

Course title	Concepts for Software Development	Course code	
Teacher(s)	prof. dr. Suzana Loshkovska, assoc. prof. dr. Ana Madevska Bogdanova, prof. dr. Dejan Gjorgjevikj, assist. prof. dr. Ivan Chorbev		
Status	Compulsory	ECTS	6
Semester	Winter(I)	Weekly classes	2+2+2
Goals	To introduce the students to the Structured programming paradigm, to understand the concept of algorithms and to enable them to develop algorithms, to code, test and compile programs. There will be introduction of data types, control structures, functions, arrays and files		
Course content	Introduction, Concept of computer science, Programming languages and paradigms, Types of data and operations, Algorithms, Control structures, Functions, Recursion, Complex data structures – arrays, matrices, pointers. Files. Applications: programming language working environment. Realization of Concepts for Software Development in C working environment		
Course prerequisites	None		
Literature	1. Kernighan B., Ritchie D., The C Programming Language, (2nd edition), Prentice Hall 2. Kochan C., Programming in ANSI C, SAMS Publishing 1994 3. "C++ Programming Language", Bjarne Stroustrup, Addison Wesley, 2004, 4. "Osnovi na programiranje", Gj. Jovancevski, B. Stojcevska, N.Ackovska, 2007,		
Grading methods			
Periodic evaluation		Full Exam	
1. Colloquiums	2	1. Writing exam	x
In writing	X	Tasks	
Oral		Theory	
Tasks		2. Practical (labs, problem solving)	x
Theory	x	3. E-exam	x
Practical (labs, problem solving)	x	4. Oral Exam	
E-exam	x	5. Seminar work, homework	
2. Tests	2	Remark:	
3. Seminar work, homework			
4. Activity and/or attendance	x		
5. Final Exam			
Conditions for signature and right for exam : Successfully done the lab tasks			

1.	Course title	Advanced Software Development
2.	Course code	
3.	Study program	Computer Science and Engineering, Computer Networks Technologies, Applied E-Technologies
4.	Unit offering the course	FCSE
5.	Undergraduate/postgraduate/PhD	Undergraduate
6.	Year/semester 2/summer/compulsory	7. ECTS: 6
8.	Teacher(s)	assoc. prof. dr. Ana Madevska-Bogdanova, assoc. prof. dr. Dejan Gjorgjevikj, assist. prof. dr. Nevena Ackovska, assist. prof. dr. Ivan Chorbev
9.	Course prerequisites	None
10.	<p>Goals (competences): The goal of the course is to acquaint the student with the basic concepts of object-oriented programming through the programming language C ++ and Java programming language. Therefore, the concepts of classes and objects will be introduced, encapsulation, inheritance and polymorphism. The students will be introduced to the concept of hierarchy of classes. Comparisons will be made of the implementation of the object-oriented concepts in C++ and Java programming languages.</p> <p>After the completion of the course, the student will understand the principles of object-oriented programming and will be able to develop programs based on these concepts and principles using the programming language C ++ and Java programming language.</p>	
11	<p>Course content: Programming paradigms. Definition and basis of object-oriented programming. Terminology (Objects, classes, Methods, encapsulation, abstraction, inheritance, polymorphism). Basic programming elements of the C++ language and differences in comparison of C. Objects and classes. Implementation of methods. Constructors, Destructors, Overloading of constructors. Objects as arguments. Embedding objects. Overloading of operators. Friendly functions and classes. Dynamic reserving of memory. Inheritance. Overlapping and redefining of functions in derived classes. Deriving classes and generalizations. Conversion between basic and derived classes. Polymorphism. Virtual functions. Implementation of polymorphism. Clean virtual functions. Abstract Classes. Static membership of classes. Multi-level inheritance. Virtual database classes.</p> <p>Introduction in Java. Difference between C++ and Java. Implementation of object-oriented concepts in java. Java pakets, inheriting, overlapping, Polymorphism, Interfaces, Solutions of multi-level inheriting, Exceptions.</p>	

12.	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).					
13.	Total available time			6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time			30 + 45 + 30 + 75 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours		
		15.2.	Training (labs, problem solving), seminar and team Work	60 hours		
16.	Other activities	16.1.	Project work	30 hours		
		16.2.	Self study	30 hours		
		16.3.	Home work	30 hours		
17.	Grading					
	17.1.	Tests			75 points	
	17.2.	Seminar work/project (written or oral presentation)			15 points	
	17.3.	Active participation			10 points	
18.	Grading criteria	to 59 points			5 (five) (F)	
		from 60 to 68 points			6 (six) (E)	
		from 69 to 76 points			7 (seven) (D)	
		from 77 to 84 points			8 (eight) (C)	
		from 85 to 92 points			9 (nine) (B)	
from 93 to 100 points			10 (ten) (A)			
19.	Final exam prerequisites		Completed activities 15.1 and 15.2			
20.	Course language		Macedonian and English			
21.	Quality assurance methods		Internal evaluation and satisfaction polls			
22.	Literature					
	22.1.	Compulsory				
		No.	Authors	Title	Publisher	Year
		1.	Prata S.	C++ Primer Plus	the Waite Group	1998
2.		Bruce Eckel	Thinking in Java, 4th edition	MindView	2006	
3.	Stroustrup B	The C++ Programming Language	AddisonWesley,	1997		

