e-business. Examples of using cloud computing in a science and education.

Practical instruction:

Software for managing cloud infrastructure. OpenStack. Modeling data for non-relational database. Introduction with Apache Hadoop framework for managing big data. Apache Hadoop distributed file system (HDFS). Hadoop YARN tool for managing resources in cluster and managing execution of user's request. Creating MapReduce program using Apache Pig tool. Development e-business application using Amazon web services, Google App Engine and Windows Azure services.

Literature/Readings

1. E-resources, available at www.elab.rs.
2. Despotović-Zrakić M., Milutinović V., Belić A. (Eds), High performance and cloud computing in scientific research and education, monografija, IGI Global, 2014.
3. Furht B. Escalante A. (Eds) Handbook of Cloud Computing, monografija, Springer publishing company, 2010.

4. Dean J, Ghemawat S. MapReduce: Simplified Data Processing on Large Clusters, OSDI'04: Sixth Symposium on Operating System Design and Implementation, San Francisco, CA, December, 2004. http://research.google.com/archive/mapreduce.html
5. White T., Hadoop: The Definitive Guide, O'Reilly Media, 2009.
6. Buyya R, Broberg J., Goscinski A (Eds). Cloud computing Principles and Paradigms, Wiley 2011. 9780470887998

The *number of class hours* **per** *week*				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods

Lectures, exercises, case studies, lab exercises in classrooms with computers, project / seminar papers, distance education

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**40**	Test	**20**
		Final project	**40**

Study program / study programs:E-business and system management

Degree level: Graduate studies - master

Course:

Biometric Technologies

Teacher:Starčević B. Dušan,Simić B. Dejan,Minović V. Miroslav,Milovanović M. Miloš

Course status: elective

ECTS points: 6

Prerequisites: /

Course objective

This course introduces students to current state of the art technologies in the field of biometric systems and trains them to evaluate applications of current biometric methods.

Learning outcomes

Students will acquire necessary knowledge and skills in the area of biometric systems and their possible applications.

Course structure and content

Theoretical instruction:

P-01: Introduction to biometricsУвод у биометрију P-02: Comparing different biometric methods P-03: Fingerprint as a biometric modality P-04: Face recognition. P-05: Iris as a biometrics modality. P-06: Palmprint scanning technologies. P-07: Standardization, applications and privacy. P-08: Retina as biometric modality. P-09: Speech recognition. P-10: Other behavioristic modalities. P-11: Multimodal biometric systems P-12: Smart cards technologies. P-13: Smart cards applications. P-14: Evaluating biometrics systems performances. P-15: Biomertric systems - future development trends

Practical instruction:

Students attend labs in aforementioned lessons. Practical instruction is realized in Laboratory for multimedia communications. The work includes examining possibilities for practical application of biometric technologies in laboratory conditions. Practical application put emphasis on use of different types of biometric sensors. Student needs to finish labs and also to realize the given task in the field of biometrics applications.

Literature/Readings

1. D. Maltoni, D. Maio, A. K. Jain, S. Prabhakar, "Handbook o Fingerprint Recognition", Springer-Verlag London Limited, 2009.

2. A. K. Jain, P. Flynn, A. A. Ross, “Handbook of Biometrics”, Springer, New York, 2008.

3. J. N. Pato, and Lynette I. Millett, Editors, “Biometric Recognition Challenges and Opportunities”, The National Academy of Sciences, Washington, 2010;

4. Zeljko Obrenovic, Dusan Starcevic, Emil Jovanov, “Multimodal Presentation of Biomedical Data”, Chapter in Metin Akay (Ed.) Wiley Encyclopedia of Biomedical Engineering, Wiley, 2006.

5. Stan Z. Li, Editor, A. K. Jain, Editorial Advisor, "Encyclopedia of Biometrics", Springer, New York, 2009.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures, labs, practical work, consultations

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Practical work, tasks	20	Written exam	50
Project	30		

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Time series and fractals

Teacher:Petrović J. Bratislav,Filipović Ž. Vojislav

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective The aim of this course is to provide students with the necessary theoretical concepts and methods in analysis of time series and fractals. Students will be enabled to apply these methods in solving real world business problems with special focus to problems in financial engineering.

Learning outcomes The acquired knowledge of time series modeling will enable students to make predictive models and perform sensitivity analysis using analytical and simulation techniques.

Course structure and content

***Theoretical instruction**:*

Introduction to time series. Stationarity. Correlation and autocorrelation. White noise. Autoregressive (AR) model. Moving average (MA). ARMA and ARIMA models. Autoregressive conditional heteroskedastic (ARCH) models. GARCH model and its extensions. Nonlinear models and their applications. Analysis of multivariate time series. Monte Carlo method. Analysis of financial time series. Time-space decomposition, wavelets. Fractals and multifractals – deterministic, stochastic and fuzzy.

***Practical instruction**:*

Practical instructions closely follow the lectures. In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) J. D. Hamilton, Time Series Analysis, Princeton University Press, 1994.

2) G. S. Maddala, Introduction to Econometrics – third edition, Wiley, 2001.

3) G. E. P. Box, G. M. Jenkins, G. C. Reinsel, Time Series Analysis: Forecasting and Control – fourth edition, Wiley, 2008.

4) D. P. Kroese, T. Taimre, Z. I. Botev, Handbook of Monte Carlo Methods, Wiley, 2011.

The number of class hours per week				Other classes:
Lectures: 2	Labs: 2	Workshops:	Research study:	

Teaching methods

Lectures. In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab). Lectures by visiting experts. Case studies. Project assignments for individuals or small groups. Mentoring.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	Points	Final exam	Points
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Dynamical discrete event systems

Teacher:Petrović J. Bratislav

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective The aim of this course is to provide students with the necessary theoretical knowledge of the fundamental concepts, methods and techniques of discrete event system theory and their application.

Learning outcomes The acquired knowledge of the concepts of discrete event system theory will enable students to select tools and appropriately model and control networks, production systems, databases.

Course structure and content

Theoretical instruction:

The systems described by differential and difference equations. Riemann's sampling period. Lebesgue sampling period. Characteristic properties of Discrete Event Systems (DES). Abstraction of DES. Concepts of languages and automata. Operations on automata. Finite-state automata. Safety and blocking properties. Supervisory control. Controllability, observability, nonblocking and decentralized control. Petri nets. Comparison of Petri nets and automata. Analysis and control of Petri nets. State-based control of Petri nets. Applications of Petri nets.

Practical instruction (exercises):

Practical instructions closely follow the lectures. Project assignment.

Practical instruction (lab exercises):

In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) F. L. Baccelli, G. Cohen, G. J. Olsder, J.-P. Quadrat, Synchronization and Linearity: An Algebra for Discrete Event Systems, Wiley, 1993.

2) C. G. Cassandras, S. Lafortune, Introduction to Discrete Event systems, Springer, 2007.

3) J. E. Hopcroft, R . Motwani, J. D. Ullman, Introduction to Automata Theory, Languages and Computation – third edition, Prentice Hall, 2006.

4) B. J. Petrović, Introduction to discrete event systems, FON, 2002. (in Serbian)

5) W.M. Wonham, Notes on Control of Discrete-Event Systems, Department of Electrical and Computer Engineerings University of Toronto, 2002.

The *number of class hours* per *week*				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures. In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab). Project assignments for individuals or small groups.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: **Master studies**

Course:

E-banking

Teacher:Barać M. Dušan,Vasković R. Vojkan,Labus B. Aleksandra

Course status: **elective**

ECTS points: 6

Prerequisites: none

Course objective

The main aim of this course is to introduce students with possibilities of using a new information and communication technologies in financial institutions. Through this course, students acquire knowledge about the online banking development and automation of the transactions in banking.

Learning outcomes

Students are trained to apply modern technologies in banking business, as well as for the design and implementation of complex system of electronic banking.

Course structure and content

Theoretical instruction:

History of banking business, the beginnings of e-business, the reasons for the introduction of e-business in banks. Automated banking online business. Security mechanisms for the protection of electronic banking, SSL (Secure Socket Layer), PGP (Pretty Good Privacy), SET (Secure Electronic Transaction), VISA 3D secure, Biometric security systems,tokens, USB tokens. Electronic money, Electronic checks, Systems of paying in large, basic concepts about money transfer. Domestic payments. Payment cards, EMB standard, security card business, devices to work with the cards, virtual cards. B2B payment, general model of B2B payments, financial chain B2B business, basic characteristics of B2B business and processing electronic documents. Mobile banking, development of mobile services, technology of mobile business, why are the mobile services needed, banking services, brokers, investment banking. Stock exchange and the stock business on the Internet. The place and role of safety in e-business, History of insurance, risk sharing, ASP and place and role providers in business, critical places, typical coverage, risk analysis, transfer risk. Credit bureau. Interoperable payment systems. Trends in e-banking.

Practical instruction:

Projecting applications of e-banking. Implementation and integration of modules in-app payments of e-commerce. PayPal system. Working with banking software solutions, working with software for cryptography, work with smart cards, work with RF card, exercise of the stock exchange simulators.

Literature/Readings

1. E-resources, available at: www.elab.rs

2. V. Vasković, Payment systems in e-business, FON Beograd, 2007.

3. M. Nakajima, Payment System Technologies and Functions: Innovations and Developments, IGI Global 2011, ISBN: 978-1615206452.

4. M. Shah, S. Clarke E-banking Management: Issues, Solutions, and Strategies, IGI Global, 2009.

5. M. Balderas PayPal APIs: Up and Running: A Developer's Guide, O'Relly, 2011.

6. D. William, Pro PayPal E-Commerce, Apress, 2007.

7. BBVA Innovation Edge, Mobile Banking, Centro de Innovación BBVA, 2013.

8. I. Lee (ed.), Mobile Applications and Knowledge Advancements in E-business, IGI Global, 2013.

9. Ada Scupola, Developing Technologies in E-Services, Self-Services, and Mobile Communication: New Concepts, IGI Global 2011, ISBN-13: 978-1609606077

The number of class hours per week				**Other classes:**
Lectures:	**Labs:**	**Workshops:**	**Research study:**	
2	2			

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**30 points**	Seminar / Final project	**50 points**
		oral exam	**20 points**

Електронско образовање

Study program / study programs:E-business and system management

Degree level: **Master studies**

Course:

E-government

Teacher:Bogdanović M. Zorica,Vasković R. Vojkan,Labus B. Aleksandra

Course status: **elective**

ECTS points: 6

Prerequisites: none

Course objective

The aim of this course is to prepare students for the application of e-business technologies in public administration, as well as for the design and development of e-government services.

Learning outcomes

Students will learn the principles of functioning of electronic government, as well as the principles of design and implementation of e-business services in public administration.

Course structure and content

Theoretical instruction:

The concept of the information society. E-business models in public administration. Legislation and EU frameworks for the development of e-government services. Infrastructure and architecture of e-government. Types of e-government services. Stages of planning and implementation of e-government. Channels of communication, control and responses to customer requests. Obstacles and barriers in electronic government development. Privacy in e-government system. Identification documents. Technology, smart card. The use of biometric methods in recognition. PKI infrastructure, certification bodies, certificates, digital signature. RF technology. Digital democracy. Types of e-democracy. Political activity on the Internet. Voting via the Internet. Virtual diplomacy. Mobile Management. E-Health as a segment of e-government. Overview of the development of e-business services in public administration in the world and in Serbia.

Practical instruction:

Testing and analysis of existing software solutions in the field of e-government. Working with digital certificates and certification bodies. Working with the technologies of the digital signature and cryptographic methods. Working with RFID technology solutions. Testing and analysis of biometric identification. Using the e -Government portal of the Republic of Serbia. The development of e-government services.

