



Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Mobile Devices and Systems</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.1
Year:	1
Semester:	I
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	15
Lecture	15
Classes	0
Laboratory	0
Project	0
Number of ECTS credits:	2
Form of assessment:	<i>Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	Learning about mobile devices types
CO2	Learning about modern mobile operating systems
CO3	Learning about data transmission standards
CO4	Learning about systems for mobile application distribution
CO5	Preparing for mobile application development

Prerequisites in terms of knowledge, skills and other competencies

1	Basic knowledge of modern operating systems (Windows and Linux in particular)
2	Basic knowledge of mobile technologies
3	English

Learning outcomes (LO)

	In terms of knowledge:
LO1	Student knows mobile devices and mobile platforms
LO2	Student has knowledge concerning mobile operating systems and their architecture
LO3	Student is familiar with wireless communications standards and data transmission standards
LO4	Student knows how to prepare a mobile application for distribution

	In terms of skills:
LO5	Student can recognize and setup a mobile device and application runtime environment
LO6	Student is able to setup programming tools for a mobile application developer (for selected modern mobile platforms)
LO7	Student can select appropriate data transmission standards
	In terms of social competence:
LO8	Student understands the need for continuous improvement of his/her skills due to the rapidly changing environment of mobile devices.

Course content	
Form of classes - lectures (L)	
	Course content
L1	History of mobile devices and mobile operating systems
L2	Modern mobile operating systems and their architecture
L3	Wireless communications standards
L4	Data transmission standards
L5	Software distributions systems for mobile devices
L6	Preparing programming tools for a mobile application developer

Required textbooks and other course materials	
1	Mobile Computing: Technology, Applications, and Service Creation - Asoke K. Talukder, Roopa R. Yavagal - McGraw-Hill Communications Engineering 2007
2	<i>Mobile Computing</i> - 2 nd edition - Devi Kamal - Oxford University Press 2012
3	<i>Ubiquitous Computing: Smart Devices, Environments and Interactions</i> - Stefan Poslad - Wiley 2009
Recommended textbooks and other course materials	
1	<i>Android in Practice</i> - Charlie Collins, Michale Galpin, Matthias Kaeppler - Manning Publications 2012
2	<i>Beginning Windows Phone 7 Development</i> - Henry Lee, Eugene Chuvyrov - Apress 2010
3	<i>The iOS 5 Developer's Cookbook</i> - Erica Sadun - Addison-Wesley 2012

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Java - mobile programming</i>
Type of the course:	<i>Obligatory</i>
Course code:	<i>IMSM1.2</i>
Year:	<i>1</i>
Semester:	<i>1</i>
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	<i>60</i>
Lecture	<i>30</i>
Classes	<i>0</i>
Laboratory	<i>30</i>
Project	<i>0</i>
Number of ECTS credits:	<i>5</i>
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Introduction to mobile platforms and how to program these platforms
CO2	Introduction to programming in Java language for mobile platforms and teamwork
CO3	Presentation of methods for developing applications for mobile devices using their hardware and system capabilities

Prerequisites in terms of knowledge, skills and other competencies	
1	Algorithms and data structures
2	Object programming
3	Java language

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	The student has knowledge of the evolution of modern mobile operating platforms and their operating systems and knowledge in the field of programming languages to create mobile applications
LO 2	The student has an extended knowledge of Java language syntax and programming, which is useful for solving simple programming tasks on mobile platforms
LO 3	The student knows the basics of creating and applying mobile applications

	that use a graphical user interface, event handling, persistent data storage, media processing, and communicating through the communication interfaces available on mobile devices
	In terms of skills:
LO 4	Student can define the specification of the complex program and according to the given specification - create a program for a mobile device using the right programming techniques
LO 5	The student is able to plan a solution to a programming problem, perform a simulation of the operation using the emulators of mobile devices and physical mobile devices, and can draw conclusions from the obtained results
LO 6	The student is able to find the software, technical documentation and information necessary to complete the development tasks related to mobile platforms
	In terms of social competence:
LO 7	The student is able to collaborate and work in a group on the specification and implementation of mobile applications, taking on different roles in the team

Course content	
Form of classes - lectures (L)	
	Course content
L1	Introduction to Android platform: virtual machine, development tools, Java packages, emulators, services
L2	Structure and lifecycle of an application for Android system
L3	Graphical User Interface: preparing containers and components, management of component layout, event handling
L4	Processing of application resources, content providers, filesystem
L5	Data persistence: backups, databases
L6	Application security and permissions: security architecture, application signing, user identification, file access, declaration and verification of permissions
L7	Network communication and internet applications
L8	Wi-Fi connections
L9	Multimedia, 2D and 3D graphics processing
L10	Simple game programming
L11	Geographical location: use of GPS data
L12	Bluetooth communication: basics, permissions, Bluetooth device discovery, device connectivity as a client, server creation, connection management
L13	Deployment of applications: localisation of applications, application signing, version management, licences, preparing for distribution
Form of classes - laboratories (Lab)	

	Course content
Lab1	Introduction to Android platform. Introduction to the tools used in the lab. Create a simple application
Lab2	Developing of an application with Graphical User Interface
Lab3	Application for resource processing
Lab4	Developing of an application for 2D graphics processing
Lab5	Developing of an application using network connections
Lab6	Developing of an application for data persistence
Lab7	Developing of an application for multimedia processing
Lab8	Developing of simple game
Lab9	Description of small student projects
Lab10	Developing of individual applications based on given project subjects
Lab11	Presentation of project results
Lab12	Assessment and credit improvement laboratory

Required textbooks and other course materials	
1	Burnette E.: Hello, Android: Introducing Google's Mobile Development Platform., Pragmatic Bookshelf , 2010
2	Steele J.: The Android Developer's Cookbook: Building Applications with the Android SDK., Addison-Wesley Professional, 2010
3	Murphy M.: Beginning Android 3., Apress, 2011
4	Hashimi S., Komatineni S., MacLean D.: Pro Android 3., Apress, 2011
5	Conder S., Darcey L.: Android Wireless Application Development, 3rd edition, Addison-Wesley Professional 2012
6	Collins C., Galpin M., Kaeppler M.: Android in Practice, Manning 2012
Recommended textbooks and other course materials	
1	Eckel B.: Thinking in Java., Pearson Education, Inc., 2006
2	Friesen J.: Learn Java for Android Development, Apress, 2010

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>C# Mobile Programming</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.3
Year:	1
Semester:	I
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	0
Laboratory	30
Project	0
Number of ECTS credits:	5
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	<i>Getting knowledge of mobile application development in C# language</i>
CO2	<i>Practical knowledge of mobile application development for the Windows platform</i>

Prerequisites in terms of knowledge, skills and other competencies

1	Knowledge of object oriented programming
2	Knowledge of design pattern basics
3	Logical and creative thinking skills
4	Lifelong learning habits

Learning outcomes (LO)

	In terms of knowledge:
LO1	Student has basic and extended knowledge of programming in C# language for the Windows platform
LO2	Student has knowledge about user interface development in accordance of platform requirements
	In terms of skills:
LO3	Student can use selected technologies for mobile application development
LO4	Student can design and develop mobile application for the Windows platform using data binding techniques
LO5	Student can use existing documentation to gather information

	In terms of social competence:
LO6	Student understands a need for lifelong developing his or her own abilities in new programming languages and development environments