		Additional				
		No.	Authors	Title	Publisher	Year
22.2.		1.	Deitel, Deitel	How to program, Java, 8th edition	Prentice Hall	2010
		2.				
		3.				

1.	Course title	Basis of Software Engineering		
2.	Course code			
3.	Study program	CSE, CE, NT, AET		
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester	7. ECTS: 6		
8.	Teacher(s)	Prof. Katerina Zdravkova, Assist. Prof. Dejan Spasov, Assist. Prof. Ivica Dimitrovski, Assist. Prof. Gjorgji Madzharov		
9.	Course prerequisites	None		
10.	Goals (competences): High awareness of ICT fundamentals, ICT history, current status and future; the way how computers work; Web fundamentals; image, video and animation processing; key areas of ICT and their influence; competence to manipulate text, tables, graphs, images, audio and video.			
11.	Course content: Introduction to computer history; How computers work?; How software and application software work?; Internet fundamentals; Web and networking; Malicious software and countermeasures; Multimedia, graphics, sound and video; Computer science and its areas; Project assignments: text, table, graph, image, audio and video manipulation programs.			
12.	Teaching methods: Lectures, training, labs, project assignments, home assignments			
13.	Total available time	6 ECTS * 30 = 180 hours		
14.	Distribution of the available time	30 + 15 + 30 + 25 + 40 + 40 = 180		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	15 + 30 hours
16.	Other activities	16.1.	Project work	25 hours
		16.2.	Self study	40 hours
		16.3.	Home work	40 hours
17.	Grading			
	17.1.	Tests		40 points
	17.2.	Practical assessments		40 points
	17.3.	Practical projects		15 points
	17.4.	Active participation		5 points
18.	Grading criteria		to 50 points	5 (five) (F)
			from 51 to 60 points	6 (six) (E)
			from 61 to 70 points	7 (seven) (D)
			from 71 to 80 points	8 (eight) (C)

		from 81 to 90 points	9 (nine) (B)			
		from 91 to 100 points	10 (ten) (A)			
19.	Final exam prerequisites	Activities 15 and 16				
20.	Course language	Macedonian and English				
21.	Quality assurance methods	Mechanisms for internal evaluation and student polls				
Literature						
22.	Compulsory					
		No.	Authors	Title	Publisher	Year
	22.1.	1.	Evans, D.	Introduction to Computing: Exploration in Language, Logic, and Machines	Create Space Independent Publishing Platform	2011
		2.	Conery, J., S.	Exploration in Computing	CRC Press	2010
		3.	Zdravkova, K. et al.	Introduction to Computing	courses.finki.ukim.mk	2013
	Mandatory					
		No.	Authors	Title	Publisher	Year
	22.2.	1.	Stanford University	Computer Science 101	https://www.coursera.org/course/cs101	2012
		2.	Boston University	CS 101: Introduction to Computers	http://www.cs.bu.edu/courses/cs101/	2012

1.	Course title	Data base
2.	Course code	
3.	Study program	FCSE, ASI, IT, IKI, INFO
4.	Unit offering the course	FCSE
5.	Undergraduate/postgraduate/PhD	Undergraduate
6.	Year/semester	3/ Winter / Compulsory
7.	ECTS	6
8.	Teacher(s)	prof. dr. Danco Davcev, prof.dr Margarita Kon- Popovska, prof. dr Andrea Kulakov, assist. dr. Slobodan Kalajdziski, assist.dr. Goran Velinov
9.	Course prerequisites	Algorithms and Data Structures Object oriented programming
10.	<p>Goals (competences):</p> <p>Introducing the student with the basic concepts for work with databases, ways of modeling and implementing databases, as well as query languages, The student will be able to model databases through semantic and relational modeling and process of normalization, will know how to practically use the SQL standard for creating, maintaining and manipulating relational databases, and will gain introduction knowledge for creating applications for databases</p>	
11.	<p>Course content :</p> <p>Introduction, historical development, basic concepts for systems for databases, comparison of file processing and databases, software management of databases (DBMS) and architectures, data independency. Model of the real world, semantic modeling: model of entities and relations (E-R model), extended entity–relationship model (EE-R model), UML Model Object (Class Diagram). Relational Model of databases, integrity constraints, logical and physical organization, Design of relational databases, transformation of EE-R model in relational model. Formal query languages: Relational algebra and relational computing. Query languages (SQL), limiting, triggers, stored procedures, indexes, analytical queries. Functional, key, join and multi-value dependencies. Normal forms: first, second, third. Boyce-Codd, fourth and fifth normal form. Process of normalization. Transactional control of concurrency. Development of applications of databases, Inserting question languages in program languages, connecting to the database.</p>	
12.	<p>Teaching methods:</p> <p>Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).</p>	
13.	Total available time	6 ECTS x 30 Hours = 180 hours
14.	Distribution of the available time	30+60+30+30+30 = 180 hours