Literature/Readings

1. E-resources, available at: www.elab.rs
2. Vasković, B., E-business in public administration script.
3. Mazinjanin, Đ., Methods of communication governments and citizens in e-business city government. 2008.
4. Mehdi Khosrow, Encyclopedia of E-Commerce, E-Government, and Mobile Commerce, Information Resources Management Association, USA, 2000.

5. Stiglitz Joseph E. Public Economics, edition 1. studied the Faculty of Economics, 2004
6. Caddy Joanne, Vintar Mirko, Building Better Quality Administration for the Public: Case Studies from Central and eastern Europe, Nispacee 2002.
7. T.Stojadinovic, V.Radonjic, B.Radenkovic, E-business in the Regulation of Medicines in Serbia, Drug Information Journal, Vol.44, No.2, pp.177-187, Mart 2010, ISSN 0092-8615.
8. Strategy for Information Society Development in the Republic of Serbia for the period since 2009. to 2013.
9. Strategy for Development of Information Society in the Republic of Serbia by 2020th year.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**40**	Test	**20 points**
		seminar/ final project	**40 points**

Study program / study programs:E-business and system management

Degree level: **Master studies**

Course:

E-business - selected chapters

Teacher:Despotović-Zrakić S. Marijana,Bogdanović M. Zorica,Barać M. Dušan,Labus B. Aleksandra,Vukmirović V. Dragan

Course status: **Compulsory**

ECTS points: 6

Prerequisites: none

Course objective

The aim of the course is to introduce students to the advanced concepts in the field of electronic business, in order to be enable to design and implement complex e-business systems.

Learning outcomes

Students are trained to design and implement complex e-business systems.

Course structure and content

Theoretical instruction:

E-business - state and perspectives. Virtual Organizations. Business models on the Internet. Revenue models. Electronic retailing. B2B electronic commerce. Interoperability in e-business. E-government . E-Health. E-education. E-recruitment. Applications of mobile services and technologies. Mobile commerce. Supply chain management. Customer relationship management. Business Intelligence. Project management in e-business. Risk management in the development and implementation of e-business systems. Managing e-business infrastructure. Semantic Web. Integration of information. Standards and quality management. The key performance indicators. Legal and ethical aspects of e-business. Trends in electronic business.

Practical instruction:

Making Internet business plan. Implementation of Internet business plan. Development of intranet and Internet portals. Integrating document management systems in the intranet portal. Integration services for communication and cooperation in the Intranet portal. Systems integration for project management of intranet portal. The development of electronic stores. Integration into the web portal. Development of CRM systems. The development of B2B e-business services.

Literature/Readings

1. E-resources, available at: www.elab.rs

2. Editors M. Ivkovic, B. Radenković, Internet and modern business, monographs, Technical Faculty "Mihajlo Pupin", Zrenjanin in 1998.

3. D.Chaffey, *E-Business and E-Commerce Management (4th Edition),* Prentice Hall, 2009.

4. K.C.Laudon, C.G.Traver,*E-commerce 2012. Business. Technology. Society*, Pearson, 2012.

5. J.L.Brewer, K.C.Dittman, *Methods of IT Project Management*, Pearson Prentice Hall 2010.

6. A.Afuah, C.L.Tucci, *Internet business models and strategies: text and cases*,McGraw-Hill, 2003.

7. P.Bocij, D.Chaffey, *A.Greasley, S.Hickie, Business information systems: technology, development and management for the e-business*, Financial Times : Prentice Hall, 2003.

8. H.M.Deitel, P.J.Deitel, K.Steinbuhler, E-business and e-commerce for managers, Upper Saddle River: Prentice-Hall 2001.

9. P.Harmon, M.Rosen, M.Guttman, *Developing E-business systems & architectures: a manager's guide*, San Francisko[etc.] : Morgan Kaufman. cop. 2001. - XXIV.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	40 points	Written exam	20 points
		Seminar - Final project	40 points

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Internet of things - selected chapters

Teacher:Krčo M. Srđan,Barać M. Dušan,Labus B. Aleksandra

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective

The aim of this course is to introduce technologies, hardware and software infrastructure for Internet of things to students, in order to enable design and implementation of such systems and services.

Learning outcomes

Students have mastered design and implementation of a system based on use of Internet of things. Students should be familiar with hardware, devices and open source and commercial software solutions in this field.

Course structure and content

Theoretical instruction:

Introduction to Internet of things. Internet technology in automatization of smart environments. Internet standards of intelligent devices. Wireless sensor networks. Smart cities. Smart homes. Smart classrooms and offices. Smart grids and green houses. Smart parking. Automatization of transport systems and traffic signals. Internet of intelligent devices in e-government. Internet of intelligent devices in e-health. Designing smart environments and systems. Platform for collecting, analyzing and distribution of data from intelligent devices. Risk management in the application of Internet of things. Examples of applications of the Internet of intelligent devices. Robotics in the automation of smart environment.

Practical instruction:

Hardware and software infrastructure for Internet of things. Using microcomputer Raspberry Pi in automatization of smart environment. Use of Arduino microcontroller in automatization of smart environment. Platform for collecting, analyzing and distribution of data from intelligent devices and sensors in smart environments. Xively - M2M PaaS cloud platform for automating the smart environment. Development of mobile and web applications for managing smart environment. Using API's M2M platform to deliver services in a smart environment. Use of robots in automation of smart environment .

Literature/Readings

1. E-resources, available at www.elab.rs

2. Despotović-Zrakić M., Milutinović V., Belić A. (Eds), High performance and cloud computing in scientific research and education, monografija, IGI Global, 2014, DOI: 10.4018/978-1-4666-5784-7, ISBN13: 9781466657847.

3. Greg Milette, Adam Stroud. „Professional Android Sensor Programming“, John Wiley & Sons, Inc., 2012.

4. Jean-Philippe Vasseur, Adam Dunkels. „Interconnecting Smart Objects with IP“, Elsevier, Inc. 2010.

5. Klaus Finkenzeller. „RFID HandbookFundamentals and Applications in Contactless Smart Cards, Radio Frequency Identification and Near-Field Communication (Third Edition)“, John Wiley & Sons, Inc. 2010.

6. Mike Riley. „Programming Your HomeAutomate with Arduino, Android, and your Computer“, ThePragmaticProgrammers, LLC. 2012.

7. David Boswarthich,Omar Elloumi,Olivier Hersent. „M2M CommunicationsA Systems Approach“, John Wiley & Sons,Ltd. 2012.

8. S. SitharamaIyengar, NandanParameshwaran,VirV. Phoha,N. Balakrishnan,ChukaD. Okoye. „Fundamentals of Sensor Network ProgrammingApplications and Technology“, John Wiley & Sons,Inc. 2011.

The ***number of class hours*** per ***week***				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods

Lectures, exercises, case studies, lab exercises in classrooms with computers, project / seminar papers, distance education

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	40	Written exam	20
		Project	40

Study program / study programs:E-business and system management

Degree level: Graduate studies - master

Course:

Human-Computer Interaction

Teacher:Starčević B. Dušan,Minović V. Miroslav,Milovanović M. Miloš

Course status: elective

ECTS points: 6

Prerequisites: /

Course objective

Training students to define user requirements in domain of human-computer interaction, perform analysis, project, implement and evaluate elements of user interface. All steps are done in accordance with well known and generally accepted development methodologies.

Learning outcomes

Students will acquire necessary knowledge in domain of human-computer interaction, learn to perform analysis, project, implement and evaluate elements of user interface.

Course structure and content

Theoretical instruction:

P-01: Human-computer interaction basics. P-02: Paradigms and principles. P-03: Development process. User models in development process. P-04: Defining user requirements. Social-Technical Models. P-05: Soft systems methodology. Participative development. P-06: Cognitive models. Linguistic models. P-07: Physical and device models. P-08: Assignement analysis. Digital notation and development. P-09: System models: Implementation support. P-10: Evaluation techniques. P-11: Areas of application. Groupware. CSCW. P-12: Multimodal communucation. Speech. Natural user interfaces. P-13: Handwriting recogniton. Computer vision. P-14: Comprehensive computing. Virtual reality. Hypertext. P-15: Multimedia. WWW. Animations. Digital Video. Computer supported learning .

Practical instruction:

V-01: Human-computer interaction basics. V-02: Devices for human-computer interaction. V-03: Principles of user interface. WIMP paradigm examples. V-04: User interface development methodology. V-05: Examples and assigments. V-06: Cognitive systems architecture. V-07: Help systems development. V-08: Decomposition examples (HTA). V-09: Knowledge based analysis example (TAKD). V-10: Analysis based on entity-relationship model (ATOM). V-11: Dialog development examples. V-12: Multimoda communication examples. V-13: Natural user interfaces examples. V-14: Virtual reality examples. V-15: Development of a WWW application with focus on user interface

Literature/Readings

Human-Computer Interaction, Third Edition, Dix, Finlay, Abowd, Beale, Prentice Hall, 2004

<table>
<tr><td colspan="5">Usability Engineering, Jakob Nielsen, Morgan Kaufmann, 1993

Designing the User Interface, Shneiderman, Plaisant, Addison Welsey, 2005</td></tr>
<tr><td colspan="4">The number of class hours per week</td><td>Other classes:</td></tr>
<tr><td>Lectures:

2</td><td>Labs:

2</td><td>Workshops:</td><td colspan="2">Research study:</td></tr>
<tr><td colspan="5">Teaching methods

Lectures, labs, practical work, consultations</td></tr>
<tr><td colspan="5">Evaluation/Grading (maximum 100 points)</td></tr>
<tr><td colspan="2">Pre-exam requirements</td><td>Points</td><td>Final exam</td><td>Points</td></tr>
<tr><td colspan="2">Project</td><td>60</td><td>Written exam</td><td>40</td></tr>
</table>

Study program / study programs:E-business and system management

Degree level: master

Course:

Internet economics

Teacher:Milićević K. Vesna

Course status: elective

ECTS points: 6

Prerequisites: none

Course objective

Acquisition of scientific and expert knowledge and skills related to current approaches, models, processes, and trends in the Internet economy, as well as managerial decision making in this context.

Learning outcomes

Competencies related to the complexity of doing business in the Internet economy. Gaining the ability to connect knowledge in the field of networking. Student competence in the practical application of knowledge related to various business concepts and models in terms of the Internet economy.

Course structure and content

Theoretical instruction:

Characteristics of the Internet economy. The impact of the Internet on business transformation. Traditional business enterprise in the Internet economy. New types of businesses on the Internet. Business networks and Internet infrastructure. Intellectual capital and its measurement. Transaction costs in the Internet economy. Economies of "increasing returns". Exchange of information on the Internet, extranet and intranet as a source of value creation. Business models on the Web. Virtualization of business and virtual value chain. Competitive strategies of companies in the Internet economy. The impact of the Internet on business performance. Internet economy, Europeanization and globalization of business. Scenarios for the future development of the Internet and its implications for the Internet economy.

Practical instruction:

Class exercises follow the content and structure of lectures and include: development of the economic aspects of e-business; application of information and communication technologies in the creation of competitive advantages in the Internet economy; development of strategic positioning on the Internet; application of methods to increase the efficiency of the new economy; case study analysis, creative workshops, exercises using the Internet.

Literature/Readings

Milićević V., Internet ekonomija, Fakultet organizacionih nauka, Beograd, 2002.

