SOFTWARE DEVELOPMENT FOR MOBILE DEVICES

Minsk 2017

1. COURSE PLAN

Year of study	Semester	Academic hours					Hours of course work	ECTS	Number of hours
		Total	Lectures	Lab	Practice/ seminar	Independent work			
3	5	136	32	48	-	56	-	5	Full-time
3	5	136	8	10	-	118	-	5	Part-time

2. COMPETENCIES

To be able to perform modelling, design of software tools and documentation to support activities in various subject areas.
To be able to design interfaces and provide ergonomic evaluation of information systems.
To be able to work independently and in a team.

3. COURSE GOAL

To study architecture and main components of mobile platforms, principles and tools for design of mobile application interfaces, technologies of mobile application programming.

4. COURSE OUTCOMES
After completing this course student will be able to:
- compare different mobile platforms
- choose the appropriate integrated environment
- make use of the main components of mobile platforms
- design graphical user interfaces for mobile applications
- create and test mobile applications

5. COURSE CONTENT (FULL TIME)

№	Name of the topic	Number of academic hours					Form of knowledge control
		TOTAL	Lectures	practical tasks	labs	Independent work	
1	2	3	4	5	6	7	8
1	Introduction to Software Development for Mobile Devices	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
2	Design graphical user interfaces for mobile applications	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
3	Creation and testing of mobile applications	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
4	Design patterns in mobile applications	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
5	Data store	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
6	Background tasks	17	4	-	6	7	Testing. Defense of laboratory

№	Name of the topic	Number of academic hours					Form of knowledge control
		TOTAL	Lectures	practical tasks	labs	Independent work	
1	2	3	4	5	6	7	8
							work. Defense of independent work.
7	Multimedia and user location	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
8	Connecting to the Network and external devices. Publishing of mobile applications	17	4	-	6	7	Testing. Defense of laboratory work. Defense of independent work.
	Total	**136**	**32**	**-**	**48**	**56**	

6. COURSE CONTENT (PART TIME)

№	Name of the topic	Number of academic hours					Form of knowledge control
		TOTAL	Lectures	practical tasks	labs	Independent work	
1	2	3	4	5	6	7	8
1	Introduction to Software Development for Mobile Devices	17	1	-	1	14	Testing. Defense of laboratory work. Defense of independent work.
2	Design graphical user interfaces for mobile applications	17	1	-	2	16	Testing. Defense of laboratory work. Defense of independent work.
3	Creation and testing of mobile applications	17	1	-	2	16	Testing. Defense of laboratory work. Defense of independent work.
4	Design patterns in mobile applications	17	1	-	1	16	Testing. Defense of laboratory work. Defense of independent work.
5	Data store	17	1	-	1	14	Testing. Defense of laboratory work. Defense of independent work.
6	Background tasks	17	1	-	1	14	Testing. Defense of laboratory work. Defense of independent work.
7	Multimedia and user location	17	1	-	1	14	Testing. Defense of laboratory work. Defense of independent work.
8	Connecting to the Network and external devices. Publishing of mobile applications	17	1	-	1	14	Testing. Defense of laboratory work. Defense of independent work.
	Total	**136**	**8**	**-**	**10**	**118**	

7. THEORETICAL CONTENT

№	Names of topics	Content

1.	Introduction to Software Development for Mobile Devices	Tendencies in mobile application development. Internet of things. Architecture and main components of mobile platforms. Software for creating and testing mobile applications.
2.	Design graphical user interfaces for mobile applications	Different modes for construction of graphical user interfaces. Graphical user interface elements and their properties. Creating custom views. Changing the screen orientation. Standards and guidelines of graphical user interface creation. Best practices for user interface. Images and graphics. Animation.
3.	Creation and testing of mobile applications	Building mobile application. Handling events in mobile applications. Data transfer in mobile applications. Logging and pop-up messages. Dialogs. Menu in mobile applications. Running and testing of mobile applications on virtual and real devices.
4.	Design patterns in mobile applications	Model-View-Controller (MVC). Model-View-Presenter (MVP). Model-View-ViewModel (MVVM). Adapters. Callback mechanisms in mobile applications. Using the interface to track events.
5.	Data store	Data and File Storage Overview. Saving Key-Value Sets. Saving Files. Saving Data Using Database.
6.	Background tasks	Sending Operations to Multiple Threads. Services. Loaders. Notifications.
7.	Multimedia and user location	Camera. Sensors. User location. Adding maps.
8.	Connecting to the Network and external devices. Publishing of mobile applications	Connecting to the Network. Managing Network Usage. Parsing Data. Social networks. Web-Based Content. Transfering data to and from other devices using Bluetooth. Stages of the project publishing.