Course content	
Form of classes - lectures (L)	
	Course content
L1	Class creation syntax, interfaces and other code elements in C#. Collections.
L2	Building Windows mobile application. Usage of emulator, differences between project types. Application lifecycle.
L3	Designing user interface using controls and containers.
L4	Creating data models. Transferring data between data model and user interface. Data binding.
L5	Advanced usage of data binding, with conversion and formatting. Usage of styles and templates for elements of application view.
L6	Geolocation. Using mobile device sensors in mobile applications.
L7	Network communication. Usage of network sockets, web services and collecting data from the Internet.
L8	Storing data on the device. Using embedded databases and handling file input and output.
L9	Sharing data between applications. Utilization of user data from the device.
L10	Localization and internationalization. Developing multilingual applications and customizing for regional settings.
L11	Advanced user interface design
L12	Preparing application for publication in the Store. Application deployment
Form of classes - laboratories (Lab)	
	Course content
Lab1	C# language and Visual Studio development environment. Creating classes and their elements, using mechanisms available in the IDE.
Lab2	Building simple mobile application for Windows. Using the emulator and application testing. Using built-in project templates.
Lab3	Using built-in controls. Creating applications responding to user input.
Lab4	Data model creation. Preparing application for data binding.
Lab5	Usage of advanced data binding with formatting and conversions.
Lab6	Developing application that uses mobile device's sensors.
Lab7	Implementation of mobile application connecting to a web service using sockets.
Lab8	Building series of application saving and reading data from the device
Lab9	Applications cooperating with other applications. Data exchange data between applications.

Lab9	Implementation of multilingual application and preparing it to be published for end users.
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Required textbooks and other course materials	
1	Andrew Whitechapel, Sean McKenna, Windows Phone 8 Development Internals, Microsoft Press 2013
2	Charles Petzold, Programming Windows: Writing Windows 8 Apps With C# and XAML (Developer Reference), Microsoft Press 2013
3	http://dev.windows.com
Recommended textbooks and other course materials	
1	Kraig Brockschmidt, Programming Windows Store Apps with HTML, CSS and JavaScript, Wyd. 2, Microsoft Press 2014
2	Ian Griffiths, Programming C# 5.0: Building Windows 8, Web, and Desktop Applications for the .NET 4.5 Framework, O'Reilly 2012
3	Charles Petzold, Programming Windows Phone 7, Microsoft Press 2010

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Module/Course Syllabus Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Application Design with UML</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.4
Year:	1
Semester:	1
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	0
Laboratory	30
Project	0
Number of ECTS credits:	5
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	To familiarize students with techniques used in object-oriented design of computer application.
CO2	Practical learning of application design using dedicated supporting tools.

Prerequisites in terms of knowledge, skills and other competencies

1	Ability of programming in object-oriented languages.
2	Basic knowledge of software engineering, including database design principles.
3	The ability of logical and creative thinking.

Learning outcomes (LO)

	In terms of knowledge:
LO 1	A student has knowledge about object-oriented application design, in particular knowledge about UML, design patterns and MDA
LO 2	A student has knowledge about standards used in the process of software development.
	In terms of skills:
LO3	A student is able to design a computer system using object-oriented method in full project cycle
LO4	A student is able to properly use the selected tools dedicated to application design.
	In terms of social competence:
LO5	A student understands the need for proper implementation of the application design and can identify and resolve issues in application design tasks.

LO6	The student is able to work independently and in a team
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Course content	
Form of classes – lectures (L)	
	Course content
L1	An introduction to object-orientation, object-oriented programming. Analysis and modeling of object-oriented applications. Model perspectives.
L2	Requirements engineering and analysis. Object specification of system requirements. Use Case Scenarios.
L3	UML language - history and the present. General principles of UML language. The essence and typology of diagrams, diagrams relations. Stereotypes.
L4	External perspective. Use case diagrams. Sequence diagrams.
L5	Complex structures on UML diagrams. Package diagrams.
L6	Structural perspective. Classes and relationships modeling. Interfaces. Object diagram.
L7	Modeling of system dynamic – interaction perspective. Diagrams of communication.
L8	The behavior perspective. State and activity diagrams.
L9	Other UML diagrams. Component, deployment and implementation diagrams.
L10	UML profiling. OCL language.
L11	CASE tools. Code generation and reverse engineering.
L12	Analysis and design architecture. Frameworks.
L13	Design Patterns: basic concepts, applications, classification, examples. Patterns in the management and web applications. Interface patterns.
L14	MDA architecture. OMG standards.
L15	Object-oriented techniques in the databases design. ORM.
Form of classes – laboratories (Lab)	
	Course content
Lab1	Gathering and analysis of system requirements. The method of user stories.
Lab2	Requirements modeling - use case scenarios.
Lab3	Requirements verification - work in teams.
Lab4	Familiarize with CASE tools. Package and use cases diagrams.
Lab5	Class diagrams.
Lab6	Object diagrams.
Lab7	Sequence diagrams.
Lab8	Design patterns.
Lab9	Dynamic Diagrams: activities.
Lab10	Deployment diagrams.
Lab11	Consistency requirements analysis.
Lab12	User interface design.
Lab13	Implementation of projects in teams.
Lab14-15	Presentation and evaluation of projects.

Required textbooks and other course materials	
1	Schach S.: Object-Oriented Software Engineering. McGrawHill, NY 2008
2	Pilone D., Pitman N.: UML 2.0 in a Nutshell. O'Reilly. 2005.

3	Freeman E., Freeman E., Bates B., Sierra K.: Head First Design Patterns. O'Reilly. 2004.
Recommended textbooks and other course materials	
1	Wiegers K., Beatty J.: Software Requirements. Microsoft Press. 2013.
2	Larman C.: Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development. Prentice Hall PTR. 2004.

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Module/Course Syllabus
Computer Science
 Mobile Application Development – Master degree
 programme

Course:	<i>Preparation of Scientific Publications</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.5
Year:	1
Semester:	1
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	30
Lecture	15
Classes	-
Laboratory	15
Project	-
Number of ECTS credits:	2
Form of assessment:	<i>Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	To familiarize students with the problems of working with literature in the library, scientific databases, and the Internet
CO2	To develop skills of proper preparation of scientific papers
CO3	To familiarize students with the problems of the collection and processing of knowledge

Prerequisites in terms of knowledge, skills and other competencies	
1	The ability of logical and creative thinking

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	The student has knowledge of working with literature in the library, scientific databases, and the Internet
LO 2	The student has the knowledge of how to assess the scientific activity, citing sources, and compliance with copyright law
	In terms of skills:
LO 3	The student has the ability to properly prepare a scientific paper, its format and propose for publication
LO 4	The student has the ability to choose place of publication according to the content of the paper
	In terms of social competence:
LO 5	Student can understand the need to work and the collection and processing

	of knowledge, including the bibliographic
LO 6	Student is able to identify and resolve problems of the researcher's ethics