Chaffey D., E-Business and e-Commerce Management, Strategy, Implementation and Practice (selected

chapters), Prentice Hall, Financial Times, Harlow, 2011

Internet sources

The number of class hours per week				**Other classes:**
Lectures: 2	**Exercises:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures with the participation of students in interactive teaching, presentation of practical examples, case studies, exercises using the Internet, creative workshops, exercises to solve specific business problems in the Internet economy.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	10	Written exam	
Participation in labs		Oral exam	55
Seminar paper	35		

Study program / study programs:E-business and system management

Degree level: **Master studies**

Course:

Internet marketing and social media

Teacher:Bogdanović M. Zorica,Barać M. Dušan,Labus B. Aleksandra,Vukmirović V. Dragan,Janičić R. Radmila

Course status: **Compulsory**

ECTS points: **6**

Prerequisites: none

Course objective

The aim of this course is to familiarize students with Internet marketing, business models, performance on the Internet to learn the techniques of Internet marketing and social media tools in the development and implementation of Internet marketing plan.

Learning outcomes

Students are trained to design and implement the systems for e-business. In scope of the exercises students use open source and commercial software solutions for web presentation development. Using Internet technologies, Internet marketing techniques and social media tools, students implement complete project of the e-business system.

Course structure and content

Theoretical instruction:

Advanced concepts of Internet marketing. Models of business performance on the Internet - Case studies. Internet marketing plan - examples, case studies. Strategies , tactics and techniques of Internet marketing. Measurement and analysis of the performance of the Internet. The integration of the components of Internet marketing. SEO techniques. Services and applications for customer relationship management. Application of mobile technologies in marketing. Social media - state and perspectives. Social computing. Application of social networks in business. Business models , services , and analysis of social networks. Costs, revenues and social media optimization. The use of business analytics in Internet marketing. Internet and public relations. The use of virtual reality in Internet marketing. Application of the concept of fun activities in marketing. Current trends in Internet marketing and social media.

Practical instruction:

Internet marketing plan - examples, case studies. Internet marketing techniques. SEO techniques and optimization of websites in browser. Responsiveness of the web site. HTML5 and CSS3. CSS frameworks. A content management system WordPress. Development of plugins and themes for WordPress. Google services in Internet marketing. Customer Relationship Management - SugarCRM. Creating campaigns and appearances on social networks and media (Facebook, Twitter, Youtube, LinkedIn and others) and integration with WordPress. The development of services and applications of SMS marketing . Creating business applications using the Facebook and Twitter APIs. Creating games on social networks. Business intelligence concept in Internet marketing. Application of virtual reality in Internet marketing.

Literature/Readings

1. E-resources, available at: www.elab.rs

2. David Meerman Scott (2007). The New Rules of Marketing and PR. John Wiley & Sons.

3. Dave Chaffey (2006). Internet Marketing: Strategy, Implementation and Practice (3rdEdition). Prentice Hall.

4. Judy Strauss, Adel El-Ansary, Raymond Frost (2006). E-Marketing 4thEdition. Prentice Hall.

5. Judy Strauss, Raymond Frost (2009). E-Marketing 5thEdition. Prentice Hall.

6. Tracy L. Tuten and Michael R. Solomon (2013). Social Media Marketing. Pearson International edition.

7. Anthony J. Bradley and Mark P.McDonald (2011). The Social Organization: How to Use Social Media to Tap the Collective Genius of Your Customers and Employees. Harvard Business Press Books.

8. Christer Holloman (2012). The Social Media MBA: Your Competitive Edge in Social Media Strategy Development and Delivery. A John Wiley & Sons, Ltd.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**40 points**	Test	**20 points**
		Seminar – Final project	**40 points**

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Internet technologies and systems

Teacher:Radenković LJ. Božidar,Despotović-Zrakić S. Marijana,Barać M. Dušan,Krčo M. Srđan

Course status: Compulsory

ECTS points: 6

Prerequisites:

Course objective

The main objective of this course is to introduce the advanced capabilities of application of modern Internet technologies in the development of e-business.

Learning outcomes

Students are trained to apply advanced Internet technologies in the development of e-business applications.

Course structure and content

Theoretical instruction: Principles of application development in Internet environment. Modern software architecture for e-business. XML technologies. Internet technologies for information integration: data sources management, web services, replication, *federated* systems, data warehouse, queries, views. Mapping, tranformation and modeling information. Mashups. Application of semantic web for information integration: RDF, SPARQL, OWL2, ontology. Programming interfaces and data models for t integration of information. Advanced internet technology for integration of services and system components. Development of B2B e-business applications. Interoperability of e-business. Methods for protecting web applications. Virtualization. Basics of *cloud computing* technology. Management of digital identities in e-business. Aplications of *Social computing*. Technologies for data virtualization in web applications: ontologies, network graphs, tables, maps, frameworks for visualization, D3 library, database graph, animation. VOIP technologies.

Practical instruction: The use of JavaScript framework for development of web applications. HTML5, CSS3 frameworks for development. Advanced design techniques of web applications. JQuery. JqGrid. Advanced concepts of object-oriented programming in a web environment. MVC architecture and application development framework. Codeigniter. Larawell. Ruby on Rails. Development of B2B applications. Complex web services. Advanced methods of protecting web applications at all levels. Advanced methods of management of data layers. LDAP. Management of transactions, long transactions, and triggers of the web applications. Data visualization using the concepts of the Semantic Web. Installing application server. Web server administration. Development of VOIP application. Asterisk.

Literature/Readings

1. E-resources, available at www.elab.rs

2. Internet i savremeno poslovanje, monografija, editori M. Ivković, B. Radenković, Tehnički fakultet „Mihajlo Pupin“, Zrenjanin 1998.
3. Despotović-Zrakić M., Milutinović V., Belić A. (Eds), High performance and cloud computing in scientific research and education, monografija, IGI Global, 2014. (у штампи)
4. J.Miller, Internet technologies and information services, Libraries Unlimited, 2009, ISBN-13: 978-1591586258
5. Mario Freire Encyclopedia of Internet Technologies and Applications, Information Science Reference, 2008.
6. Al-S. Pathan, M.Pathan, H.Y. Lee (Eds). Advancements in Distributed Computing and Internet Technologies: Trends and Issues, IGI Global 2011, ISBN: 978-1613501108
7. T. Segaran, C.Evans, J.Taylor, Programming the Semantic Web, O'Reilly Media, 2009.
8. K.Breitman, M.Casanova, W.Truszkowski, Semantic Web: Concepts, Technologies and Applications: Concepts, Springer, 2007.
9. B. Porebski, K.Przystalski, L. Nowak, Building PHP Applications with Symfony, CakePHP, and Zend Framework, Wiley 2011. ISBN: 978-1-118-06792-5.
10. K. Arthur, Pro PHP: Patterns, Frameworks, Testing and More, Apress, 2008.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods

Lectures, exercises, case studies, lab exercises in classrooms with computers, project / seminar papers, distance education

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignements	40	Written exam	20
		Project	40

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Concurrent and distributed programming

Teacher:Radenković LJ. Božidar

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective

Main aim is to study advanced distributed computer systems and concurrent programming applications

Learning outcomes

Students are capable for using distributed computing systems and concurrent programming in development of e-business applications.

Course structure and content

Theoretical instruction:

Kernel multi program system, examples of concurrent programs. Advanced organizations of multiprocessors. distributed computing systems, components of distributed computing systems. Advanced soncepts of soncurrent programming in Java. Advanced concepts of concurent programming in C + +. Coordination and synchronization of processes in distributed computing systems. Distributed file systems of service-oriented architecture and distributed business logic. Current trends in distributed and concurent programming.

Practical instruction:

Examples of concurent programs in Java programming language. Examples of concurent programs in programming language C + +. Concepts of coordination and synchronization in C programming language, operating system UNIX, and Windows.

Literature/Readings

1. E-resources, available at www.elab.rs
2. Despotović-Zrakić M., Milutinović V., Belić A. (Eds), High performance and cloud computing in scientific research and education, monografija, IGI Global, 2014.
3. M. Ben-Ari , Principles of concurent and distributed programming, New York: Prentice-Hall 1991.
4. A. Puder, K. Römer, F. Pilhofe, *Distributed Systems Architecture: A Middleware Approach*, Elsevier 2006.
5. G. Coulouris, J.Dollimore, T. Kindberg, G.Blair, *Distributed Systems: Concepts and Design*, Pearson Education, 2011. ISBN:0133001377
6. Michael Philippsen, *A survey of concurrent object-oriented languages*, Concurrency: Practice and Experience, 12(10), 980, John Wiley & Sons, 2000.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods

Lectures, exercises, case studies, lab exercises in classrooms with computers, project / seminar papers, distance education

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	40	Written exam	20
		Seminar paper/ Project	40

Study program / study programs:E-business and system management

Degree level: Master academic studies

Course:

Electronic business management

Teacher:Marković M. Aleksandar

Course status: elective

ECTS points: 6

Prerequisites: none

Course objective

The primary objective of this course is to give an overview of the basic concepts in the management of electronic business (e-business) and electronic commerce (e-commerce). To discuss and analyze in detail the main activities and processes in the field of e-business and e-commerce, and to identify the key problems in them. To identify possible courses of action in business organizations whose operations are based on the use of the Internet. To define the decisions at different levels of management made in e-business organizations. The aim of the course is also to deepen the knowledge and skills necessary for managers and IT managers that will help them to manage their organizations on the path to e-business.

Learning outcomes

To get knowledge and deepen skills to successfully manage organizations in the field of e-business and e-commerce. Acquiring the ability to create an integrative view of management issues in electronic business. Overcoming the challenges and the problems in the management of e-business companies. Acquiring the necessary knowledge to start their own business in the field of electronic business/e-commerce.

Course structure and content

Theoretical instruction: Introduction to the management of e-business; Basic terms and concepts in the management of e-business; E-business versus traditional business; Impact of the Internet on the stages of the process control and management levels. Introduction to e-business and e-commerce. Management of e-commerce; Analysis and management of e-business infrastructure. Scanning and analysis of the environment of e-business. The development of e-business. Basic concepts of supply chain management in e-business. Management of e-procurement. Electronic marketing - basic concepts. Customer relationship management. Change management in the e-business organisations. Virtual organizations.

Practical instruction: Discussions with students. Consideing specific examples and case studies.

Literature/Readings

1. Chaffey, Dave, *E-Business and E-Commerce Management*, (Part I, II), IV edition, FT Prentice Hall, UK, 2009.
2. Deitel H., Deitel P., Steinbuhler K. ,*E-business and e-commerce for managers*, Prentice Hall, 2001.
3. Earle, Nick, *From .com to .profit:inventing business models that deliver value and profit*, 1st ed., San Francisco: Jossey-Bass, 2000.
4. Langer Arthur, *Applied ecommerce*, Wiley & Sons, 2002.
5. Marković, A., *E-business management - electonic materials*, http:// mep.fon.bg.ac.rs , .2013.

6. Turban, E., Lee, J., King, D. and Chung, H., *Electronic Commerce: A Managerial Perspective*. Prentice-Hall, Upper Saddle River, NJ. Chapter 1 introduces industry structures and models for e-commerce, 2000.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures, discussions, case studies, exercises, analysis and discussion of concrete examples from practice.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Colloquium	40		
Essay/project	20	Oral exam	40

Study program / study programs:E-business and system management

Degree level: Graduate studies (Master)

Course:

Security Methods in Electronic Business

Teacher:Simić B. Dejan

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective Introducing students to new security threats and risks, as well as methods of protection in e-business systems. Increasing awareness of the potential threats and attacks especially in a distributed environment.

Learning outcomes Students are prepared to analyze, identify threats and vulnerabilities, as well as to apply methods of protection in e-business systems.