8. PRACTICAL CONTENT

№	Name of the practical assignment	Content
-	-	-

9. LABORATORY PRACTICE

№	Name of laboratory assignment	Content
1.	Introduction to Software Development for Mobile Devices	Software for creating and testing mobile applications.
2.	Design graphical user interfaces for mobile applications	Different modes for construction of graphical user interfaces. Graphical user interface elements and their properties. Creating custom views. Changing the screen orientation. Images and graphics. Animation.
3.	Creation and testing of mobile applications	Building mobile application. Handling events in mobile applications. Data transfer in mobile applications. Logging and pop-up messages. Dialogs. Menu in mobile applications.

№	Name of laboratory assignment	Content
		Running and testing of mobile applications on virtual and real devices.
4.	Design patterns in mobile applications	Model-View-Controller. Adapters. Callback mechanisms in mobile applications. Using the interface to track events.
5.	Data store	Saving Key-Value Sets. Saving Data Using Database.
6.	Background tasks	Services. Loaders. Notifications.
7.	Multimedia and user location	Camera. User location. Adding maps.
8.	Connecting to the Network and external devices. Publishing of mobile applications	Connecting to the Network. Parsing Data. Social networks. Web-Based Content. Transfering data to and from other devices using Bluetooth. Project publishing.

10. ASSIGNMENT FOR INDEPENDENT WORK

№	Name of the assignment	Content
1	Development and presentation of individual software project for mobile devices: step1	Searching of the idea for individual software project on the basis of trends in mobile development
2	Development and presentation of individual software project for mobile devices: step2	Design graphical user interfaces for individual software project
3	Development and presentation of individual software project for mobile devices: step3	Building mobile application for individual software project and working with graphic elements from a code
4	Development and presentation of individual software project for mobile devices: step4	Implementation of design patterns in individual software project
5	Development and presentation of individual software project for mobile devices: step5	Working with data store in individual software project
6	Development and presentation of individual software project for mobile devices: step6	Background tasks in individual software project
7	Development and presentation of individual software project for mobile devices: step7	Programming of special functions of individual software project (multimedia, user location, connecting to the Network and others)
8	Development and presentation of individual software project for mobile devices: step8	Presentation of individual software project for mobile devices

Tools for creation and testing of independent work:

1. Personal computer with development environment for mobile application programming (Android Studio for Android mobile platform or Xcode for iOs mobile platform).
2. Virtual devices or real mobile devices for testing of mobile applications.

11. SYSTEM OF ASSESSMENT OF KNOWLEDGE AND SKILLS (ACCORDING TO THE NATIONAL REQUIREMENTS)

A ten-point scale, depending on the grade and the mark, includes the following criteria:

10 (ten) points, passed:

- systematized, deep and full knowledge on all sections of the curriculum of the institution of higher education in the academic discipline, as well as on major issues that go beyond its limits;
- accurate use of scientific terminology (including in a foreign language), competent, logically correct statement of the answer to questions;
- perfect mastering of the tools of the academic discipline, the ability to use it effectively in formulation and solution of scientific and professional problems;
- the expressed ability independently and creatively to solve complex problems in non-standard situations;

- complete and profound studying of basic, additional literature on the subject of the discipline;
- the ability to freely navigate in theories, concepts and directions on the discipline and give them an analytical assessment, use the scientific achievements of other disciplines;
- creative independent work on practical, laboratory classes, active creative participation in group discussions, high level of the culture of performance of tasks.