Course content	
Form of classes - lectures (L)	
	Course content
L1	The organization of the library. Features and capabilities of the library system in Poland and the university. Information resources. Terms of use
L2	Evaluation of scientific work. Quality of publications. Evaluation lists (Polish and foreign). Indexes. Systems publicise achievements. Social science and profession. Google Scholar, Research Gate, LinkedIn
L3	Scientific databases of bibliographic and full text (digital library). Databases: Web of ScienceDirect, Scopus, ACM, IEEE Xplore, Emerald, dblp. Search Rules, copying and use. E-legible. Standardization and patent database
L4	Bibliography management programs. Management software bibliographic inventories. Transfer of bibliographic descriptions. Create collections of bibliographic data, search and generate lists of publications in different styles
L5	Terms and citation styles (Oxford, Harvard and vancouver, APA, MLA)
L6	Purpose of scientific publication. Selection of topics, authors and journal publications. The principle of co-authorship
L7	Components of the publication: title, abstract, introduction, thesis/ hypothesis / material, research methodology, results, discussion, summary, bibliography, acknowledgments. Workshop on publication
L8	Language and formatting publications. Typical formats of journals
L9	Procedures for publication. Reviewing research papers. Taking into account the comments of reviewers
Form of classes - laboratories (Lab)	
	Course content
Lab1	Study visit to the library
Lab2	Working with digital databases - searching for publication on the selected subject
Lab3	Using a publication management software
Lab4	Development of the structure to the specified journal publications
Lab5	The literature research on a selected topic
Lab6	Writing a literature review on a selected topic
Lab7	Formatting article according to requirements of the journal

Required textbooks and other course materials	
1	Blackwell J., Martin J.: A Scientific Approach to Scientific Writing. Springer, 2011

2	James E. A., Slater T.: A map for writing your dissertation: Proven methods for finishing faster. Thousand Oaks, CA, USA. Sage Publications, 2013
Recommended textbooks and other course materials	
1	Kothari C.R., Garg Gaurav: Research Methodology: Methods and Techniques . New Age International, 3rd edition, 2014

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Web Applications for Mobile Devices</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.6
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	5
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	Familiarize students with the basic technologies and problems of web applications development for mobile devices.
CO2	Provide students with the principles of rich mobile internet applications and describe development tools.
CO3	Familiarize students with rules of data processing, presenting and management of multimedia content in mobile web applications.
CO4	Introduce to students the principles of specifying mobile internet applications and creation of user-friendly mobile interfaces.

Prerequisites in terms of knowledge, skills and other competencies

1	Basic knowledge of HTML, CSS and JavaScript
2	Basic knowledge of programming languages.
3	The habit of lifelong learning

Learning outcomes (LO)

	In terms of knowledge:
LO 1	Has knowledge of the trends and the most important new achievements in the field of mobile web applications development.
	In terms of skills:
LO 2	is able to effectively use information and communication technologies,

	including the engineering graphics, responsible for the mobile web applications development.
LO 3	is able to evaluate the usefulness and possibility of the use of new techniques in the field of mobile web applications development.
	In terms of social competence:
LO 4	is able to cooperate and work in a project group, assuming different roles.
LO 5	is able to think and act creatively and enterprisingly during realization of mobile web application development task.

Course content	
Form of classes - lectures (L)	
	Course content
L1	Mobile Internet applications - features, specificity, presentation of selected technologies of creation.
L2	HTML5 and CSS3 in mobile applications development. Typical user interfaces.
L3	Overview of HTML5 features useful in developing mobile applications.
L4	Data layer management. Availability of services and devices.
L5	Introduction of jQuery Mobile Library supporting web mobile applications development.
L6	jQuery Mobile Components and examples of their use.
L7	Other technologies of mobile application development
L8	3D graphics in mobile web applications - WebGL
L9	The PhoneGap / Apache Cordova tool for generation of native mobile applications based on HTML applications
Form of classes - laboratories (Lab)	
	Course content
Lab1	Introduction to Multimedia Internet Applications development, environments and tools.
Lab2	Design and construction of the correct mobile user interface.
Lab3	jQuery Mobile - creating interfaces and simple mobile applications
Lab4	jQuery Mobile - creating mobile applications with lists and forms, modal windows.
Lab5	Creating of simple mobile applications with other tools
Lab6	XDK - introduction to development tool. Creating and testing of simple applications.
Lab7	Applications of WebGL in mobile web apps - 3D visualization.
Lab8	Performing task of building a functional mobile web application.
Lab9	Classes Summary - presentation of the applications created by students, discussion of the correctness and assessment of their projects.

Required textbooks and other course materials	
1	Weyl E., Mobile HTML5, O'Reilly Media, 2013

2	Camden R., Matthews A., jQuery Mobile Web Development Essentials, 2nd Edition, Packt Publishing, 2013
3	Clark J. E., Johnson B. P.; Creating Mobile Apps with Sencha Touch 2, Packt Publishing, 2013
Recommended textbooks and other course materials	
1	Parisi T., Programming 3D Applications with HTML5 and WebGL, O'Reilly Media, 2014
2	Wargo J. M., Apache Cordova 3 Programming, Addison-Wesley, 2013

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Module/Course Syllabus
Computer Science
 Mobile Application Development – Master degree
 programme

Course:	<i>Human-Computer Interaction</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM1.7
Year:	1
Semester:	1
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	45
Lecture	15
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	4
Form of assessment:	<i>Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Understanding the problems of interaction between human and computer
CO2	Skills in designing systems of interaction between human and computer, using supporting tools
CO3	Learning the methods and techniques and their practical application, system usability testing interaction between human and computer

Prerequisites in terms of knowledge, skills and other competencies	
1	Basic knowledge of software engineering and the creation of interfaces
2	The ability of logical and creative thinking

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	Knows the methodology and systems development paradigms of human-computer interaction
LO 2	Has knowledge of the methods and techniques, and systems design standards of interaction between human and computer
LO 3	Has knowledge of the methods and techniques of usability testing systems interaction between human and computer
	In terms of skills:
LO 4	The student is able to design systems of interaction between human and computer
LO 5	The student is able to design systems of interaction between human and

	computer
	In terms of social competence:
LO 6	The student understands the importance of the interface and its usefulness in the correct use of information systems

Course content	
Form of classes - lectures (L)	
	Course content
L1	Introduction to ergonomics of systems. The theory of action. Cognitive effort and memorability
L2	Models of interactions between human and computer
L3	Types and objects of software interface
L4	The quality of the software interfaces
L5	Usability and accessibility of information systems
L6	Software interfaces designing - general scheme
L7	User-oriented design (UCD)
L8	Tools for interface design
L9	Quality assessment of the software interfaces. Methods, techniques and tools
Form of classes - laboratories (Lab)	
	Course content
Lab1	Context analysis using the brainstorming technique
Lab2	Defining the requirements of system users. Observation of potential users, and interviews
Lab3	Creating and grouping person
Lab4	Prototyping: creating sketches interface
Lab5	Prototype testing: testing corridor
Lab6	Prototyping: creating a Web application skeleton using tools supporting
Lab7	Test of usability application using the tests with the user. Preparation of the test with the user: the purpose of the test plan and scenarios. Selection of research group. Testing. Preparation of the report of the tests. Develop recommendations (1)
LAB8	Usability testing of the application interface using the selected heuristics. Prepare a report / report. Develop recommendations (2)
Lab9	Usability testing of the application interface using an eye tracker. Preparation of the test plan, testing, and report generation from the study. Develop recommendations (3)
Lab10	Studies on the application interface accessibility using tools