Course structure and content

Theoretical instruction: L-01: The importance of data protection in e-business systems. Threats and vulnerabilities of e-business systems. L-02: Types of Attacks. Examples of attacks in e-business systems. L-03: Protection of distributed systems. Operating system protection. L-04: Topics in Cryptography. The Use of Cryptography in Protection of E-Business Systems. L-05: E-mail Server Security. L-06: Database Security. L-07: Web Application Security. L-08: Data Transfer Protection. L-09: Public Key Infrastructure (PKI). Key Management. L-10: Digital certificates (X509v3). Digital signature and qualified electronic signature. L-11: Wireless Security as Infrastructure in E-Business Systems. L-12: Biometric Identification Systems. L-13: International Standards in the Field of Information Security. Security Management in E-Business Systems. L-14: 10 Common Web Application Vulnerabilities. Examples of Protection at Application Level of ISO Model. L-15: The Use of Tools for Network Security (Wireshark, Metasploit, Nessus). Security Methods in Transaction Systems Based on ISO 8583 Standard.

Practical instruction: E-01: Examples of threats in e-business E-02: Examples of Attacks E-03: Examples of protection in distributed systems E-04: Examples of Applyied Cryptography E-05: Examples of E-mail Security E-06: Examples of Database Security E-07: Examples of Web Application Security E-08: Examples of the use of protocol SSL/TLS. E-09: Examples of PKI systems E-10: Examples of Digital Certificates E-11: Examples of Wireless Security E-12: Examples of Biometric Systems E-13: Examples of International Standards E-14: Examples of scanning Web applications E-15: Examples of tools for data protection.

Literature/Readings

1. Stallings W., *Network Security Essentials: Applications and Standards*, Pearson Education Limited, 2013.
2. A. Belapurkar, A. Chakrabarti, H. Ponnapalli, N. Varadarajan, S. Padmanabhuni, S. Sundarrajan, Distributed *Systems Security Issues, Processes and Solutions*, John Wiley & Sons Ltd., 2009.
3. Efraim Turban, Dave King, "Electronic Commerce 2012 – Managerial and Social Networks Perspectives", 7th edition, 2012.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods Lectures, Exercises, Practical Work, Consultation.				
Evaluation/Grading (maximum 100 points)				
Pre-exam requirements		**Points**	**Final exam**	**Points**
Participation in class		**30**	Written exam	**30**
Participation in labs		**40**		

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Modeling and control in organizational systems

Teacher:Petrović J. Bratislav

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective The aim of this course is to provide students with the necessary theoretical knowledge of the concepts, methods and techniques for modelling and control applied to organizational systems.

Learning outcomes The acquired knowledge of the concepts of organizational systems modelling and control will enable students to select tools and appropriately solve practical business problems using ICT.

Course structure and content

Theoretical instruction:

Organizational systems, Mathematical models, Flow charts, Structure, Inputs and outputs, Goal (Target) , Hierarchy. Measures of success, Technological influence on organizational structure and dynamics. Organization as a large and complex system – management and development. Organization systems modeling. Modeling and control in corporations. Social system models, global models, models of ecologycal system. Discrete event systems, (max,+) and (min,+) algebra. Petri nets. Timed Petri nets. Business process modeling, UML activity diagram. Business process control systems.

Practical instruction (lab exercises):

In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) Y. Takahara, M. Mesarović, Organization Structure – Cybernetic Systems Foundation, Springer, 2003.

2) B. J. Petrović, Uvod u dinamičke sisteme diskretnih događaja, FON, 2002.

3) M. Jackson, G. Twaddle, Business Process Implementation: Building Workflow Systems, Addison-Wesley, 1997.

4) A. Cassandras, P. Lafortune, Introduction to discrete event systems, Kluwer, 1999.

5) L. Fisher, Workflow Handbook, Future Strategies, 2002

The number of class hours per week	**Other classes:**

Lectures:	Labs:	Workshops:	Research study:	
2	2			

Teaching methods

Teaching methods include both traditional and e-learning methods. Lectures. Labs. Lectures by visiting experts. Mentoring. Project assignments for individuals or small groups.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	Points	Final exam	Points
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Modeling and control in finance

Teacher:Petrović J. Bratislav,Bogojević-Arsić T. Vesna

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective The aim of this course is to provide students with the necessary theoretical knowledge of the concepts, methods and techniques of systems modelling and control and their application in financial engineering.

Learning outcomes The acquired knowledge of the concepts of financial systems modelling and control will enable students to price financial instruments, to solve portfolio selection and optimization problems, to build forecasting models, and to build decision support and automated trading systems in finance.

Course structure and content

Theoretical instruction:

Quantitative finance – basic concepts. Time value of money, Net present value, Internal rate of return. Simple and compound interest methods, Discrete and continuous compounding. Corporate finance modeling – forecasting and valuation. Portfolio models, portfolio selection and optimization. Pricing models for financial instruments. Bonds, Bond duration, Bond immunization. Option pricing – Binomial model and Black-Scholes model. Option pricing – the Greeks. Interest rates, Estimating the yield curve. Interest rate models, Vasicek model, Cox–Ingersoll–Ross model, Hull-White model. Risk, Types of risks, Risk measures. Value-at-Risk (VaR), analytical method, historical method, Monte Carlo method. Automated trading, Mathematical trading models, High frequency trading.

Practical instruction (lab exercises):

In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) J. Cvitanić, Introduction to the economics and mathematics of financial markets, MIT Press, 2004.

2) S. Benninga, B. Czaczkes, Financial Modeling, MIT Press, 1997.

3) P. Bradimarte, Numerical Methods in Finance and Economics: A MATLAB-Based Introduction – second edition, Wiley-Blackwell, 2006.

4) V. Bogojević-Arsić, Upravljanje finansijskim rizikom, FON, 2009.

5) V. Bogojević-Arsić, Korporativne finansije, FON, 2006.				
The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	
Teaching methods Teaching methods include both traditional and e-learning methods. Lectures. Labs. Lectures by visiting experts. Mentoring. Project assignments for individuals or small groups.				

Evaluation/Grading (maximum 100 points)			
Pre-exam requirements	**Points**	**Final exam**	**Points**
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Neural networks and systems

Teacher:Radojević Dragan,Petrović J. Bratislav

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective

The aim of this course is to introduce students to the basic concepts and structure of neural networks and learning rules, as well as to explore their properties (using both the mathematical as well as the systems approach) in order to provide students with the ability to solve various problems in organizational systems.

Learning outcomes

The acquired knowledge will enable students to model and manage organizational systems using soft computing methods and information and communication technologies.

Course structure and content

Theoretical instruction:

Basic concepts and functioning of neural networks. Main types of neural networks. Advantages and application of domain neural networks. Learning rules. Setup and performance optimization. Existence of minimum and maximum. Newton method, method of steepest descent, conjugate gradient, mean square error. Single-layer and multi-layer, linear and non-linear network. Widrow-Hoff learning. Backpropagation algorithm. Specification of network architecture. Convergence and improving convergence speed, variable learning rate. Methods for the implementation and realization of neural networks. Levenberg-Marquardt algorithm. Associative learning. Unsupervised Hebbian learning. Networks of simple recognition. Kohonen learning rule. Competing networks. Hamming network. Grossberg network. Analysis of steady-state learning stability. Concepts of stability. Stability of recurrent networks.

Practical instruction:

Introduction to Matlab, Mathematica, SciLab and appropriate tool-boxes.

Literature/Readings

1) S. Haykin, Neural Networks: A Comprehensive Foundation, MacMillan Publishing, 1994.

2) M. T. Hagan, H. B. Demuth, M. Beale, Neural Network Design, PWS Publishing, 1999.

3) J. C. Principe, N. R. Euliano, W. Curt Lefebvre, Neural and Adaptive Systems: Fundamentals through Simulations, Wiley, 1999.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Teaching methods include both traditional and e-learning methods. Lectures. Labs. Lectures by visiting experts. Mentoring. Project assignments for individuals or small groups

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	30	Written exam	30
Participation in labs		Seminar	40

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Optimal control and game theory

Teacher:Petrović J. Bratislav,Gajić R. Zoran

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective The aim of this course is to provide students with the necessary theoretical knowledge of the fundamental concepts, methods and techniques of optimal control and game theory and their application for solving practical business problems.

Learning outcomes The acquired knowledge of the concepts of optimal control and game theory will enable students to select tools and appropriately model and control practical business problems using ICT.

Course structure and content

Theoretical instruction:

Optimal control, modelling and optimality criteria. Calculus of variations, the principle of optimality and the maximum principle. Numerical methods for solving optimal control. The basic elements of non-cooperative and simultaneous games (players, strategy, representation of games). Random selection strategy. Strategic dominance. Example: The prisoners' dilemma. The best response. Nash equilibrium and its implications. Simultaneous games with imperfect information. Bayesian equilibrium. The possibility of errors. Dynamic games (continuous and discrete time): Stackelberg, Nash and Pareto strategy.

Practical instruction (exercises):

Practical instructions closely follow the lectures. Project assignment.

Practical instruction (lab exercises):

In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) M. I. Zelikin, Control theory and optimization I: Homogeneous Spaces and the Riccati Equation in the Calculus of Variations, Springer, 2000.

2) A. Mas-Colell, M. D. Whinston, J. R. Green, Microeconomic Theory, Oxford University Press, 1995.

3) M. J. Osborne, A. Rubinstein, A Course in Game Theory, MIT Press, 1994.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures. In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab). Project assignments for individuals or small groups.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: Master graduate

Course:

Data mining

Teacher:Suknović M. Milija,Delibašić V. Boris

Course status: Optional

ECTS points: 6

Prerequisites: /

Course objective

Introduction to the important business problems for which data mining can be applied, and gaining skills for using selected data analysis tools.

Learning outcomes

Students have acquired skills to recognize cases where data mining can be used, and how to apply data mining tools for analsis.

Course structure and content

Theoretical instruction:

L-01: Introduction to data mining. L-02: Market basket analysis with case study. L-03: Credit scoring with case study. L-04: Churn prediction with case study. L-05: Electricity load prediction with case study. L-06: Market segmentation with case study. L-07: Gene expression clustering with case study. L-08: Student success prediction with case study. L-09: Collaborative filtering for recommendation systems with case study. L-10: Spam detection with case study. L-11: User comment analysis with case study. L-12: Attribute selection with medical application. L-13: Image analysis with case study. L-14: Anomaly detection in data. L-15: Preparation for the final exam.

Practical instruction:

E-01: Introduction to software tools. E-02: Market basket analysis using software. E-03: Credit scoring using software. E-04: Churn prediction using software. E-05: Electricity load prediction using software. E-06: Market segmentation using software. E-07: Gene expression clustering using software. E-08: Student success prediction using software. E-09: Collaborative filtering for recommendation systems using software. E-10: Spam detection using software. E-11: User comment analysis using software. E-12: Attribute selection with medical application. E-13: Image analysis using software. E-14: Anomaly detection in data. E-15: Preparation for the final exam.

Literature/Readings

1. RapidMiner: Data Mining Use Cases and Business Analytics Applications Edited by Ralf Klinkenberg, Chapman and Hall/CRC 2013, Print ISBN: 978-1-4822-0549-7, eBook ISBN: 978-1-4822-0550-3

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods Classic lecture, lab exercises.				
Evaluation/Grading (maximum 100 points)				
Pre-exam requirements		**Points**	**Final exam**	**Points**
Participation in class			Project work	80
Participation in labs			Written exam	20

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Computer simulation and virtual reality

Teacher:Radenković LJ. Božidar,Despotović-Zrakić S. Marijana,Marković M. Aleksandar,Labus B. Aleksandra

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective

The goal of this course is to study basic concepts, principles, models and techniques of computer simulation and virtual reality, as well as to show possibilities of computer simulation usage in business

Learning outcomes

Students are capable to identify, formulate and solve problems of real systems by using simulation models. They are enabled to choose and apply appropriate simulation tools for the implementation of simulation models and virtual reality models and perform experiments on them as well.