9 (nine) points, passed:

- systematized, deep and full knowledge on all sections of the curriculum of the institution of higher education on the academic discipline;
- accurate use of scientific terminology (including in a foreign language), competent, logically correct statement of the answer to questions;
- mastering of the tools of the academic discipline, the ability to use it effectively in formulation and solution of scientific and professional problems;
- ability independently and creatively to solve complex problems in non-standard situations within the curriculum of the institution of higher education on the academic discipline;
- complete studying of basic, additional literature on the subject of the discipline, recommended by the curriculum of the institution of higher education on the discipline;
- the ability to navigate in theories, concepts and directions on the discipline and give them an analytical assessment;
- Systematic, active independent work on practical, laboratory classes, active creative participation in group discussions, high level of the culture of performance of tasks.

8 (eight) points, passed:

- systematized, deep and full knowledge on all sections of the curriculum of the institution of higher education in the academic discipline in the volume of the curriculum of the institution of higher education on the discipline;
- use of scientific terminology (including in a foreign language), competent, logically correct statement of the answer to questions, the ability to make sound conclusions and generalizations;
- mastering of the tools of the academic discipline (methods of complex analysis, information technology), the ability to use it effectively in formulation and solution of scientific and professional problems;
- ability independently to solve complex problems within the curriculum of the institution of higher education on the academic discipline;
- studying of basic, additional literature, recommended by the curriculum of the institution of higher education on the discipline;
- the ability to navigate in theories, concepts and directions on the discipline and give them an analytical assessment;
- active independent work on practical, laboratory classes, systematic participation in group discussions, high level of the culture of performance of tasks.

7 (seven) points, passed:

- systematized, deep and full knowledge on all sections of the curriculum of the institution of higher education on the academic discipline;
- use of scientific terminology (including in a foreign language), competent, logically correct statement of the answer to questions, the ability to make sound conclusions and generalizations;

- mastering of the tools of the academic discipline, the ability to use it effectively in formulation and solution of scientific and professional problems;
- free possession of generic solutions within the curriculum of the institution of higher education on the academic discipline;
- studying of basic, additional literature, recommended by the curriculum of the institution of higher education on the discipline;
- the ability to navigate in basic theories, concepts and directions on the discipline and give them an analytical assessment;
- independent work on practical, laboratory classes, participation in group discussions, high level of the culture of performance of tasks.

6 (six) points, passed:

- sufficiently fulland systematized knowledge in the volume of the curriculum of the institution of higher education on the discipline;
- use of the necessary scientific terminology, competent, logically correct statement of the answer to questions, the ability to make sound conclusions and generalizations;
- mastering of the tools of the academic discipline, the ability to use it effectively in solution of scientific and professional problems;
- ability independently to apply generic solutions within the curriculum of the institution of higher education on the academic discipline;
- studying of basic literature, recommended by the curriculum of the institution of higher education on the discipline;
- the ability to navigate in basic theories, concepts and directions on the discipline and give them acomparative assessment;
- active independent work on practical, laboratory classes, periodic participation in group discussions, high level of the culture of performance of tasks.

5 (five) points, passed:

- sufficient knowledge in the volume of the curriculum of the institution of higher education on the discipline;
- use of scientific terminology, competent, logically correct statement of the answer to questions, the ability to make sound conclusions;
- mastering of the tools of the academic discipline, the ability to use it in solution of scientific and professional problems;
- ability independently to apply generic solutions within the curriculum of the institution of higher education on the academic discipline;
- studying of basic literature, recommended by the curriculum of the institution of higher education on the discipline;
- the ability to navigate in basic theories, concepts and directions on the discipline and give them a comparative assessment;
- active independent work on practical, laboratory classes, periodic participation in group discussions, high level of the culture of performance of tasks;
- independent work on practical, laboratory classes, periodic participation in group discussions, sufficient level of the culture of performance of tasks.