Required textbooks and other course materials	
1	Dix A., Finlay J. Abowd G., Beale R.: Human-Computer Interaction. Prentice Hall, 2004
2	Sharp H., Rogers Y., Preece J.: Interaction Design. Beyond Human-Computer Interaction. Wiley, 2005
3	Rubin J., Chisnell D., Spool J.: Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Wiley, 2008
4	Nielsen J.: Mobile Usability. New Riders, 2012
Recommended textbooks and other course materials	
1	Neil T.: Mobile Design Pattern Gallery. O'Reilly Media, 2012
2	Nielsen J.: Eyetracking Web Usability. New Riders, 2009
3	Rubin J., Chisnell D., Spool J.: Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Wiley, 2008
4	Allen J., Chudley J.: Smashing UX Design: Foundations for Designing Online User Experiences. O'Reilly Media, 2011
5	Tidwell J.: Designing Interfaces. Wiley, 2012

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Mobile Databases</i>
Type of the course:	<i>Obligatory</i>
Course code:	
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time studies</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	0
Laboratory	30
Project	0
Number of ECTS credits:	6
Form of assessment:	<i>exam</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	<i>Familiarize students with the basics of mobile processing and the possibilities of creating mobile database systems</i>
CO2	<i>To presents students the mobile database design and management on a different mobile platforms</i>

Prerequisites in terms of knowledge, skills and other competencies	
1	Knowledge of object oriented programming in Java or C# languages.
2	Knowledge of relational databases design and usage.
3	SQL language knowledge.

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	The student has knowledge about the most important features of mobile devices and mobile databases usage.
LO 2	The student has knowledge about standards and architectures of mobile database systems regarding to different mobile platform.
	In terms of skills:
LO 3	The student can design an application with the use of mobile database.
LO 4	The student can manage data integrity in mobile databases, in particular can realize queries and data synchronization.

	In terms of social competence:
LO 5	The student presents specialized tasks and projects in an accessible form, in a comprehensible manner.
LO 6	The student is able to identify and resolve dilemmas related to the implementation of different mobile databases.

Course content	
Form of classes - lectures (L)	
Course content	
L1	Introduction, characteristics of distributed mobile database systems.
L2	Different types of data storages in mobile devices.
L3	Distributed database design, fragmentation, allocation
L4	Query processing in mobile databases, query decomposition, data localization, optimization
L5	Other mobile database architectures
L6	Query languages in mobile databases.
L7	Data manipulation on mobile databases.
L8	Operation on data objects in mobile databases
L9	File databases
L10	Architecture of databases for mobile systems
L11	Developing of mobile applications using databases
L12	Complex systems of databases for mobile systems
L13	Application development using database for mobile systems (SQLite database, database support from application code level - CRUD operations, database access with Content Provider)
L14	Administration of the mobile databases
Form of classes - laboratories (Lab)	
Course content	
Lab1	Design distributed databases, including replication, partitioning and data allocation.
Lab2	Queries in distributed mobile databases
Lab4	Mobile databases for Android platform, design and usage.
Lab5	Mobile databases for Windows Phone platform, design and usage.
Lab6	Mobile databases for iOS platform, design and usage.
Lab7	SQL Lite mobile database, writing the sensors data
Lab8	Realization of student project.
Lab9	Presentation and evaluation of projects.

Required textbooks and other course materials	
1	<i>Kumar V.: Mobile Database Systems - Wiley 2006</i>

2	<i>Jason Wei. Android Database Programming. Packt. 2012</i>
3	<i>Jay A. Kreibich: Using SQLite . O'Reilly 2010</i>
Recommended textbooks and other course materials	
1	<i>Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill</i>
2	<i>Kevin Ebi, Organize your business with a mobile database, Microsoft.com</i>

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Name of the course</i>
Type of the course:	<i>Core/Obligatory/Elective</i>
Course code:	IMSM2.2
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	6
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Familiarize students with the basic tools and problems of computer graphics in mobile applications.
CO2	Provide students with the principles of 2D graphics processing for mobile applications.
CO3	Provide students with the principles of 3D graphics processing for mobile applications.
CO4	Familiarization with the principles of modeling, animation and creation of multimedia sources for mobile applications.

Prerequisites in terms of knowledge, skills and other competencies	
1	Basic knowledge of CSS
2	Basic knowledge of programming languages.

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	has detailed theoretical knowledge of selected topics related to graphics in mobile applications.
LO 2	knows the algorithms, methods, techniques and tools used to solve advanced problems of graphics processing in mobile devices
	In terms of skills:

LO 3	can obtain, integrate and interpret information regarding computer graphics from the literature, databases, and other sources in English; can make their critical evaluation, as well as can draw conclusions and formulate fully justified opinions
LO 4	is able to evaluate the usefulness and possibility of the use of specific techniques for fulfilling the task that requires the use of computer graphics in mobile device
	In terms of social competence:
LO 5	is able to think and act creatively and enterprisingly during realization of tasks requiring graphics and sound processing

Course content	
Form of classes - lectures (L)	
	Course content
L1	Basic concepts of 2D and 3D graphics.
L2	Overview of computer graphics processing tools.
L3	Basic raster operations, image scaling, interpolation.
L4	Geometric transformations of 2D and 3D objects.
L5	The specificity of graphics for mobile devices.
L6	Basics of touch interface design.
L7	3D Graphics - OpenGL ES Standard.
L8	OpenGL ES Shading Language basics
L9	Unity as a tool for developing 3D apps for mobile
L10	Unity- examples of simple 2D and 3D mobile apps
Form of classes - laboratories (Lab)	
	Course content
Lab1	Getting acquainted with tools for editing raster and vector graphics in 2D.
Lab2	Simple raster image processing: correction of image parameters, using filters, image correction using the area tools.
Lab 3	Creation of images such as icons and backgrounds - intended for mobile devices
Lab 4	building a mobile application interface
Lab 5	Displaying of 3D graphics in mobile devices
Lab 6	Combining vector and raster image, creating 3D graphics,
Lab 7	3D graphics processing and animation basics.
Lab 8	Performing design task of building a graphic application interface.
Lab 9	Classes Summary - presentation of the design work carried out by students, discussion of the correctness and assessment of their projects

Required textbooks and other course materials	
1	Neil T., Mobile Design Pattern Gallery, O'Reilly Media, 2012
2	Semko V., Marucchi-Foino R., Semko R., Game and Graphics Programming

	for iOS and Android with OpenGL ES 2.0, Wiley, 2012
3	Petrou M., Petrou C., Image Processing, 2nd Edition, Wiley 2010
Recommended textbooks and other course materials	
1	<i>Buttfield-Addison P., Manning J., Mobile Game Development with Unity, O'Reilly Media, 2017</i>

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Objective-C Programming</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM2.3
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	
Lecture	30
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	7
Form of assessment:	<i>Examination/Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	<i>Obtaining practical skills in creating the applications using Objective-C language in a development environment.</i>
CO2	<i>Acquiring the knowledge of both the structure of iOS system and the programming environment.</i>
CO3	<i>The ability to create mobile applications on the iOS platform.</i>

Prerequisites in terms of knowledge, skills and other competencies

1	<i>The ability of object-oriented programming.</i>
2	<i>Using English language on intermediate level.</i>

Learning outcomes (LO)