Course structure and content

Theoretical instruction:

Basics of modeling and simulation. Resources for simulation. Simulation of continuous systems. Discrete event simulation. Languages for simulating continuous systems and discrete event. Probability and statistics in simulation. Computer systems and simulation. Intelligent systems. Artificial intelligence. Simulation of social networks. Virtual reality. Medium (concepts, development and significance). Types of medium. The presentation of the virtual world. Enviromental models. 2D and 3D modeling. Techniques and tools for 2D and 3D modeling. 3D modeling: transformation and rendering. Computer animation. Computer visualization. Simulation-based games. Modeling games. Virtual reality in: games development, fun industry, industrial design, archeology, forensics, medicine (assisting and diagnosis), economy and finance, education, urbanism, architecture and other.

Practical instruction:

Development of verbal, mathematical, conceptual and simulation models for: 1. simulation of continuous systems by using software tools: CSMP and Simulink, 2. discrete-event simulation – GPSS. Development and implementation of 2D and 3D models in software packages (AutoCAD, Blender, Maya, 3DStudioMax). Creating a virtual environment and virtual world by using X3D. Mapping developed simulation models with virtual environments.

Literature/Readings

1. The materials in e-form, from www.elab.rs
2. Computer simulation, B. Radenković, M. Stanojević, A. Marković, Faculty of Organizational Sciences, Saobraćajni fakultet, 2009.
3. J. Banks, J.S. Carson II, B. L. Nelson, D. M. Nicol, *Discrete-Event System Simulation (Fifth Edition)*, Pearson Education, Inc. 2010. ISBN: 978-0136062127

4. M.F.Shiratuddin, K.Kitchens, D.Fletcher, *Virtual Architecture: Modeling and Creation of Real-Time 3D Interactive Worlds*, 2008, Lulu Press, USA.
5. G.Burdea, P.Coiffet, *Virtual Reality Technology*. Hoboken, New Jersey: John Wiley and Sons.
6. X3D International Standard. (2013). *Information technology — Computer graphics and image processing — Extensible 3D (X3D)* ISO/IEC 19775-1:201.
7. L. Ahearn, *3D Game Environments*, Elsevier, Inc. 2008. ISBN: 978-0-240-80895-6.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs: 2**	**Workshops:**	**Research study:**	

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**50**	Test	**25**
		Oral exam	**25**

Study program / study programs:E-business and system management

Degree level: Master Academic Studies

Course:

Cyber Crime

Teacher:Drakulić S. Mirjana,Ivanović Zvonimir

Course status: Mandatory

ECTS points: 6

Prerequisites: No

Course objective: Lectures will point out the basic problems related to Cyber Crime. By studying the types and characteristics of these criminal acts, as well as through the analysis of cases from local and international case law, students participate in interactive teaching and train themselves for understanding complexity of regulation of Cyber Crime

Learning outcomes

Enabling student to understand the phenomenon of Cyber Crime; independent scientific and technical work on solving problems in this field; forming creative and intellectual body of work in the field of crime research in general; independent and team work

Course structure and content

Theoretical instruction:

Problems in cyberspace: legal, ethical, crime related and organizational. Cyber Criminal law. White-collar crime. Definition of Cyber Crime. Criteria for classification. Cyber Crime in broad and narrow terms. Acts against confidentiality, integrity and availability of electronic data. Acts related to content. Political Cyber Crime. Economic Cyber Crime. Organized Cyber Crime. Ethical aspects of Cyber Crime. Perpetrators. Regulation.

Practical instruction: Exercise, Other Teaching modes, Study research work

Characteristics of cyberspace. Characteristics of Cyber Crime. Forms of Cyber Crime. Method of execution of criminal act. Confidentiality of electronic data. Forgery and identity theft. Child pornography, pedophilia, abuse of women. Human and human organ trafficking. Spreading of racial, religious and political hatred. Xenophobia. Money laundering and credit cards misuse. Cyber terrorism. Cyber warfare. Characteristics of organized groups. Features and profile of perpetrators of Cyber Crime.

Literature/Readings:

1. Mirjana Drakulić, Ratimir Drakulić', *Cyber crime*, in edition Cyber Crime and the Links to Irregular Migration and uman Trafficking, international monograph, MUP, Belgrade, 2014, pp. 169 - 403
2. Mirjana Drakulić, *Basis of Computer Law*, Belgrade, DOPIS, 1996., part related to Computer crime
3. Eoghan Casey, *Digital evidence and computer crime, forensic scene, computers and the internet*, Amsterdam, Elsevir, 2011.

4. David S. Wall, *Cybercrime: The Transformation of Crime in the Information Age*, Polity, Wiley, 2007.
5. Susan W. Brenner, *Cybercrime: Criminal Threats from Cyberspace* (*Crime, Media, and Popular Culture*), ABC-CLIO, inc, Santa Barbara, 2010.
6. Mirjana Drakulić, Ratimir Drakulić, *Balkan Hackers War in Cyberspace*, 14th BILETA Conference: "CYBERSPACE 1999: Crime, Criminal Justice and the Internet", 1999., http://www.bileta.ac.uk/content/files/conference%20papers/1999/Balkan%20Hackers%20War%20in%20Cyberspace.pdf
7. Dragan Mladenović, *International aspects of Cyber Warfare*, Belgrade, Vojno delo, 2012.
8. Stuart Mc Clure, Joel Scabraz, George Kurtz, *Hacking Exprosede*, Osborne, MvGraw - Hill, 2001.

The number of class hours per week				**Other classes:**
Lectures: 2	**Exercise: 2**	**Workshops:**	**Research study:**	

Teaching methods:

Interactive lectures and exercises, research, creative workshops, study of court cases, independent work in forensic laboratories.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Creative Workshops	**10**	Final written test	**15**
Case study/Court case study	**15**	Research project/creation and defence	**30**
Project creation	**30**		

Study program / study programs:E-business and system management

Degree level: Master Academic Studies

Course:

Cyber Law

Teacher:Drakulić S. Mirjana,Ivanović Zvonimir

Course status: Optional (elective)

ECTS points: 6

Prerequisites: No

Course objective:

To mark a basic legal problems of development and application of information and communication technologies and systems and cyberspace.

Course learning outcomes

Students are trained to solve legal problems in cyberspace; understanding legal framework of application of information and communication technologies and networks.

Course structure and content

Theoretical instruction:

Concept and characteristics of cyberspace. Cyber Law. Data and their protection. Individual rights in cyberspace. Privacy. Information privacy. Medical privacy. Genetic privacy. Freedom of expression. Contents in cyberspace. Property in cyberspace. Intellectual Property Rights: software, databases, integrated circuits, domains, trademarks. Electronic contracts. Business in cyberspace. Confidential services. Authentication, authorization, identification. Ethical and professional challenges: social responsibility, models of professionalism, ethical codes and practices.

Practical instruction:

Formation, goal and development of Cyber Law. Internet citizens. Categories of data in cyberspace. Rights and obligations of subjects of electronic data. Attacks and forms of protection of electronic data. Possession and use of on-line property. Conflict of trademarks and domain names. Formalities in the conclusion and implementation of electronic contracts, the probative force, validity, authenticity, reliability. Electronic signature, electronic stamp, electronic time stamp, electronic document, electronic certificate. Electronic delivery. Regulation of e-Business, e-Health, e-Government, e-Inclusion.

Literature/Readings:

9. Mirjana Drakulić, *Basis of Computer Law*, Belgrade, DOPIS, 1995., part related to protection of data and software
10. Ferrera, Lichtenstein, Reder, Bird, *CyberLaw: Text and Cases*, Academic Internet Publishers, Inc., 2006
11. Mirjana Drakulić, Ratimir Drakulić, *European perspective of regulation of Internet services: challenge to*

traditional European Law, Telekomunikacije, br. 6/2010, http://www.telekomunikacije.rs/arhiva_brojeva/sesti_broj/prof_dr_mirjana_drakulic,_mr_ratimir_drakulic:_evropska_perspektiva_regulisanja_internet_usluga:_izazov_tradicionalnom_evropskom_pravu.344.html
12. Djordje Krivokapic, Mirjana Drakulic, Ratimir Drakulic, Svetlana Jovanovic, *Perspective of Global Impact of E-Commerce Directive: Good Experiences and Common Mistakes from Western Balkans*, BILETA2010 25th Anniversary Conference, University of Vienna, 28 – 30 March 2010 PreProceedings; Erich Schweighofer & Anton Geist (Eds.), str. 56; http://irisj.eu/inhalte/IRISNewsRI-mrz10.pdf
13. Mirjana Drakulić, Ratimir Drakulić, *Electronic commerce, intellectual property and law*, Pravni život, 2000, vol. 49, br. 11, p. 713-730
14. Mirjana Drakulic, Ratimir Drakulic, *Privacy in the Yugoslav Cyberspace - Problems and Protection*, 15th BILETA Conference: Electronic Datasets And Access To Legal Information, University of Warwick, Coventry, England, 2000., http://www.bileta.ac.uk/content/files/conference%20papers/2000/Privacy%20in%20the%20Yugoslav%20Cyberspace%20-%20Problems%20and%20Protection.pdf
15. Mirjana Drakulić, Ratimir Drakulić, *Illegal And Harmful Contents In Yugoslav Cyberspace*, Vienna, Knowright 2000, NetLaw, NetEhics and Free Flow of Information in Information Society, Austian Computer Society, UNESCO, 2000., str. 105-115.
16. Ratimir Drakulić, Mirjana Drakulić, *Electronic Commerce And Abuses - View Of Some Yugoslav Problems*, Edinburgh, Bileta 2001, The 16th Bileta Conference, www.law.ed.ac.uk/script/bileta2001.htm
17. Mirjana Drakulić, *Basis of Business Law* [2.edition.]. Belgrade: Faculty for Organizational Sciences, University, 2001., part related to e-business

The number of class hours per week				**Other classes:**
Lectures: 2	**Exercise: 2**	**Workshops:**	**Research study:**	

Teaching methods:

Interactive lectures, creative workshops, case study, team work and independent work.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Creative Workshops	**10**	Final written test	**25**
Case study/Court case study	**15**	Defence of project	**20**
Preparation and creation of project/research	**30**		

Study program / study programs:E-business and system management

Degree level: Master

Course:

Standardization in information systems and technologies

Teacher:Filipović V. Jovan,Mijatović S. Ivana,Marjanović M. Zoran

Course status: elective

ECTS points:

Prerequisites: none

Course objective

Acquiring of knowledge about standardization in information systems and technologies on the levels of understanding, application of the acquired knowledge.

Learning outcomes

Active participant will be able to: understand importance, purposes and benefits of ICT standardization; understand roles and complex relationships among organizations for standardization in ICT sector; understand and contribute to researches related to broad aspects of ICT standardization.

Course structure and content

Theoretical instruction:

Standardization and standards - basics. Development and importance of ICT standardization on global market; Classification of ICT standards and standardization. Formal ICT standardization. Consortia based ICT standardization. Sectoral ICT standardization. Organizations for standardization in ICT sector (ITU, ISO, IEC, CEN, CENELEC, ETSI, TIA, TTC, W3C, WWRF, IEEE, OASIS, OMG, IETF, OSI...) and cooperation among them. Relationships between standards and markets. Competing standards and standards battles in area of ICT. Dynamics and quality of standards in ICT. Specific principles of ICT standardization. Paradox of RAND/FRAND principles. Interoperability and compatibility and ICT standards. Standards related to ITC services. ITIL concept. Relationships between ITIL concept and QMS in accordance to ISO 9001. Family of standards ISO/IEC 20000. ISO/IEC 20000 Certification. Relationships between ITIL concept and ISO/IEC 20000. Capability Maturity Model Integration (CMMI). IT Mark

Practical instruction:

Case study: Development of ICT standardization. Standardization Workshop: Classifications of standards. Case Study: ICT standards and market. Standardization workshop: Standards development, Case study: Standards battle. Case study: Consortia based standardization. Standard development in formal organizations for

standardization. Ad hoc de facto standardization. Work shop: ITIL concept, Workshop: ИСО /ИЕЦ 20000. Workshop: CMMI. Workshop: IT mark.