4 (four) points, passed:

- sufficient knowledge within the educational standard of higher education;

- studying of basic literature, recommended by the curriculum of the institution of higher education on the discipline;
- use of scientific terminology, logical statement of the answer to questions, the ability to make sound conclusions;
- ability to draw conclusions without essential errors;
- mastering of the tools of the academic discipline, the ability to use it in solution of standard (typical) tasks;
- ability to solve standard (typical) tasks under the guidance of a teacher;
- ability to navigate in basic theories, concepts and directions on the discipline and give them an assessment;
- work under the guidance of a teacher on practical, laboratory classes, the permissible level of the culture of performance of tasks.

3 (three) points, failed:

- insufficient knowledge within the educational standard of higher education;
- studying of basic literature, recommended by the curriculum of the institution of higher education on the discipline;
- knowledge of a part of the basic literature, recommended by the curriculum of the institution of higher education on the discipline;
- use of scientific terminology, presentation of answers to questions with significant, logical errors;
- weak possession of the tools of the academic discipline, incompetence in solving standard (typical) tasks;
- inability to navigate in basic theories, concepts and directions on the discipline;
- work under the guidance of a teacher on practical, laboratory classes, the permissible level of the culture of performance of tasks.
- passivity on practical, laboratory classes, law level of the culture of performance of tasks.

2 (two) points, failed:

- fragmented knowledge within the educational standard of higher education;
- knowledge of individual literary sources, recommended by the curriculum of the institution of higher education on the discipline;
- inability to use scientific terminology of the academic discipline, the presence in the answer rude, logical errors;
- passivity on practical, laboratory classes, law level of the culture of performance of tasks.

1 (one) point, failed:

- lack of knowledge and (competences) within the educational standard of higher education, failure to answer, failure to appear for attestation without good cause.

11. METHODS AND MEANS OF IMPLEMENTATION OF THE CONTENT OF THE EDUCATIONAL PROGRAM AND TRAINING OF EDUCATIONAL, TRAINING AND METHODICAL MATERIALS

The following tools and technologies were used in the preparation of training, teaching and methodological materials:
• Android Studio, Java (for Android mobile platform programming)
• Xcode, Swift (for iOs mobile platform programming)

In the classroom, students will learn the discipline in the format of laboratory studies directly in the computer class. The following software will be used during the training:

№	Software	System requirements for the specified software	№ of the theme from the educational-methodical map, for the support of which the specified software will be used	The purpose of software using
1.	Android Studio	Microsoft Windows 7/8/10 (64-bit) 3 GB RAM minimum, 8 GB RAM recommended; plus 1 GB for the Android Emulator 2 GB of available disk space minimum, 4 GB Recommended (500 MB for IDE + 1.5 GB for Android SDK and emulator system image) 1280 x 800 minimum screen resolution	Topic 1-8	To develop laboratory practice tasks
2.	Xcode	MacBook 13Inch Mid Processor 2.5GHZ 6 GB RAM 1600 MHz DDR3 Storage 500 GB	Topic 1-8	To develop laboratory practice tasks

12. RESOURCES

Basic literature

1. Android Developers [Electronic resource]. - Access mode: https://developer.android.com/index.html. - Date of access: 27/02/2018.

2. Apple Developers [Electronic resource]. - Access mode: https://developer.apple.com/. - Date of access: 27/02/2018.

3. Google Android is easy [Electronic resource]. - Access mode: http://startandroid.ru. - Date of access: 27/02/2018.

4. The new programming is playful. The site of Alexander Klimov [Electronic resource]. - Access mode: http://developer.alexanderklimov.ru/. - Date of access: 27/02/2018.

5. iOSProgramming [Electronic resource]. - Access mode: https://www.reddit.com/r/iOSProgramming/. - Date of access: 27/02/2018.

Additional literature

1. FANDROID.info [Electronic resource]. - Access mode: http://www.fandroid.info/. - Date of access: 27/02/2018.

2. Ed Burnette Hello, Android. The Pragmatic Bookshelf. – Dallas, Texas, 2010. – 302 p.