15.	Teaching activities	15.1	Lectures	30 hours	
		15.2	Training (labs, problem solving), seminar and team work	60 hours	
16.	Other activities	16.1	Project work	30 hours	
		16.2	Self-study	30 hours	
		16.3	Home work	30 hours	
17.	Grading				
	17.1	Tests	60%		
	17.2	Seminar work/project (written or oral presentation)	30%		
	17.3	Active participation	10%		
18.	Grading criteria	to 50 points		5 (five) (F)	
		from 51 to 60 points		6 (six) (E)	
		from 61 to 70 points		7 (seven) (D)	
		from 71 to 80 points		8 (eight) (C)	
		from 81 to 90 points		9 (nine) (B)	
		from 91 to 100 points		10 (ten) (A)	
19.	Final exam prerequisites		Completed activities 15.1 and 15.2		
20.	Course language		Macedonian and English		
21.	Quality assurance methods		Internal evaluation and satisfaction polls		
22.	Literature				
	22.1	Compulsory			
		No.	Author	Title	Publisher
		1	Abraham Silberschatz, Henry Korth, S. Sudarshan	Database System Concepts	Fifth Edition McGraw-Hill
		2	Raghu Ramakrishnan Johannes Gehrke	Database Management Systems	McGraw-Hill Science Engineering
		3	Thomas M.Connolly and Carolyn E. Begg	Database Systems: A practical Approach to Design, Implementation and Management	Addison Wesley (5 th Edition)
		Year	2005	2005	2009
	22.2	Additional			
		No.	Author	Title	Publisher
		1	Carlos Coronel, Steven Morris and Peter Rob	Database Systems: Design implementation and Management	
2		R. Elmasri, S. Navathe	Fundamentals of Database Systems	Addison Wesley(6 th Edition)	
Year	2009	2010			

		3	H.Garcia-Molina, J. Ulman, J. Widom	Database Systems: The Complete Book	Prentice Hall (2 nd Edition)	2008
--	--	---	---	--	--	------

1.	Course title	Data and Computer Communications		
2.	Course code			
3.	Study program			
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester 3/winter/mandatory	7. ECTS: 6		
8.	Teacher(s)	Marjan Gusev, Full Professor, Dimitar Trajanov, Associate Professor, Dejan Spasov, Assistant Professor, Sonja Filiposka, Assistant Professor, Igor Miskovski, Assistant Professor		
9.	Course prerequisites	Computer Architecture and Organization (at least audit)		
10.	Goals (competences): Introduction to fundamental concepts in computer networks. Students will gain knowledge of network architectures, network protocols and how to design computer network. Students will be familiarized with main components and applications of TCP/IP protocol suite.			
11.	Course content: Fundamental models of communication, data communications and networks, protocols and their basic architecture, the idea behind standardization, data transfer, network types (LAN, MAN, WAN). Multiplexing and commutation. ISO/OSI and Internet, TCP/IP and ATM. Basic principles of physical layer and its limitations. Data layer: frame format, flow control, medium access layer and Ethernet-based networks. The ARP protocol. Network layer: routing protocols, IP protocol (address scheme, masks and subnetworks) RIP, OSPF, EIGRP routing protocols. Overview of Transport layer protocols and Application layer protocols. Principles of operation of DHCP and DNS. Overview of network security.			
12.	Teaching methods: Lectures with slide presentations, interactive lectures, exercises (using equipment and software packages), team work, use cases, guest lectures, individual work and project defence, online collaboration tools.			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	30+60+30+20+40 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	60 hours
16.	Other activities	16.1.	Project work	30 hours
		16.2.	Self study	20 hours
		16.3.	Home work	40 hours