Literature/Readings:

1. Филиповић Ј., Јовановић Б., *Квалитет и информационе технологије - Приручник за вежбе*, Факултет организационих наука, Београд, 2014.
2. Мијатовић И., *Стандардизација*, Факултет организационих наука, 2014.
3. Jakobs K., *Information Communication Technology Standardization for Business Sectors: Integrating Supply and Demand Factors*, IGI Global, 2009.
4. Ahern, Dennis; Jim Armstrong, Aaron Clouse, Jack Ferguson, Will Hayes, Kenneth Nidiffer, *CMMI SCAMPI Distilled: Appraisals for Process Improvement*. Addison-Wesley Professional, 2005.

The number of class hours per week				**Other classes:**
Lectures:	**Labs:**	**Workshops:**	**Research study:**	

Teaching methods

Interactive lectures, workshops and case studies

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	5	Written exam	20
Seminar papers	20	Verbal exam	35
Midterm exams	20		

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Systems theory 2 – selected topics

Teacher:Petrović J. Bratislav,Gajić R. Zoran

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective

The aim of this course is to provide students with the ability to model and manage organizational systems using the methods of systems theory and control systems, computer sciences and information technologies.

Learning outcomes

The acquired knowledge will enable students to model and manage organizational systems using information and communication technologies.

Course structure and content

Theoretical instruction:

Organizational systems – flow diagram, structure, inputs and outputs, mathematical models, goals, hierarchy. Modeling of business processes and business collaborations. Measuring success and the influence of new technologies on the structure and dynamics of an organization. Business systems as large, complex systems – managing current operations and future development. Modeling and managing corporate organizations. Discrete event systems. (max,+) and (min,-) algebra. State diagram and Petri net modeling tools. Social system models, global models, ecological systems.

Practical instruction: *Exercises*

Project assignment.

Practical instruction: *Laboratory exercises*

Introduction to Matlab, Mathematica, SciLab and the appropriate toolboxes.

Literature/Readings

1) B. J. Petrović, Systems theory, FON, 1998.

2) E. Sontag, Mathematical Control Theory, Springer, 1998.

3) M. Mesarovic, Y. Takahara, Abstract Systems Theory, Springer- Verlag, 1989.

4) Y. Takahara, M. Mesarovic, Organization structure: cybernetics systems foundation, Springer, 2003.

5) C. G. Cassandras, S. Lafortune, Introduction to Discrete Event systems, Springer-Verlag, 2007.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Classes, computational and laboratory exercises are conceived as a combination of traditional and e-learning.

Lectures, exercises, labs, distance learning, case studies, consultations, mentoring.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	30	Written exam	30
Participation in labs		Seminar	40

Study program / study programs:E-business and system management

Degree level: Postgraduate studies (Master academic studies)

Course:

Testing and software quality

Teacher:Lazarević D. Saša

Course status: Optional

ECTS points: 6

Prerequisites: Non

Course objective: **Part I**: Understanding of the principles, rules and methods of software testing. Introduction to techniques of software testing. Mastering the process of software testing. Utilising the available development environment for testing software. The development of software-driven testing. ◆ **Part II**: Understanding the principles, rules and methods of software quality. Specifying the models and the features of software quality. Understanding and mastering the process of quality management software. Metrics. Optimization and performance tuning. Application of appropriate software tools for managing software quality.

Learning outcomes: Competence of students as to test the software using methods, models and tools for software testing, as well as to optimize the software.

Course structure and content (Syllabus):

***Lectures*: Part I**: Fundamentals of Software Testing: The terminology of software testing. Key testing questions (dynamic, finality, selectivity, expectancy). Link testing with other activities of software development. Testing levels: test's subject. Test Purposes (qualification testing, installation testing, alpha and beta testing, correctness testing, reliability testing and evaluation, regression testing, performance testing, etc). Testing techniques: Techniques based on the experience of the tester. Techniques based on the specification of the program. Techniques based on the program code. Techniques based on errors of programs. Techniques based on the use of the program. Techniques associated with the nature of the application. Combining techniques. The measurements related to the test: Evaluation of the program to be tested. Evaluation of the tests. Testing process: Process control testing. Test documentation. Test models. Testing activities. ◆ **Part II**: Fundamentals of Software Quality: Ethics and the culture of software engineering. Value and cost of quality. Models and quality characteristics (quality of the software process, the quality of a software product). Quality improvement. Process Quality Management Software: Security software quality. Verification and validation. Review and monitoring of software quality (management review, technical review, inspection anomalies, evaluation of software products, testing software product). Practical Considerations: Requirements of software quality (impact factors, dependence, levels of integrity software). Properties of the defect (error, fault, failure, mistake). Techniques of software quality (static techniques, oriented towards people, analytical techniques, dynamic techniques, testing). Measuring software quality (statistical measure, trend analysis and prediction). Metrics. Performance tuning software.

***Labs**:* The order of labs exercises and labs exercise content is fully compliant with lecturing units.

Literature/Readings:

1. K. Beck: *Test-Driven Development by Example*, Addison-Wesley, 2002.
2. P. C. Jorgensen: *Software Testing: A Craftsman's Approach,* 2nd ed., CRC Press, 2004.
3. C. Kaner, J. Bach, and B. Pettichord: *Lessons Learned in Software Testing*, Wiley Comp. Publishing, 2001.
4. S. L. Pfleeger: *Software Engineering: Theory and Practice*, 2nd ed., Prentice Hall, 2001.
5. J. W. Horch: *Practical Guide to Software Quality Management*, Artech House Publishers, 2003.
6. S.H. Kan: *Metrics and Models in Software Quality Engineering*, 2nd ed., Addison-Wesley, 2002.
7. S. McConnell: *Code Complete: A Practical Handbook of Software Construction*, Microsoft Press, 2004.

8. I. Sommerville: *Software Engineering*, 7th ed., Addison-Wesley, 2005.				
The number of class hours per week				**Other classes:**
Lectures: 2	Labs: 2	Workshops: /	Research study: /	/
Teaching methods: *Lectures*: Lectures ex cathedra, and with the use of multimedia resources; specification, implementation, testing; explanation of the case study. *Labs*: case studies, programming.				
Evaluation/Grading (maximum 100 points)				
Pre-exam requirements	**Points**	**Final exam**	**Points**	
Participation in class	10	Written exam	40	
Project (required)	30	Oral exam	20	

Study program / study programs:E-business and system management

Degree level: Graduate studies (Master)

Course:

Security Techniques in Computer Networks

Teacher:Simić B. Dejan,Starčević B. Dušan

Course status: Elective

ECTS points: 6

Prerequisites: /

Course objective The course objective is to transfer knowledge to students about possible threats, attacks, and safeguards that are relevant to Internet environment, and Web services, the basic principles of protection techniques and mechanisms for the protection of information systems and computer networks, various methodological approaches to the design and implementation of protection.

Learning outcomes Students will gain the necessary knowledge in the field of computer networks security on concrete examples.

Course structure and content

Theoretical instruction:

L-01: Introduction to Network Security. L-02: Basic Concepts of Network Security. L-03: Security Models. L-04: Access Control Mechanisms. L-05: Introduction to Cryptography. L-06: Applied Cryptography. L-07: Digital Signature. L-08: Digital Certificates. L-09: SSL/TLS protocol. L-10: IPsec. L-11: Intrusion Detection and Prevention Systems. L-12: Network Security and Wireless Security. L-13: Protecting Applications in Computer Networks. L-14: Electronic Payment Systems Security. L-15: Review of previous lectures and preparing for the exam.

Practical instruction: *Exercises, Other forms of lectures, Research work:*

E-01: Basic Terms in Network Security. E-02: Risk Management Methods. Social Engineering Methods. E-03: Protocols for Network Security. E-04: Nessus E-05: Examples of malicious software (malware) in computer networks. E-06: Linux operating system protection. E-07: Windows operating system protection. E-08: Kerberos. E-09: Examples of Applied Cryptography in Computer Networks. E-10: Steganography. Web Security. E-11: Authentication Methods. E-12: Appying Smart Cards in Computer Networks. E-13: Appying PKI. E-14: Applying Firewalls. E-15: Review of previous excercises and preparation for the exam.

Literature/Readings

1. Lectures in e-form, FON, 2013.
2. Jim Curose, Keith Ross, *Computer Networking: A Top Down Approach*, 6th edition, Addison-Wesley, 2012.
3. Stallings W., *Network Security Essentials: Applications and Standards,* Pearson Education Limited, 2013.
4. Randy Weaver, *Guide To Network Defense and Countermeasures,* 3rd edition, 2013.
5. Emmett Dulaney, *ComTIA Security+ Deluxe Study Guide*, Sybex, 2009.

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:** 2	**Workshops:**	**Research study:**	

Teaching methods

Lectures, Exercises, Practical Work, Consultation.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	30	Written exam	30
Participation in labs	40		

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Mobile business technologies

Teacher:Radenković LJ. Božidar,Barać M. Dušan,Krčo M. Srđan

Course status: Elective

ECTS points: 6

Prerequisites:

Course objective

The object of the course is to acquaint students with modern mobile technologies and the design and development of advanced applications of mobile business. The specific objective is to acquire the knowledge necessary for advancement to higher levels of study.

Learning outcomes

Students are able to design and develop advanced applications of mobile business. Students have mastered the art mobile technology and are able to apply technology to business applications

Course structure and content

Theoretical instruction:

Introduction. Techniques of wireless transmission. Mobile and wireless networks. LTE technologies and standards. Design of wireless networks. IEEE 802.11 series of standar. WiGig specification. Overview of applications of mobile business. Customizing business applications using mobile devices. Development of advanced mobile applications. Development of multiplatform applications. Internet and mobile applications. Platform for realization of mobile and web services. Security, scalability, and reliability of mobile applications. Models of management of knowledge and information in mobile environments. Mobile cloud computing. Internet of Everything. Context-aware computing. Wearable computing – examples. Gamification and serious games – review and use in business applications. Augmented reality – examples. Mobile biometrics. Mobile applications and social media. Mobile devices of special purpose. Pervasive computing. Omnipresent computing. Future of mobile business.