	In terms of knowledge:
LO 1	<i>The student has a structured and expanded knowledge of object-oriented programming in Objective-C language for software development.</i>
LO 2	<i>The student has detailed knowledge of the iOS architecture, the iOS mobile application development environment, as well as the advanced mobile application programming techniques for iPhone and iPad.</i>
	In terms of skills:
LO3	<i>The student has an intermediate and advanced skills in Objective-C programming in a development environment.</i>

LO4	<i>The student can develop an intermediate and advanced mobile application on iOS platform, test it on an emulator and a device.</i>
	In terms of social competence:
LO5	<i>The student is creative.</i>
LO6	<i>The student can organize the process of learning independently and in a group.</i>

Course content	
Form of classes – lectures (L)	
	Course content
L1	<i>Program Structure in Objective C. Presentation of data types, expressions and instructions.</i>
L2	<i>Definition of a class and its structure. Presentation classes, access to its components, methods and their arguments.</i>
L3	<i>Class inheritance, hermetization and polymorphism.</i>
L4	<i>Presentation typing, interfaces, categories, protocols and delegations.</i>
L5	<i>Introduction to mobile programming on the iOS platform, the iOS architecture presentation.</i>
L6	<i>Introduction to Model-View-Controller. Overview of controller and view.</i>
L7	<i>Creating and using table views in programming. Developing mobile applications using Storyboard.</i>
L8	<i>Maps and locations.</i>
L9	<i>Gesture recognition. Network support.</i>
L10	<i>Storing data. Data management.</i>
Form of classes – laboratories (Lab)	
	Course content
Lab1	<i>Familiarity with the development environment. Running and testing desktop applications.</i>
Lab2	<i>Creating desktop applications using object-oriented techniques in Objective-C language.</i>
Lab3	<i>Creating desktop application using advanced object-oriented features in Objective-C language.</i>
Lab4	<i>Assessment of acquiring the knowledge about developing desktop applications.</i>
Lab5	<i>A presentation the software environment dedicated for a mobile platform using an example application. An overview of the controller and view. Running and testing mobile applications.</i>
Lab6	<i>Using table views in mobile applications. Passing parameters between screens.</i>
Lab7	<i>Developing mobile applications with gesture recognition.</i>
Lab8	<i>Developing mobile applications with network support.</i>
Lab9	<i>Developing mobile application storing and manipulating data.</i>
Lab10	<i>Using the maps and locations in mobile applications.</i>
Lab11	<i>Assessment of acquiring the knowledge about developing mobile applications.</i>
Lab12	<i>Assigning applications for self-development in groups.</i>
Lab13	<i>Supervising the student's work and checking progress.</i>
Lab14	<i>Verification of the developed application.</i>

Required textbooks and other course materials	
1	Manning Jonathon, Buttfield-Addison Paris, Learning Cocoa with Objective-C, O'reilly Vlg. Gmbh&Co., Oreilly&Assoc Inc., 2012
2	Ch. Fairbairn, C. Ruffenach, J. Fahrenkrug, Objective-C Fundamentals,
3	iOS Developer Library, https://developer.apple.com/library/ios/navigation/#section=Resource%20Types&topic=Guides
4	Neuburg Matt, iOS 7 Programming Fundamentals. O'reilly Vlg. Gmbh&Co., Oreilly&Assoc Inc., 2014
5	E. Łukasik, M. Skublewska-Paszkowska. IOS Application Development Lublin: PIPS Polish Information Processing Society, 2016.
Recommended textbooks and other course materials	
1	<i>Programming with Objective-C</i> https://developer.apple.com/library/content/documentation/Cocoa/Conceptual/ProgrammingWithObjectiveC/Introduction/Introduction.html
2	<i>M. Skublewska-Paszkowska, E. Łukasik, iOS mobile to route determining, Logistyka 2/2014</i>

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Mobile Business Intelligence Systems</i>
Type of the course:	<i>Obligatory</i>
Course code:	<i>IMSM2.4</i>
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	6
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Gaining the knowledge about the concept of mobile business intelligence in management of contemporary organization
CO2	Gaining the competencies required for designing and implementing the mobile business intelligence solutions that use data warehouses
CO3	Gaining the competencies to explore, analyze and visualize data with use of mobile business intelligence systems

Prerequisites in terms of knowledge, skills and other competencies	
1	Database fundamentals
2	Database languages

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	Student has a knowledge necessary to understand the concept of mobile business intelligence in enterprise management
LO 2	Student has detailed knowledge about data warehouses designing and multidimensional modeling
LO 3	Student knows and can describe particular phases of designing and implementing of mobile business intelligence solutions that use data warehouse

LO4	Student knows the techniques and IT tools used in mobile business intelligence to analyze and visualize data
	In terms of skills:
LO5	Student is able to build the conceptual and logical model of the data warehouse
LO6	Student is able to design ETL process to supply data warehouse with data
LO7	Student is able to create analytical reports designed for mobile devices with use of data warehouse as a data source
LO8	Student is able to create dashboards designed for mobile devices with use of data warehouse as a data source
	In terms of social competence:
LO9	Student understands and can describe the impact of concept of traditional and mobile business intelligence on the way the enterprise operates
LO10	Student is able to prioritize the activities while designing and implementing the mobile business intelligence solutions
LO11	Student is able to think and to operate creatively while designing and implementing the mobile business intelligence solutions

Course content	
Form of classes - lectures (L)	
	Course content
L1	The fundamental terms related with business intelligence (BI). The place of BI in the architecture of information systems. The areas of implementation of BI systems. Mobile BI and its importance in decision making.
L2	The architecture of BI systems. The place of data warehouse in BI systems.
L3	The fundamentals of business analytics.
L4	The fundamental terms related to data warehouses.
L5	The place of data warehouse in enterprise information system ecosystem. The areas of data warehouse implementation. Trends of development of data warehouses.
L6	The architectures of data warehouse.
L7	The strategies for data warehouse building and the stages of its designing.
L8	Data models used in data warehouse (ROLAP, MOLAP, HOLAP).
L9	ETL process and its importance in the life cycle of data warehouse.
L10	Data exploration and data mining in BI systems.
L11	The IT tools used in designing and implementing mobile BI systems.
Form of classes - laboratories (Lab)	
	Course content
Lab1	The analysis of business area that will be supported by designed mobile BI system. Definition of aims of system building. Creating the business

	model for a chosen enterprise.
Lab2	Designing the conceptual model of data warehouse.
Lab3	Applying the ROLAP data model in the project of data structures. Defining the structure of fact and dimension tables as well as hierarchies for particular dimensions.
Lab4	Defining ETL process.
Lab5	Creating data warehouse repository and mobile BI repository.
Lab6	Creating analytical reports fitted for mobile devices with use of data warehouse as a data source
Lab7	Creating dashboards fitted for mobile devices with use of data warehouse as a data source

Required textbooks and other course materials	
1	Wilfried Grossmann , Stefanie Rinderle-Ma , Fundamentals of Business Intelligence, Springer, 2015
2	Ralph Kimball, Margy Ross, The Kimball Group Reader: Relentlessly Practical Tools for Data Warehousing and Business Intelligence, Wiley Publishing, 2010
3	William H. Inmon, Building the data warehouse, Third Edition, Wiley Publishing, 2002
Recommended textbooks and other course materials	
1	Aberdeen Group Publications , http://www.aberdeen.com/_aberdeen/business-intelligence/BIAV/practice.aspx
2	Business Intelligence Journal, https://tdwi.org/research/list/tdwi-business-intelligence-journal.aspx
3	David Stodder, Mobile Business Intelligence and Analytics, TDWI Best Practices Report, TDWI Research, 2013
4	Howard Dresner, Mobile Computing / Mobile Business Intelligence Market Study. Wisdom of Crouds, Dresner Advisory Services, 2014