1.	Course title	Mobile applications		
2.	Course code	CSES616		
3.	Study program	KNI, MT, PET, KE, IKI, ASI, INFO, IT		
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester	4/8 (3/6) elective		
7.	Number of Course credits	6 ESTC		
8.	Teacher(s)	Prof.dr. Vladimir Trajanovikj, Prof.Dr. Dimitar Trajanov, Prof. Dr. Ljupco Antovski, assist. Dr. Igor Mishkovski		
9.	Course prerequisites	Object-oriented programming		
10.	Goals (competences):	After the completion of the course it is expected that the student understands and has profound knowledge in using of the technologies and tools for organizing, storing, accumulating and processing data in a distributed mobile and all-round environment		
11.	Course content:	Interaction on mobile applications in an informational systems. Mobile applications and their interoperability with web based solutions. Multicontext mobile solutions. All-round devices and services. Mobile sensor technologies and applications. Technologies for communication in mobile applications. Technology for communication in close range. Mobile sensor systems. Integration with databases, work with memory on mobile devices, mobile animated graphics. Mobile social networks, location based apps and games, mobile E-Banking, Mobile electronic trade, mobile studying, mobile health services. Systems for mobile voting.		
12.	Teaching methods:	Lectures supported by presentations with slides, interactive lectures, exercises(use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums,consultations).		
13.	Total available time	6 ESTC x 30 Hours = 180 hours		
14.	Distribution of the available time	30+45+35+35+35= 180 hours		
15.	Teaching activities	15.1	Lectures	30 hours
		15.2	Training (labs, problem solving), seminar and team work	45 hours
16.	Other activities	16.1	Project work	35 hours
		16.2	Self-study	35 hours
		16.3	Home work	35 hours
17.	Grading			
	17.1	Tests	60 points	
	17.2	Seminar work/project (written or oral presentation)	30 points	
	17.3	Active participation	10 points	
18.	Grading criteria	to 50 points		5 (five) (F)
		from 51 to 60 points		6 (six) (E)
		from 61 to 70 points		7 (seven) (D)
		from 71 to 80 points		8 (eight) (C)
		from 81 to 90 points		9 (nine) (B)
from 91 to 100 points		10 (ten) (A)		

19.	Final exam prerequisites	Completed activities 15.1 and 15.2				
20.	Course language	Macedonian and English				
21.	Quality assurance methods	Internal evaluation and satisfaction polls				
22.	Literature					
	22.1	Compulsory				
		No.	Author	Title	Publisher	Year
		1	Reza B'Far	Mobile Computing Principles: Desining and Developing Mobile Applications with UML and XML	Cambridge University Press	2005
		2	James A.Brannan	Iphone SDK programming	McGraw Hill	2009
	3	Ivo Salmre	Writing Mobile Code	Addison Wesley	2005	
	22.2	Additional				
		No.	Author	Title	Publisher	Year
		1	Walker, J.	Mobile Information Systems	Artech House	1990
		2	Articles on the internet linked with mobile applications			
3						

1.	Course title	Web Development		
2.	Course code			
3.	Study program			
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester	7. ECTS: 6		
8.	Teacher(s)	Assoc. prof. dr. Dimitar Trajanov, assist. prof. dr. Goce Armenski		
9.	Course prerequisites	Internet technologies		
10.	Goals (competences): Development of advanced server based web applications based on templates. Development of cloud based web applications.			
11.	Course content: MVC Template for development of web applications. Asynchronous calls to web services. Basic tools for development of MVC for web applications. URL routing. Controllers and actions. Filters. Extending controllers. Views. Models templates. Connecting models. Model validation. Ajax. jQuery. Security. Authentication and authorisation. Web API. Installation of web applications. Web development in cloud. Using cloud as a platform for development of web applications. Storing data in the cloud. Using and creating services in the cloud.			
12.	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	30 + 45 + 40 + 30 + 35= 180		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	45 hours
16.	Other activities	16.1.	Project work	40 hours
		16.2.	Self study	30 hours
		16.3.	Home work	35 hours
17.	Grading			
	17.1.	Tests		60 points
	17.2.	Seminar work/project (written and oral presentation)		30 points
	17.3.	Active participation		10 points
18.	Grading criteria		to 50 points	5 (five) (F)
			from 51 to 60 points	6 (six) (E)
			from 61 to 70 points	7 (seven) (D)
			from 71 to 80 points	8 (eight) (C)

		from 81 to 90 points	9 (nine) (B)	
		from 91 to 100 points	10 (ten) (A)	
19.	Final exam prerequisites	Completed activities 15 and 16		
20.	Course language	Macedonian and English		
21.	Quality assurance methods	Internal evaluation mechanisms supported by student polls		
22.	Literature			
	22.1.	Compulsory		
		No.	Authors	Title
		1.	Adam Freeman	Pro ASP.NET MVC 4
		2.	Marten Deinum , Koen Serneels , Colin Yates , Seth Ladd , Christophe Vanfleteren	Pro Spring MVC: With Web Flow
	3.	Tejaswi Redkar , Tony Guidici	Windows Azure Platform 2nd Edition	
	22.2.	Additional		
		No.	Authors	Title
		1.	Adam Freeman , Matthew MacDonald , Mario Szpuszta	Pro ASP.NET 4.5 in C#
		2.	Alexander Reelsen	Play Framework Cookbook
3.				