Practical instruction:

Design of wireless networks. Framework for developing mobile applications. Tools for fostering development of mobile applications. Manipulation of multimedia records in Android. Mobile jQuery. Using QR codes in Android mobile applications. Work with RFID and NFC technologies in Android mobile applications. Work with 2D and 3D graphics in Android. The development of games for mobile devices. Using sensor systems in Android. Using system for recording image / sound in Android. Using web services in mobile applications. Advanced interface elements for quick access to features of Android applications. Optimization of application for various types of devices. Techniques to optimize utilization of hardware resources. Testing application. Security in mobile applications. Setting up applications on publicly available application store. The development of mobile games in Units3D enviroment

Literature/Readings

1. Материјали у е-форми, са сајта www.elab.rs
2. Despotović-Zrakić M., Milutinović V., Belić A. (Eds), High performance and cloud computing in scientific research and education, monografija, IGI Global, 2014. (у штампи)
3. R. Meier, Professional Android 4 Application Development, 2012, ISBN: 978-1118102275
4. W.M. Lee, Beginning Android Application Development, 2011, ISBN: 978-1118017111
5. R. Rodger, Beginning Mobile Application Development in the Cloud, John Wiley & Sons,, 2011
6. M. L Murphy, The Busy Coder's Guide to Advanced Android Development, ISBN: 978-0981678054, CommonsWare, LLC, 2011.
7. S.Conder, L.Darcey, Android Wireless Application Development Volume II: Advanced Topics (3rd Edition), Addison-Wesley, 2012.
8. H.Guihot, Pro Android Apps Performance Optimization, Apress, 2012, ISBN: 978-1430239994
9. D.Siewiorek, A. Smailagic, Thad Eugene Starne, Application Design for Wearable Computing, Morgan and Claypool Publishers, ISBN: 978-1598291209, 2008

The number of class hours per week				**Other classes:**
Lectures: 2	**Labs:2**	**Workshops:**	**Research study:**	

Teaching methods

Lectures, exercises, case studies, lab exercises in classrooms with computers, project / seminar papers, distance education

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	40	Written exam	20
		Project	40

Study program / study programs:E-business and system management

Degree level: Postgraduate studies (Master academic studies)

Course:

Document Management

Teacher:Lazarević D. Saša

Course status: Optional

ECTS points: 6

Prerequisite: Non

Course objectives: Understanding the principles, rules and methods of document management. Training in the design of business processes and supporting documentation. Application of appropriate software solutions for document management in the business system.

Learning outcome: Competence of students to analyze, design and implement a document management system and managing documents.

Course structure and content (Syllabus):

***Lectures*:** Introduction: objectives, moduls, mode, method of examinations, literature; Basic concepts: data, information, business process, activity, quality of the document; kinds and types of documents; Document activities: regulation, procedures, specifications, form, record; Scientific and technical documents, business documents, administrative documents. Processes in the processing of documents: create, review, processing, approval, publication, distribution, archiving, searching. Document lifecycle: prepare, birth, growth and disappearance. Business processes and documentation I: identification and classification of processes, processes and organizational structure. Business processes and documentation II: processes and data classes, methods for modeling and analyzing business processes and data classes (BPM, UML, SSA). SSA technique: data flow diagram (DFD), the decomposition of DFD; Data Dictionary; specification of primitive processes logic. Methods SSA; case study; defining the form and content of documents based on the data dictionary. Checking the acquired knowledge: Test no. 1. Post-test observations: Analysis of the questions and answers. Standardization documents: standardization of forms, standardization of content, standard document flow (workflow). Ways of archiving documents: classic archiving with no computer records, microfilm, scanning, hybrid approach. XML - concept, development, elements; life cycle of an XML document, XML technology. The technology of document management: objectives, activities, problems, results, users, database, way of adoption documents, method of adjustment documents. System documentation quality: system quality handbook, quality policy (the policy of quality in the business system, basic policy document, quality assurance), the basics of quality plan, basic management procedures, technology management of products/services. Administrative documentation: adm. brief, document, item, object, file, folder, archive material, administrative offices, archives. Content management and electronic document management: CMS and DMS; basic functions, architecture, implementation. Checking the acquired knowledge: Test no. 2. Post-test observations: Analysis of the questions and answers.

Labs: The order of labs exercises and labs exercise content is fully compliant with lecturing units.

Literature/Readings:

1. R. J. Glushko, T. McGrath: *Document Engineering - Analyzing And Designing Documents for Business Informatics & Web Services*, The MIT Press, 2005
2. ***: *How to introduce a quality system*, Yupik, Belgrade, 1996 (in Serbian)
3. Ž. Mitrović: *Quality and Management*, IIPS, Belgrade, 1996 (in Serbian)
4. S. D. Lazarević: *Document Management*, scripts, FON, Belgrade, 2012 (in Serbian)
5. M. M. Radović, S. Z. Karapandžić: *Process Engineering*, FON, Belgrade, 2005 (in Serbian)

The number of class hours per week				Other classes:
Lectures: 2	Labs: 2	Workshops: /	Research study: /	/

Teaching methods:

Lectures: Lectures ex cathedra, and with the use of multimedia resources; explanation of the case study; process modeling and documentation modeling; lectures by experts from practice.

Labs: Process modeling and documentation modeling; demonstration exercises; application of DMS software.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	Points	Final exam	Points
Project (required)	30	Written exam	20
Tests (optional)	30	Oral exam	20

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Supply Chain Management 2

Teacher:Vasiljević V. Dragan,Vujošević B. Mirko

Course status: Compulsory for Management and Organization

ECTS points: 6

Prerequisites: Integrated Logistics Systems or some of the courses which offer quantitative support to operations management.

Course objective: To broaden and deepen the existing knowledge of students with contemporary concepts of supply chain management as well as models for supply chain performance measurement.

Learning outcomes: Theoretical and practical knowledge which enable students to perform operations in the field of supply chain management and supply chain processes optimization.

Course structure and content

Theoretical instruction:

T-01: Course introduction.

T-02: Theoretical basics of *VMI* concept.

T-03: Theoretical basics of *CPFR* and *Flowcasting* concepts.

T-04: Preparation for writing term paper.

T-05: *E-SCM.*

T-06: Strategic alliances: definition, role and forms.

T-07: Ecological aspects of supply chains.

T-08: Theoretical basics of network location problems.

T-09: Inventory management under uncertainty.

T-10: Risk management in supply chain.

T-11: Multi-criteria optimization in supply chains.

T-12: Performance measurement in supply chain.

T-13: Software support for SCM.

T-14: Control test.

T-15: Presentation of term papers.

Practical instruction:

P-01: Communication and contracting skills in supply chains.

P-02: The *VMI* concept: case study.

P-03: The *CPFR* and *Flowcasting* concepts: case studies.

P-04: Aggregate planning in supply chains.

P-05: Routing in distribution networks.

P-06: Test 1.

P-07: Designing the distribution network.

Literature/Readings:

1. Vasiljevic D., Jovanovic B., *Logistics and Supply Chain Management*, ISBN 978-86-7680-150-3, FOS, Belgrade, 2008. (in Serbian)
2. Simchi-Levi, D., Kaminsky, P. And Simchi-Levi, E., *Designing and Managing the Supply Chain, Concepts, Strategies, and Case Studies*, McGraw-Hill International Editions, 2000.
3. Voss S., Woodruff D.L., *Introduction to computational optimization models for production planning in a supply chain*, Springer Verlag, Berlin, 2003.

The number of class hours per week				Other classes:
Lectures: 2	Labs: 2	Workshops:	Research study:	

Teaching methods: Ex cathedra teaching, interactive teaching methods (creative workshops and case studies analysis), practical and lab exercieses.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Participation in class	10	Oral exam	30
Participation in labs	15		
Tests	20		
Term paper	25		

Method of knowledge evaluation:

Grades	**5**	**6**	**7**	**8**	**9**	**10**
Points	[0-55]	[56-65]	[66-75]	[76-85]	[86-95]	[96-100]

Study program / study programs:E-business and system management

Degree level: Master studies

Course:

Management of IS Development

Teacher:Pantelić S. Ognjen,Marjanović M. Zoran,Čudanov J. Mladen

Course status: Elective

ECTS points: 6

Prerequisites: /

Course objective

The course is designed to introduce students to the specific concepts of managing IT projects and provide necessary knowledge and skills for managing and evaluating system performance.

Learning outcomes

Students have sufficient knowledge and skills for managing IT projects. The student leaves the course with an understanding of different concepts of software systems and the risks of their implementation. The student has knowledge of standards in the field of information systems and technologies.

Course structure and content

Theoretical instruction:

Project management of IS development, IS development models, Analysis of different IS development methodologies, IT service management, Standards in the field of software development processes and system documentation, Software metrics: Different models of software metrics, The role and characteristics of ERP systems, Overview of ERP solutions from different vendors, IT economy, The role of IS in the supply chain management, IS security and business ethics, Content management: Overview of content management IS, Cloud computing and virtualization characteristics, Green IT, The role of business analytics in the development of IS, Big data management, New trends in development of IS.

Practical instruction:

Workshop- Select the best providers offer for information system based on implemented standards, Case study- Analysis of business information systems and simulation of decision making process regarding IS development, Research of new methods in IS development, Examples of ERP system implementation, Implementation of ITIL framework in the practice.

Literature/Readings

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

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

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

4. Applegate,Austin, McFarlan, *Corporate Information Strategy and Management,* Mc Grow Hil,2003

5. Electronic presentations of lecture, poslis.fon.rs, 2013

The number of class hours per week				**Other classes:**
Lectures:	**Labs:**	**Workshops:**	**Research study:**	
2	2			

Teaching methods

Formal lectures, Workshops, Writing individual student papers

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Student paper	60	Oral exam	40

Study program / study programs:E-business and system management

Degree level: **Master studies**

Course:

E-business risk management

Teacher:Despotović-Zrakić S. Marijana,Bogdanović M. Zorica,Barać M. Dušan,Makajić-Nikolić D. Dragana

Course status: elective

ECTS points: 6

Prerequisites: none

Course objective

The object of this course is to introduce students with advanced concepts, methods and models for e-business risk management.

Learning outcomes

Students gain theoretical and practical knowledge necessary for the identification, analysis, evaluation and risk management in the design and development of e-business.

Course structure and content

Theoretical instruction:

Definition of risk, elements of risk, management under uncertainty and risk, unacceptable and acceptable risks. Project Management in e-business. Agile methods for project management. Technical and organizational aspects of risk management in e-business. The legal frameworks of e-business. Categorization of risk in e-business. Methods and techniques for the identification and evaluation of risks: threats analysis, weakness and risk, analysis of way of failure and efects of failure, tree of attack, analysis of malfunction tree. Monitoring and reporting on risks. Learning from Risk. Managing security of information in e-business. ISO/IEC 27000 series of standard. Creating a security policy. Business Continuity Management. IT revision of e-business. Risk management in cloud computing environment. Risk management in mobile applications. Risks management in social media. Risk management in e-commerce. Risk management in e-banking and electronic payment systems. Risk management in e-business in public administration. Risk management in e-health.

Practical instruction:

Management of IT projects using MS Project tools. Manage software development projects by using Redmine tools. Develop a plan for risk management in e-business as an integral element of Internet business plan. Develop a plan for business continuity. Using software to detect fraud in e-business. IT revision of software for e-commerce. Solving a case study.

Literature/Readings

1. E-resources, available at: www.elab.rs
2. E-Business and E-Commerce Management (4th Edition) Dave Chaffey, 2009., Prentice Hall
3. Tipton H. Krause M. Information Security Management Handbook, 6th Edition, Auerbach publications, 2007
4. M. Despotović, B.Radenković, Upravljanje rizikom u softverskim projektima elektronskog poslovanja, Info M 11, str. 39-44, Beograd, 2004.
5. A. Dacić, M. Despotović, B. Radenković, Risk Analysis in Electronic Business based on Internet Web Services, Proceedings of IPSI 2004s, Proceedings on CD, 02-09 October, 2004.
6. C. A. Ericson II, Hazard analysis techniques for system safety, Wiley, 2005
7. Y. Y. Haimes, Risk Modeling, Assessment, and Management, Wiley, 2005.