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Module/Course Syllabus *Computer Science*

Mobile Application Development – Master degree programme

Course:	<i>Fundamentals of Normalization / Introduction to the labor market</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM2.6
Year:	I
Semester:	2
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	30
Lecture	30
Classes	
Laboratory	
Project	
Number of ECTS credits:	2
Form of assessment:	<i>Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Acquiring knowledge in the field of normalization applied in modern technical activity
CO2	Understanding the rules of using norms and normative literature
CO3	Acquiring knowledge on terms and procedures in the field of national, European and international normalization
CO4	Giving knowledge about the legal, economic and social aspects of the functioning of the labor market
CO5	Providing basic information on starting a business and performing the work based on: employment contracts and civil law contracts
CO6	Presentation of the rules allowing you to acquire the skills to prepare for interviews and proper self-presentation

Prerequisites in terms of knowledge, skills and other competencies	
1	Skill of logical and creative thinking
2	Skill of group work
3	Habit of lifelong learning

Learning outcomes (LO)	
	In terms of knowledge:

LO 1	Defines and characterizes the basic terms of normalization, has knowledge of the meaning, creation, observance of norms, structure and functioning of normalization units and practical use of norms
LO 2	Identifies the goals and principles of normalization
LO 3	Identifies and defines basic terms in the labor market and entrepreneurship
LO4	Identifies legal norms, economic and social rules obligatory on the labor market
LO5	Knows the formal and legal aspects of starting a business
	In terms of skills:
LO6	Is able to define requirements for norms
LO7	Can obtain information about database norms and properly interpret the content of norms
LO8	Has the basic ability to construct contract documentation using the appropriate sources of law in this area
LO9	Can properly determine own competitive advantage in the labor market
	In terms of social competence:
LO10	Has an active attitude to independently acquire and improve knowledge and skills

Course content	
Form of classes - lectures (L)	
	Course content
L1	Objectives and principles of normalization
L2	Basis of normalization, terminology used in national, regional and international normalization, history and normalization goals
L3	National and international normalization activities
L4	Rules for using norms and normative literature
L5	Product normalization, quality marks, CE mark
L6	Assumptions of normalization in management
L7	Normalization policy and the importance of norms in the European Union
L8	Selected issues of practical normalization. Terminology and importance of ISO standards in quality management and data security
L9	The concept of the labor market, its principles, labor market institutions, the concept of unemployment and its effects
L10	Forms of employment in Poland. Basic issues of labor law: employment contract. Service contract
L11	The process of recruiting workers into the organization. Preparation of application documents: CV, motivation letters, reference letters. Preparation for the interview: self-presentation, interpersonal communication. Selective strategies and techniques. Savoir-vivre in the recruitment process
L12	Basic knowledge of undertaking and conducting individual business

	activity in the territory of the Republic of Poland
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Required textbooks and other course materials	
1	<i>Choi, Donggeun et al.: Fundamentals, impact, and business strategy, APEC Secretariat, Singapore, 2010</i>
2	<i>The basics of standardization, DIHK – Association of German Chambers of Industry and Commerce, 2012</i>
3	<i>Noe R. A., Hollenbeck J. R., Gerhart B., Wright P. M.: Gaining a competitive advantage. Irwin: McGraw-Hill, 2003</i>
4	<i>Osterman P.: Securing prosperity: The American labor market: How it has changed and what to do about it. Princeton University Press, 2014</i>
Recommended textbooks and other course materials	
1	<i>De Vries, Henk J. Fundamentals of standards and standardization. Standardisation in Companies and Markets, 2007</i>
2	<i>Betcherman G., Dar A., Olivas K.: Impacts of active labor market programs: New evidence from evaluations with particular attention to developing and transition countries. Social Protection, World Bank, 2004</i>

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Module/Course Syllabus
Computer Science
Mobile Application Development - Master degree programme

Course:	<i>e-Business</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM2.7
Year:	1
Semester:	2
Form of the degree programme:	<i>Full-time studies</i>
Form of classes and number of hours per semester:	15
Lecture	15
Classes	0
Laboratory	0
Project	0
Number of ECTS credits:	2
Form of assessment:	<i>credit</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Developing the skills of proper planning and implementation of projects.
CO2	Acquiring the skills to create advertising on the Internet.
CO3	Acquire the skills of analyzing the website in terms of electronic economy.
CO4	Acquire the skills of optimizing your website for SEO.
CO5	To familiarize students with the problems of teamwork and its organization.

Prerequisites in terms of knowledge, skills and other competencies	
1	Ability to use the computer and web browser.
2	The ability of logical and creative thinking.
3	Basic knowledge of web technologies, including HTML, CSS.

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	Has knowledge of development trends and most important new achievements in the field of science, relevant to the studied field of studies and related scientific disciplines.
LO 2	Has basic knowledge of management, including quality management, and doing business.
LO 3	Knows the general principles of creating and developing individual entrepreneurship, using knowledge in the field of science relevant to the

	chosen field of study.
	In terms of skills:
LO 4	Is able to use information and communication techniques appropriate to the tasks typical of engineering activities.
LO 5	Has the ability to analyze the website in the aspect of e-economy
LO 6	Has the ability to optimize website according to the best practices of SEO and SEM.
	In terms of social competence:
LO 7	Knows and understands the need to work in a team and also accepts different roles in it.
LO 8	Is able to determine the priorities that are appropriate for his task.
LO 9	Can think and act in a creative and enterprising way.

Course content	
Form of classes - lectures (L)	
	Course content
L1	Introduction to e-business.
L2	Strategy in e-business.
L3	Advertising techniques on the Internet.
L4	Advertising campaigns on the Internet: measure the effectiveness, degree of conversion, and make modifications to your campaign.
L5	Techniques of e-business on the Internet: e-shops and auction websites.
L6	Techniques of e-business on the Internet: social networking.
L7	Techniques of e-business on the Internet: brand building.
L8	Keeping the customer in e-business.
L9	New phenomena and trends in e-business development.