1.	Course title	Implementation of Open Source System
2.	Course code	CSEW514
3.	Study program	IKI, KNI, ET
4.	Unit offering the course	FCSE
5.	Undergraduate/postgraduate/PhD	Undergraduate
6.	Year/semester	4/Winter
7.	ECTS	6
8.	Teacher(s)	assist. dr. Ivan Corbev, prof. dr. Dragan Mihajlov, assoc. prof. dr. Dejan Gjorgjevikj, assist. dr. Gjorgji Madzarov
9.	Course prerequisites	/
10.	Goals (competences):	After completing the course it is expected that the students will be able to contribute to bigger software teams who work using technologies with open source code. To be able to work in program languages with open source code, to develop web applications on those platforms. To be able to lead a software project based on technologies with open code
11.	Course content:	<p>History of the concept of systems with open source code. Software with open source code (Free/Open Source Software- FOSS).Philosophy of development with open source code. Hardware with open source code.</p> <p>Economic analysis of systems with open source code. Business analysis. Business models. Patenting. Licensing with open source code and types of licensees (GNU General Public License (GPL)), Comparison with systems with closed source code. Comparison with free software.</p> <p>Application software with open source code. Operating Systems with open source code. Program Language for development with open source code (PHP, Perl, Python, Ruby, PHDL). Server software with open source code. Widely used products with open source code (LAMP) Educational system with open source code</p> <p>Development tools for software with open source code. Models for Open Source Development. Following the development of the projects, managing the changes. Templates implemented in open source platforms. Libraries based on platforms with open source code (possible - Code Igniter, Zend Studio, Yii framework). Practical techniques for development of web applications with open source code. Standards for coding and documentation.</p> <p>Security of software with open source code. Support for systems with open source code (communities for OSS development). Blogs, groups, forums, social networks for OSS. Future of software with open source code.</p>

12	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).					
13	Total available time			6 ECTS x30 hours=180 hours		
14	Distribution of the available time			30+15+30+105=180 hours		
15	Teaching activities	15.1	Lectures	30 hours		
		15.2	Training (labs, problem solving), seminar and team work	45 hours		
16	Other activities	16.1	Project work	35 hours		
		16.2	Self-study	35 hours		
		16.3	Home work	35 hours		
Grading						
17	17.1	Tests			70 points	
	17.2	Seminar work/project (written or oral presentation)			20 points	
	17.3	Active participation			10 points	
18	Grading criteria	to 50 points			5 (five) (F)	
		from 51 to 60 points			6 (six) (E)	
		from 61 to 70 points			7 (seven) (D)	
		from 71 to 80 points			8 (eight) (C)	
		from 81 to 90 points			9 (nine) (B)	
from 91 to 100 points			10 (ten) (A)			
19	Final exam prerequisites			Completed activities 15.1 and 15.2		
20	Course language			Macedonian and English		
21	Quality assurance methods			Internal evaluation and satisfaction polls		
Literature						
22	22.1	Compulsory				
		No.	Author	Title	Publisher	Year
		1	Allen Tucker, Ralph Morelli, Chamindra de Silva	Software Development: An Open Source Approach (Chapman & Hall/CRC Innovations in Software Engineering and Software Development Series)	CRC Press	2011
		2	Luke Welling, Laura Thomson	PHP and YSQL Web Development(4 th Edition)	Addison-Wesley	2009
3	Aarpm Saray	Professional PHP Design patterns	Wrox Programmer	2009		

					to Programmer	
22.2	Additional					
	No.	Author	Title	Publisher	Year	
	1	Amy Brown, Greg Wilson	The Architecture of Open Source Applications	Lulu.com	2012	
	2	Joseph Feller, Brian Fitzgerald, Scott A.Hissam, Karim R. Lakhand	Perspectives on Free and Open Source Software	The MIT Press	2007	
3	Matt zandstra	PHP Objects, Patterns, and Practice 2 nd Edition	Apress	2007		