The *number of class hours* per *week*				**Other classes:**
Lectures:	**Labs:**	**Workshops:**	**Research study:**	
2	2			

Teaching methods

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Assignments	**40 points**	Test	**20 points**
		Seminar	**40 points**

Study program / study programs:E-business and system management

Degree level: Graduate studies

Course:

Fuzzy logic and systems

Teacher:Radojević Dragan,Petrović J. Bratislav

Course status: Elective

ECTS points: 6

Prerequisites: none

Course objective The aim of this course is to provide students with the necessary theoretical knowledge of the methods and techniques for modeling uncertainty, imprecision, incompleteness and approximation of organizational systems. The course also covers benefits, drawbacks and applications of real-valued logic in solving practical business problems.

Learning outcomes The acquired knowledge of fuzzy logic and other soft computing techniques will enable students to select appropriate tools and model practical business problems in organizational systems using ICT.

Course structure and content

Theoretical instruction:

Fuzzy set theory. Fundamental concepts and operations on fuzzy sets. Interval and fuzzy arithmetic. Fuzzy relations and fuzzy relational equations. Measures and uncertainty, additive and fuzzy measures. Evidence and possibility theory, possibility and probability theory. Classical logic, a motive for generalization and fuzzy logic. Multi-valued and [0,1]-valued logic. Interpolative Boolean algebra (IBA). IBA as basis for classical approach generalization. IBA symbolic level: Boolean algebra, structure of BA elements and structure functionality principle. IBA valued level: Generalized product - t-norms. Generalized Boolean product. Real-valued interpolative logic, theory of interpolative sets and interpolative relations. Fuzzy modeling. Approximate reasoning. Fuzzy decision making and fuzzy expert systems. Intelligent agents. Fuzzy pattern recognition, fuzzy clustering. Fuzzy search and fuzzy databases. Probability and [0,1]-valued logic, fuzzy statistics. Fuzzy time series.

Practical instruction:

Practical instructions closely follow the lectures. In the course students gain hands-on knowledge and skills for solving practical problems using appropriate software packages (Matlab, Mathematica and SciLab).

Literature/Readings

1) D. Radojević, B. Petrović, Uvod u fazi logiku i sisteme, lectures, at www.labsys.fon.bg.ac.rs.

2) J. Kacprzyk, Multistage Fuzzy Control: A Model-Based Approach to Fuzzy Control and Decision Making, Wiley, 1994.

3) G. J. Klir, B. Yuan, Fuzzy Sets and Fuzzy Logic– Theory and Applications, Prentice Hall, 1995.

4) R. R. Yager, D. Filev, Essential of Fuzzy Modeling and Control, Wiley, 1994.

5) D. Radojević, Interpolative Relation base for Graduation and/or Fuzziness, In: Forging New Frontiers: Fuzzy Pioneers II Studies in Fuzziness and Soft Computing, Springer-Verlag, 2007.

The number of class hours per week				Other classes:
Lectures: 2	Labs: 2	Workshops:	Research study:	

Teaching methods

Lectures. In the course students gain hands-on knowledge and skills for solving practical problems using selected software packages (Matlab, Mathematica and SciLab). Lectures by visiting experts. Case studies. Project assignments for individuals or small groups. Mentoring.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Lab exercises	30	Written exam	30
		Project presentation	40

Study program / study programs:E-business and system management

Degree level: Master Academic Studies

Course:

Forensics with fundamentals of computer forensics

Teacher:Drakulić S. Mirjana,Delibašić V. Boris,Knežević P. Snežana

Course status: Optional (elective)

ECTS points: 6

Prerequisites: No

Course objective:

Introducing concepts of forensics to students, application of method of analysis of digital evidence as well as techniques, hardware and software tools, training for implementation of standards for conducting forensic investigations and criminal procedure process.

Course learning outcomes

Enabling student to understand the phenomenon of crime and Cyber Crime; independent scientific and technical work on solving problems in this field; forming creative and intellectual body of work in the field of crime research in general; independent and team work.

Course structure and content

Theoretical instruction:

Basics of forensics. History of forensics. Forensics as a profession. Criminal acts. Concept and elements of guilt. Guilt. Criminal sanctions. Legal framework for forensics. Judicial system of the Republic of Serbia: organization and functioning. Evidence and attestation in criminal proceedings. Accounting forensics. Computer forensics. Genesis of computer crime and computer forensics. Digital evidence and its admissibility. Data mining. Forensic tools, techniques, equipment and training. Forensic processes and procedures. The techniques of collecting, securing and displaying digital evidence. Forensic analysis and presentation of digital evidence. The course of judicial proceedings.

Practical instruction:

Basics of forensics. Event location. Computer forensic investigation. Victims. Evidence. Profiling the perpetrators. Data recovery. Real time forensics. Writing forensic documentation. Preparation and presentation of digital evidence in court. Investigative and judicial procedures and processes.

Literature/Readings:

2. Mirjana Drakulić, *Basis of Computer Law*, Belgrade, DOPIS, 1996., part related to computer crime
3. Solomon M. G., Barrett D., Broom D., *Computer Forensics, Jump Start*, Sybex, Alameda, 2005.
4. Eoghan Casey, *Digital Evidence and Computer Crime,* Third Edition: Forensic Science, Computers, and the Internet, Elsevir, 2011.

5. Tony Sammes, Brian Jenkinson, *Forensic Computing: A Practtitione Guide*, Springer Verlag, London, 2007.
6. Robert C. Newman, *Computer Forensics: Evidence Collection and Management*, Auerbach Publications, New York, 2007.
7. Albert J. Marcella, Frederic Guillossou, *Cyber Forensics: From Data to Digital Evidence*, New York, Auerbach Publications, 2008.
8. Philip Craiger, Sujeet Shenoi, *Advances in Digital Forensics III*, USA, Springer, 2007.
9. Mirjana Drakulić, Ratimir Drakulić, *Challenges of Cyberspace – Cyber Forensics*. http://www.internetogledalo.com, broj 56

The number of class hours per week				**Other classes:**
Lectures: 2	**Exercise: 2**	**Workshops:**	**Research study:**	

Teaching methods:

Solving case studies / court cases, training for work in forensic lab, teamwork in problem solving, independent research, consultation in preparation of project task, independent student's work through learning and development of project task. Consultation and communication with students is realized through e-learning application MOODLE.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Creative Workshops	**5**	Final written test	**25**
Case study/Court case study	**15**	Defence of project	**25**
Preparation and creation of project/research	**20**		
Work with forensic tools	**10**		

Study program / study programs: E-business and system management

Degree level: Master Academic Studies

Course:

Practice Specification

Teacher: All teachers involved in the study program

Course status: Mandatory

ECTS points: 4

Prerequisites: /

Course objective

Training students to do independent research and professional work in identifying and solving specific tasks in the program of study, in real conditions of practice and / or research laboratories and centers.

Learning outcomes

Gaining experience and mastery of skills in the use of deepening and enriching the acquired theoretical and practical knowledge for the purpose of identifying and resolving specific issues and tasks that occur in the real system.

Course structure and content

Elements of the project task; Defining the objectives and tasks of the research; Identification and description of the basic problems through the development of key thesis; The basic methods, techniques and tools for the project professional practice - selection of appropriate methods TOR and predicted empirical research; Basic elements of the presentation of research results - the principles of successful presentations and various forms and characteristics of individual forms, such as the content of written documents, oral, electronic presentations; Defining a specific project task of professional practice for each student - goals and tasks, duties and responsibilities of the student organization (if it is implemented in a particular organization), mode, form and content of the final report, and etc.

Literature/Readings

The *number of class hours* per *week*				
Lectures:	**Labs:**	**Workshops:**	**Research study:**	**Other classes:**
			20	

Teaching methods

The application of different methods of research, consultations (individual and group). The use of different teaching methods with practical work.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Seminar	50	Written exam	50

Study program / study programs: E-business and system management

Degree level: Master Academic Studies

Course:

Research proposal

Teacher: All teachers involved in the study program

Course status: Mandatory

ECTS points: 8

Prerequisites: /

Course objective

The main objective is to prepare students for Degree - Master of work, so he is the first phase of development of master work. With the help of mentors, students will be prepared that, with the conquest of the necessary methods and with the use of basic acquired during their studies, scientific-technical and professional application of knowledge, solve a specific problem within the selected areas. As part of these preparations student studying the broader context of the problem, its structure and complexity.

Based on literature student meets with the existing approaches to solving similar tasks and good practice. Based on the conducted comparative analysis of available solutions student brings a proposal of its own approach to solving the complex problems. The aim of the activities of students in this part of the research is to gain the necessary experience through solving complex problems and tasks and identifying opportunities for the application of previously acquired knowledge into practice.

Learning outcomes

Engineer should improve their previous titles acquired those skills and knowledge which enables him to solve the most complex problems. In addition to the knowledge and skills acquired in undergraduate studies, students are trained for research work. Acquire the necessary knowledge in specific scientific fields, methods of scientific research and skills (oral presentation, group communication, etc.). Because creative approach to the interpretation of other people's knowledge and experience can exercise and less scientific contributions. In this way gain a better performance on the market work, and acquired competencies enable them to find employment in research and development centers and institutes, or in companies that are committed to improving their own work and open to new approaches and solutions in the areas of organization and management. In the access student work defines the topic, purpose, research methods, literature you will use.

Course structure and content

The content of the work depends on the particular rešavanog problems and is aligned with the objectives of the case. The work includes the object and purpose of the research, initial hypotheses, research methods, the contribution of access and conclusions.

Literature/Readings

The *number of class hours* per *week*			**Other classes:**
Lectures:	**Labs:**		

Teaching methods

After discussions with the supervisor about topics of the future specialist labor, student, with the approval of the selected mentors and task-specific, starts making the access operation. During the preparation of this paper, mentor conduct regular consultations to learn about the progress of the student, critically evaluate current work and provides additional guidance in the form of student guidance or reference to a particular literature.

Evaluation/Grading (maximum 100 points)

Pre-exam requirements	**Points**	**Final exam**	**Points**
Creation paper specification	50	Defense graduate paper specification	50

Study program / study programs: E-business and system management

Degree level: Master Academic Studies

Course:

Graduate paper specification

Teacher: All teachers involved in the study program

Course status: Mandatory

ECTS points: 18

Prerequisites: /

Course objective

Engineer of organizational sciences should demonstrate an increased ability to research in the case of new or unfamiliar problems in this area, linking the acquired knowledge and skills in solving complex problems, and the ability to follow and adopt papers and research results.

Learning outcomes

Graduate engineers - masters improve their previous knowledge acquired those skills and knowledge that they provide better performance on the market work, and acquired competencies enable them to find employment in research and development centers and institutes, enterprises or their own organizations. Students gain specialization in the above sub-group can independently or in a team to solve the most complex problems, because they deepen previously acquired academic skills and knowledge, understanding and skills. Are trained to solve complex problems. They independently investigate, process the data obtained in the research, draw conclusions, write and defend the results.

Course structure and content

By creating and defending the master's thesis students are usavšavaju in the scientific field that is the subject of their master academic studies and acquire a graduate engineer in the field of master academic studies. Engineer - master has deepened academic theoretical and practical knowledge and skills in the chosen specific scientific field, knows in academia and beyond the accepted methodology for solving complex problems and is able to be independent and creative application in solving the problems that will occur in practice.

Literature/Readings

The *number of class hours* per *week*				
Lectures:	**Labs:**	**Workshops:**	**Research study:**	**Other classes:**

Teaching methods

After accepting the diploma master work of a candidate under the supervision of a mentor approach to designing work. Creating work should be carried out in accordance and in the implementation plan exposed in the application work. Candidate in the laboratory and / or field work independently on the practical aspects of the problems solved. In consultation with the supervisor if necessary checks the work plan, in terms of the elements it contains, or the dynamics of additional sources.

Evaluation/Grading (maximum 100 points)			
Pre-exam requirements	**Points**	**Final exam**	**Points**
Creation graduate paper specification	50	Defense graduate paper specification	50