Required textbooks and other course materials	
1	Dave Chaffey, E-Business and E-Commerce Management: Strategy, Implementation and Practice (5th Edition), Prentice Hall, 2011
2	Dave Kerpen, Likeable Social Media: How to Delight Your Customers, Create an Irresistible Brand, and Be Generally Amazing on Facebook (And Other Social Networks), McGraw-Hill, 2011
Recommended textbooks and other course materials	
1	Tara Ross, „Daily Actions for Social Media Mastery: 75 Daily Challenges to Help you Expand your Reach, Build your Platform“, 2014
2	Miriam Salpeter, Hannah Morgan, „Social Networking for Business Success: Turn Your Ideas Into Income“, 2013

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Computer Systems Security</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM3.1
Year:	2
Semester:	3
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	0
Laboratory	30
Project	0
Number of ECTS credits:	4
Form of assessment:	<i>Lecture – exam, Lab. – reports assessment</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Gaining knowledge of the information security area
CO2	Gaining knowledge of the information protection technology
CO3	Information systems protections choice skills
CO4	Information protection against threats skills
CO5	Awareness of the need of constant knowledge updating and gathering new knowledge from the present issues of the information systems security field

Prerequisites in terms of knowledge, skills and other competencies	
1	Objective programming skills
2	Computer network basic skills
3	Operating systems knowledge

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	Has detailed theoretically underpinned knowledge from the area of information security
LO 2	Has detailed ordered theoretical knowledge about the security issues used in information protection domain
	In terms of skills:
LO 3	Can prepare critical analysis of the certain information protection issues set

	and rate their usefulness
	In terms of social competence:
LO 4	Understands the need of the supplementing and expanding knowledge about the issues used to protect information

Course content	
Form of classes - lectures (L)	
	Course content
L1	An introduction to information security
L2	Information systems security issues
L3	Cryptology, block ciphering, block ciphers working modes
L4	Cascade ciphers, modern cryptographic algorithms
L5	Public key cryptography
L6	Digital signature and electronic signature
L7	Data security
L8	Penetration tests
L9	Operation systems security hardening
L10	Communication protection
L11	Protections against data loss or break
L12	Information security policy and strategy
L13	Malicious software and protections against it
L14	Information systems security audit
L15	Communication threats, email protection
L16	Steganology
Form of classes - laboratories (Lab)	
	Course content
Lab1	Virtualization, virtual machines usage and administration
Lab2	Virtual machines network connections configuration
Lab3	Symmetric cryptography
Lab4	Modes of operation of symmetric cryptography algorithms
Lab5	Hash calculating
Lab6	Hash weaknesses
Lab7	Reports presentation and assessment
Lab8	Asymmetric cryptography
Lab9	Public key infrastructure
Lab10	Backups
Lab11	RAID arrays
Lab12	ICMP protocol security
Lab13	OSI transport layer security
Lab14	Security mechanisms in computer networks
Lab15	Reports presentation and assessment

Required textbooks and other course materials	
1	W. Stallings, <i>Network Security Essentials</i> . Prentice Hall, 2003
2	Cryptography Engineering, Design Principles and Practical Applications, Niels Ferguson, Bruce Schneier, and Tadayoshi Kohno, 2010 John Wiley & Sons
3	Penetration Testing: A Hands-On Introduction to Hacking, Georgia Weidman 2014
Recommended textbooks and other course materials	
1	Counterterrorism and Cybersecurity, Lee, Newton 2015
2	Koziel Grzegorz, Information security policy creating, Actual Problems Of Economics - 2011, no 12, vol. 126, pp. 376-380
...	

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Module/Course Syllabus
Computer Science
 Mobile Application Development – Master degree
 programme

Course:	<i>Software Project Management</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM3.2
Year:	2
Semester:	3
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	-
Laboratory	30
Project	-
Number of ECTS credits:	3
Form of assessment:	<i>Course completion assessment</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	To familiarize students with the problems of project management and methods of solving them
CO2	To create skills of projects planning and implementation
CO3	To familiarize students with the problems of teamwork and its organization

Prerequisites in terms of knowledge, skills and other competencies	
1	Basic knowledge of Software Engineering
2	The ability of logical and creative thinking

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	The student has knowledge of project management processes, with particular emphasis on software projects
LO 2	The student has knowledge of the latest trends in the field of project management
	In terms of skills:
LO 3	The student has the ability to define, plan, manage and track work projects
LO 4	The student has the ability to choose a project management methodology to the type of project
	In terms of social competence:
LO 5	Students know and understand the need to work in a team, and to adopt different roles in it

LO 6	Student is able to identify and resolve problems related to the software project management
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Course content	
Form of classes - lectures (L)	
	Course content
L1	Fundamentals of Project Management: project definition, success of a project, an IT project life cycle model, the organization of projects and techniques of project management. The place and role in the organization of the project. Types of projects
L2	The organizational structure of the project. Roles and responsibilities the people involved in the project
L3	Factors influencing the success of the project: the definition, analysis, and its validation
L4	The role and responsibilities of the project manager. Project management styles. Organisation of manager work. Project Office. Team management and its performance. Negotiations in the projects
L5	Project planning. Description of the project in terms of the objectives and methods of achieving them. Definition of phases, tasks, activities, typical projects. The hierarchical structure of the work (WBS)
L6	Scheduling of the project. Gantt charts. Network Planning (CPM, PERT, GAN). Use of computer tools in the planning of the project
L7	The critical path and its properties. Resources and their calendars. Allocation of resources. Resolving conflicts in the allocation of resources. Budgeting of the project. Optimizing of the schedule. The base plan and its approving
L8	Managing the process of implementation of the project: monitoring the progress and quality of work. Organization of the reporting process, method, and earned value method
L9	Change and risk management. Needs, methods and procedures
L10	Closing and settlement of the project
L11	Metrics of systems and methods for estimating of productivity. Methods: lines of code, function points, and use cases points
L12	Project management methodologies: PMI, Prince2, MSF and other
L13	Agile methodologies in IT projects: AUP, XP, FDD, Scrum, RUP. Story Point methods
L14	Classification of projects and areas of application of project management methodologies
Form of classes - laboratories (Lab)	
	Course content
Lab1	Defining the scope of the project (brainstorming, a panel of experts)
Lab2	Determining the work breakdown structure (WBS)
Lab3	Interface and design of MS Project. The views and tables. Calendars

	and methods to define them
Lab4	Defining tasks and their relationships. Advanced task parameters
Lab5	Defining resources and their allocation to the tasks. Advanced resource parameters
Lab6	Detection and resolution of conflicts in the resources allocation
Lab7	Budgeting of the project. Reporting the project plan
Lab8	Work tracking on the project. Reporting on the progress of the project
Lab9	Read the documentation and the project generator of EU projects calls
Lab10	Develop a project plan specified by the teacher. Presentation and credit

Required textbooks and other course materials	
1	Harold R. Kerzner: Project Management: A Systems Approach to Planning, Scheduling, and Controlling. Eleventh Edition. John Wiley and Sons, 2013
2	Scott Berkun: The Art of Project Management. O'Reilly, 2005
3	Alistair Cockburn: Agile Software Development: The Cooperative Game. 2nd Edition. Addison-Wesley Professional, 2006
Recommended textbooks and other course materials	
1	Carl Chatfield, Timothy Johnson D.: Microsoft® Project 2010. Step by Step. Microsoft Press, 2010
2	Ken Schwaber: The Enterprise and Scrum. Microsoft Press, 2007
3	Krebs J.: Agile Portfolio Management. Microsoft Press, 2009

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Cost and Quality Management</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM3.3
Year:	1
Semester:	1
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	60
Lecture	30
Classes	0
Laboratory	30
Project	0
Number of ECTS credits:	5
Form of assessment:	<i>Examination</i>
Course language:	<i>English</i>

Course objective (CO)

CO1	To familiarize students with techniques and methods used in quality estimation of computer application.
CO2	Practical learning of cost estimation methods.

Prerequisites in terms of knowledge, skills and other competencies

1	Ability of programming in object-oriented languages.
2	Basic knowledge about project management.
3	The ability of logical and creative thinking.