1.	Course title	Virtualization and Cloud Computing		
2.	Course code	CSES802		
3.	Study program	KNI, MT, ASI-KAM, IT/AKM		
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate, Postgraduate		
6.	Year/semester	3/summer/elective		
7.	Number of Course credits	6 ECTS		
8.	Teacher(s)	prof. dr. Marjan Gusev, assist. dr. Dejan Spasov, assist. dr. Boro Jakimovski, dr. Sasko Ristov		
9.	Course prerequisites	Computer System design, Administration of network services, Computer networks, Internet, min. 150 ECTS		
10.	Goals (competences) : This course will enable the students to gain knowledge of the concepts of the cloud and services in the cloud as well as teach them opportunities for implementing cloud solutions in an open source code.			
11.	Course content: Virtualization of processors, memory and storage, Virtual machines, concepts and application, installation and adjustments, Architecture and organization of the cloud, elasticity, scalability, multi-tenancy, sharing resources, basic models of cloud services - Software as a Service(SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS), private and public cloud, hybrid cloud, Social cloud, commercial cloud and cloud with an open source code, Advantages and disadvantages, problems of interoperability, techniques for optimal usage of resources in the cloud, performances in the cloud, standards for security, security risks and gains.			
12.	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).			
13.	Total available time	6 ECTS x 30 Hours =180 hours		
14.	Distribution of the available time	2+1+2+1		
15.	Teaching activities	15.1	Lectures	30 hours
		15.2	Training (labs, problem solving), seminar and team work	60 hours
16.	Other activities	16.1	Project work	15 hours
		16.2	Self-study	45 hours
		16.3	Home work	30 hours
17.	Grading			

	17.1	Tests			75 points	
	17.2	Seminar work/project (written or oral presentation)			20 points	
	17.3	Active participation			5 points	
18.	Grading criteria	to 50 points			5 (five) (F)	
		from 51 to 60 points			6 (six) (E)	
		from 61 to 70 points			7 (seven) (D)	
		from 71 to 80 points			8 (eight) (C)	
		from 81 to 90 points			9 (nine) (B)	
		from 91 to 100 points			10 (ten) (A)	
19.	Final exam prerequisites			Completed activities 15.1 and 15.2		
20.	Course language			Macedonian and English		
21.	Quality assurance methods			Internal evaluation and satisfaction polls		
22.	Literature					
	22.1	Compulsory				
		No.	Author	Title	Publisher	Year
		1	Stephen R Smoot, Nam K Tan	Private Cloud Computing: Consolidation, virtualization, and service-Oriented Infrastructure	Elsevier	2011
		2	Christian Baun, Marcel Kunze, Jens Nimis, Stefan Tai	Cloud Computing Web-Based Dynamic IT Services	Springer	2011
		3	George Reese	Cloud Application Architectures	O'Reilly	2009
	22.2	Additional				
		No.	Author	Title	Publisher	Year
		1	Paul Braham, Boris Dragovic, Keir Fraser, Steven Hand, Tim Harris, Alex Ho, Rolf Neugebauery, Ian Pratt, Andrew Warfield	Xen and the Art of Virtualization	ACM	2003
		2	Amazon Web Services	Virtual Private Cloud	Amazon	2012
	3	Venkata Josyula, Malcom Orr, Greg Page	Cloud computing: Automating the Virtualized Data Center	Cisco Press	2011	

1.	Course title	Web design		
2.	Course code			
3.	Study program	Computer Science and Engineering, Computer Networks Technologies, Applied E-Technologies, Education of Informatics, Professional Informatics Studies		
4.	Unit offering the course	FCSE		
5.	Undergraduate/postgraduate/PhD	Undergraduate		
6.	Year/semester	7. ECTS: 6	I	
8.	Teacher(s)	prof. dr. Dragan Mihajlov, assist. prof. dr. Ivan Chorbev, assist. prof. dr. Goce Armenski		
9.	Course prerequisites	None		
10.	<p>Goals (competences): Upon completion of the course candidates are expected to receive introductory knowledge on developing web pages with contemporary design, using HTML and cascading styles.</p> <p>We expect candidates to</p> <ol style="list-style-type: none"> 1. Demonstrate a basic understanding of the importance of good web page design. 2. Demonstrate practical knowledge about web design technologies and be able to apply basic knowledge in designing websites. 3. To communicate with the terminology specific to the field. 4. Critically evaluate examples of web sites. 			
11.	<p>Course content: Introduction to WWW, History of WWW. Basics of browsers.</p> <p>Structure of web pages with HTML 5 tags, attributes, history of tags and systems. Compatibility with previous versions of HTML and XHTML.</p> <p>Cascading styles - CSS3, properties, units of length, selectors and pseudo elements, Box model, positioning, margins, page layout organization - methods</p> <p>Introduction to design, methodologies,</p> <p>Structure and architecture of the site, navigation, functionality, web copywriting, typography, colour, design concepts, golden section, contrast.</p> <p>Fundamentals of Usability, Accessibility Basics.</p>			
12.	<p>Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).</p>			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	30 + 45 + 30 + 75 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	45 hours
16.	Other activities	16.1.	Project work	35 hours
		16.2.	Self study	35 hours

		16.3.	Home work	35 hours	
17.	Grading				
	17.1.	Tests		70 points	
	17.2.	Seminar work/project (written or oral presentation)		20 points	
	17.3.	Active participation		10 points	
18.	Grading criteria		to 50 points	5 (five) (F)	
			from 51 to 60 points	6 (six) (E)	
			from 61 to 70 points	7 (seven) (D)	
			from 71 to 80 points	8 (eight) (C)	
			from 81 to 90 points	9 (nine) (B)	
			from 91 to 100 points	10 (ten) (A)	
19.	Final exam prerequisites		Completed activities 15.1 and 15.2		
20.	Course language		Macedonian and English		
21.	Quality assurance methods		Internal evaluation and satisfaction polls		
22.	Literature				
	22.1.	Compulsory			
		No.	Authors	Title	Publisher
		1.	Jon Duckett	HTML and CSS: Design and Build Websites	Wiley; 1 edition
		2.	Jennifer Niederst Robbins	Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics Web Design, 2nd Edition	O'Reilly Media; Fourth Edition edition
		3.	Elisabeth Robson	Head First HTML and CSS	O'Reilly Media; Second Edition edition
	22.2.	Additional			
		No.	Authors	Title	Publisher
		1.	Deitel, Deitel	How to program, Java, 8th edition	Prentice Hall
2.					

1.	Course title	Media and Communications
2.	Course code	CSES413
3.	Study program	Applied E-Technologies
4.	Unit offering the course	FCSE
5.	Undergraduate/postgraduate/PhD	Undergraduate
6.	Year/semester	
7.	ECTS	6
8.	Teacher(s)	prof. dr. Vladimir Trajkovikj
9.	Course prerequisites	/
10.	<p>Goals (competences):</p> <p>After completing the course it is expected that the student understands the basic concepts of the communicology as a science, as well as have deeper knowledge in application of existing techniques and realization for improving the communication between two communities. A special focus will be put on the new media and the way they affect different social spheres.</p>	
11.	<p>Course content:</p> <p>First Part: Communications</p> <p>Communicology as a science, definitions for communications.</p> <p>Social meaning and forms of communication, mass communication</p> <p>Message, impact of technology on the message</p> <p>Computer supported communications, advantages and limits, forms and shapes</p> <p>Modeling of computer communications – communication channels and channels and basics of human computer interaction and human - computer – human</p> <p>Web 1.0, Web 2.0 and Web 3.0 paradigm (Communication instead of collaboration)</p> <p>Second part: Media</p> <p>Media, definition, application</p> <p>New media versus old media</p> <p>Types of new media (electronic media)</p> <p>Virtual communities and societies</p>	

	Games as a new media					
	Cyber citizen and his connection with non-cyber space (eTrade, eSociety, eElection, cyber democracy, cyber identities Digital fun)					
12.	Teaching methods: Lectures supported by presentations with slides, interactive lectures, exercises (use of equipment and software packages), real life examples, invited guest lecturers, preparation and defence of a project work and seminar thesis, learning in an e-environment (forums, consultations).					
13.	Total available time			6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time					
15.	Teaching activities	15.1	Lectures	30 hours		
		15.2	Training (labs, problem solving), seminar and team work	45 hours		
16.	Other activities	16.1	Project work	30 hours		
		16.2	Self-study	30 hours		
		16.3	Home work	45 hours		
17.	Grading					
	17.1	Tests			40 points	
	17.2	Seminar work/project (written or oral presentation)			40 points	
	17.3	Active participation			20 points	
18.	Grading criteria	to 50 points		5 (five) (F)		
		from 51 to 60 points		6 (six) (E)		
		from 61 to 70 points		7 (seven) (D)		
		from 71 to 80 points		8 (eight) (C)		
		from 81 to 90 points		9 (nine) (B)		
		from 91 to 100 points		10 (ten) (A)		
19.	Final exam prerequisites			Completed activities 15.1 and 15.2		
20.	Course language			Macedonian and English		
21.	Quality assurance methods			Internal evaluation and satisfaction polls		
22.	Literature					
	22.1	Compulsory				
		No.	Author	Title	Publisher	Year
		1	Manuel Castells	Communication Power	Oxford University Press	2009
		2	David Holmes	Communication Theory: Media, Technology and society	Sage publishers	2005
3		Nicholas Gane, David Beer	New Media: Key Concepts	Berg publishers	2008	