Learning outcomes (LO)

	In terms of knowledge:
LO 1	A student has knowledge about methods, techniques and tools used in IT project quality estimation
LO 2	A student has knowledge about standards used in the process of software testing.
	In terms of skills:
LO3	A student is able to perform IT system testing
LO4	A student is able to properly use the selected tools dedicated to IT project cost and quality estimation.
	In terms of social competence:

LO5	A student understands the need for quality assurance and proper testing of IT system.
LO6	The student understands the balance between application cost and quality assurance.

Course content	
Form of classes - lectures (L)	
	Course content
L1	Software Development Lifecycle
L2	Fundamentals of project management
L3	Definition and components of IT system quality
L4	Principles of IT project quality management (KAIZEN, POKA-YOKE, Zero defects, Deming principles)
L5	IT project quality management methods (FMEA, QFD)
L6	IT project quality management methods (SPC, DOE)
L7	Tools for IT project quality management (Six Sigma, 5 Why, Ishikawa Diagram, Pareto-Lorenz Diagram)
L8	Quality control: audits, norms
L9	Quality control of particular project development stages
L10	Fundamentals of IT project testing
L11	Agile Practices for Building Quality Software
L12	Managing Project Risks and Changes
L13	Cost management: top-down and ground-up. Budget management.
L14	Lifecycle of product, ROI
L15	Scrum Agile as quality improvement methodology.
Form of classes - laboratories (Lab)	
	Course content
Lab1	Application of different methods of cost estimation of comprehensive IT system development
Lab2	Comparison of cost estimation methods
Lab3	Planning and optimizing of application development costs
Lab4	Application versioning
Lab5,6	Development of simple mobile application
Lab7	Applying of quality management methods during application development
Lab8	Testing the application
Lab9	Quality evaluation of program code.
Lab10	Quality evaluation of graphical user interface.
Lab11,12	Analysis of software quality using selected methods (FMEA, QFD, 5S)
Lab13	Application of selected quality management tools (Six Sigma, 5Why, Ishikawa Diagram, Pareto-Lorenz Diagram)
Lab14,15	Cost and time-consuming estimation of a given problem

	implementation in a simulated IT company with application of chosen scheduling tool
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Required textbooks and other course materials	
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1	Praeg C.: Quality Management for IT Services: Perspectives on Business and Process Performance: Perspectives on Business and Process Performance, IGI Global, 2010
2	Osterhage W.: IT Quality Management. Springer, 2015
3	Randal W.: Mastering Project Time Management, Cost Control, and Quality Management. Pearson Education (US), 2015.

Recommended textbooks and other course materials	
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1	George M., Maxey J., Rowlands D., Price M.: The Lean Six Sigma Pocket Toolkit: A Quick Reference Guide to 100 Tools for Improving Quality and Speed. McGraw-Hill Companies, 2004.
2	Wiggers P.: IT Performance Management. Taylor & Francis Ltd, 2003.

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Module/Course Syllabus
Computer Science

Mobile Application Development – Master degree programme

Course:	<i>Diploma Seminar (and master thesis preparation)</i>
Type of the course:	<i>Obligatory</i>
Course code:	IMSM3.4
Year:	2
Semester:	3
Form of the degree programme:	<i>Full-time</i>
Form of classes and number of hours per semester:	45
Lecture	
Classes	15
Laboratory	
Project	30
Number of ECTS credits:	20
Form of assessment:	<i>credit</i>
Course language:	<i>English</i>

Course objective (CO)	
CO1	Learning about the requirements of writing an MSc thesis.
CO2	Developing the skills of information gathering and creative processing in order to prepare a dissertation.
CO3	Learning about and shaping the skills for dissertation presentation.
CO4	Developing the skills for individual solving of IT problems, including writing applications.

Prerequisites in terms of knowledge, skills and other competencies	
1	Defended BSc thesis or equivalent.

Learning outcomes (LO)	
	In terms of knowledge:
LO 1	Knows and understands the basic concepts and principles for the protection of industrial property and copyright and the need for management of intellectual property; able to use the patent information resources.
	In terms of skills:
LO2	A graduate in terms of skills:
LO3	Can obtain information from the literature, databases, and other sources in

	English; can integrate the obtained information, can make their interpretation and critical evaluation, as well as can draw conclusions and formulate fully justified opinions.
LO4	Is able to prepare and introduce oral presentation in Polish and foreign language, concerning the specific issues of the field of study.
LO5	Is able to assess the suitability of the known research methods, design patterns, technologies and tools to solve complex (including unusual or research) problem in the field of Computer Science; is aware of the limitations of the methods and tools.
	In terms of social competence:
LO6	Is aware of the social role of technical university graduates, especially understands the need for the formulation and communication to the public, in particular through the mass media, information and opinions on the achievements of technology and other aspects of engineering; shall endeavour to give such information and opinions in a commonly understood way, indicating the different points of view.

Course content	
Form of classes - classes (C)	
	Course content
C1	Presentation of requirements for getting the subject's credit. Discussing a selection of thesis topics. Describing the formal requirements for MSc theses.
C2	
C3	Detailed description of the structure of an MSc thesis. Formulating a thesis topic and scope.
C4	
C5	Discussing the issues of literature search in the scientific bases available at the Lublin University of Technology.
C6	
C7	Making literature search outlines; methods of referencing literature sources.
C8	
C9	Discussing issues of thesis presentation using multimedia technology; a demonstration.
C10	Initial presentation of the theses, scope and aim of a dissertation using multimedia presentations; discussion of the presentations.
C11	
C12	Presentation of recapitulations, conclusions and summaries. Discussion of the texts presented.
C13	
C14	Presentation of requirements for getting the subject's credit. Discussing a selection of thesis topics. Describing the formal requirements for MSc theses.
C15	
Form of classes - project (P)	
	Course content
P1	Introduction into the course, information about credit requirements. Discussion of the project topics.
P2	Assigning topics to students or student teams. Discussion of the project scope.

P3	Students' presentations of their literature analysis concerning the project topics.
P4	
P5	Students' presentations of their choice of IT tools for solving the assigned projects; discussion.
P6	Presentation and discussion of the initial conception of solving the project task; discussion.
P7	
P8	Project theses, progress presentation, discussion.
P9	
P10	
P11	Project introduction, presentation of the problems, discussion.
P12	Testing and corrections.
P13	
P14	Preparation of multimedia presentations concerning the project.
P15	Course credit - final presentation of the project using multimedia technology.

Required textbooks and other course materials	
1	Wymagania dla prac magisterskich na kierunku Informatyka [Requirements for MSc theses in Computer Studies], a pdf file
2	Ivey A., <i>Perfect Presentations. How You Can Master the Art of Successful Presenting</i> , A. Ivey & Ventus Publishing ApS, Download free ebooks at bookboon.com, 2010, http://dl.is.vnu.edu.vn/bitstream/123456789/249/1/perfect-presentations.pdf
3	Literature relevant to the subject of the diploma thesis (depending on the allocation)
Recommended textbooks and other course materials	
1	Ratner B.D., <i>Effective Communication: The Art of Oral Presentation</i> , http://www.uweb.engr.washington.edu/education/engtoolchest/effective-comm.pdf
2	<i>Guide to the preparation of theses and dissertations</i> , The Graduate School of the University of Tennessee, Knoxville, 2010
3	Silverstein S.B., <i>The Art of Scientific Presentation</i> , http://home.thep.lu.se/~bijmens/introduction/silverstein.pdf

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