		Additional				
		No.	Author	Title	Publisher	Year
	22.2	1	Manuel Castells	The rise of the Network Society	BlackWell Publishers	2000
	22.2	2	Noah WardripFruin, Nick Montfort (editors)	The NewMedia Reader	MIT Press	2003
		3	Articles about the internet linked with new mediums			

Course title	Business and management systems		
Teacher(s)	assist.dr. Goran Velinov, assist.dr. Smilka Janeska - Sarkanjac		
Status	Compulsory	ECTS	6
Semester	2	Weekly classes	3+2+1
Course prerequisites	None		
Class Realization	Lectures, exercises, laboratory exercises, studies on a case, papers, presentations		
Goals (competences)	Introducing the economic way of thinking, basic microeconomic and macroeconomic terms. Introducing the principles of management with formal organizations, recognition of different challenges with the managers of today face - planning, organizing, leading and controlling. Acquiring knowledge about concepts of business and management information systems, as well as their meaning in the development of a business.		
Course content	<p>Introduction to business and management information systems – key concepts: ICT Systems and Infrastructure in service of the business; applying of information systems in businesses – e-Business and e-Trade, assessment of needs and impact of information systems of a business; management of information systems – planning, strategy, management, implementation; Development of information systems – technologies, methodologies, resources, future directions.</p> <p>Defining economy, which is the central economic problem, offer and demand, basic macroeconomic notions, BDP and economic growth.</p> <p>Definition and characteristics of management and managers; History of science for management; Limits and challenges which today's managers face, process of making decisions; strategic management; tools and techniques for planning, structure of organizations; management of human resources, management of teams, motivation of employees; control.</p>		
Literature	<p>Paul Beynon-Davies, Business Information Systems, Palgrave Macmillan, 2009</p> <p>Stephen Haag, Maeve Cummings, Donald J. McCubbery. Management Information Systems for the Information Age, McGraw-Hill 2008</p> <p>Michael Parkin, Macroeconomics, Addison-Wesley, 2012</p> <p>Stephen P. Robbins, Mary Coulter, Management, Prentice Hall, 2012</p> <p>Taki Fiti, Economics, Economic Faculty Skopje, 2008</p> <p>Bobek Shuklev, Management, Economic Faculty Skopje, 2004</p>		

Management Information Systems (3+2) 6 ECTS

Organization, management and enterprise networking. Managing digital firm. Information systems in the enterprise. Information Systems Organizations, Management, and strategies. Digital Firm: Electronic Business and electronic commerce. Ethical and social aspects of the digital firm. Security and control. Analyzing business processes of an enterprise, Infrastructure Information technology. IT infrastructure platforms. Telecommunications networks and the Internet. Wireless revolution. Creating a new Internet business. Systems and organizational management support for digital firm. Applications in the enterprise and integration of business processes. Knowledge management in the digital firm. Improvement of decision-making in the digital firm. Designing Information Portal for enterprise. Building and managing information systems. Reorganize design of information systems. Understanding the business value systems and change management. Management International Information Systems.

Course prerequisites: min. 30 ECTS

Literature: Cenneth C. Laudon, Jane P. Laudon, Management Information Systems, Prentice Hall, 2006. Whitten, Bentley, and Dittman Systems Analysis & Design, (2004), Systems Analysis and Design Methods, 6th Edition. McGraw-Hill

Team Work (3+2) 6 ECTS

The students in the final semester are given the opportunity to develop a larger project in a group under the supervision of a mentor. Placed emphasis on teamwork and development of complex software. Desirable practice in a firm.

Course prerequisites: min. 120 ECTS

Literature: Different sources, Internet...

Management and Marketing (FINKI) (2+2) 6 ECTS

Definition of management and managers, management level and evolution, scientific management, human resources and information technology, marketing management, international and global management; Deciding, diagnosing, preventive solving problems and crises; Planning, setting the objectives, policies for the realization of objectives: resources, procedures, rules, budget, Alternatives, action, strategy; Organizing concept, principles and models authority, power and influence, information systems; Motivating, concepts, Components of the person; Morale and productivity, and self management, self realization, group dynamics, groups, groupings and control groups;

Rewarding, communication barriers; process, hazards, media transmission of information, transactional analysis; Leadership theories and efficiency; Controlling, process, stages, types and techniques borders; Operational systems; properties, ecology, classification, types, information technology, application, quantitative methods, deterministic and statistical models, game theory; international organizations and companies, trade and circulation of capital, global strategic planning, cultural aspects.

Course prerequisites: none

Literature: Russ Winer, Marketing Management Prentice Hall, 2006