**SYLLABUS**

**regarding the qualification cycle FROM 2023TO 2024**

1. Basic Course/Module Information

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| --- | --- |
| Course/Module title | *Mobile programming* |
| Course/Module code \* |  |
| Faculty (name of the unit offering the field of study) | *College of Natural Sciences* |
| Name of the unit running the course | *Institute of Computer Science* |
| Field of study | *Computer Science* |
| Qualification level  | *First degree* |
| Profile | *Academic* |
| Study mode | *Full-time* |
| Year and semester of studies | *Year 3, semester 5* |
| Course type | *Major engineering* |
| Language of instruction | *English* |
| Coordinator | *Krzysztof Balicki, PhD* |
| Course instructor | *Piotr Lasek, PhD, Eng.* |

\* - as agreed at the faculty

1.1.Learning format – number of hours and ECTS credits

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Semester(n0.) | Lectures | Classes | Colloquia | Lab classes | Seminars | Practical classes | Internships | others | **ECTS credits**  |
| 5 |  |  |  | 15 |  |  |  |  |  |

1.2. Course delivery methods

- conducted in a traditional way

- involving distance education methods and techniques

1.3. Course/Module assessment (exam, pass with a grade, pass without a grade)

pass with a grade

2. Prerequisites

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| Discrete Mathematics, Algorithms and Complexity, Object-Oriented Programming I and II, Databases I and II, Web Applications |

3. Objectives, Learning Outcomes, Course Content, and Instructional Methods

3.1. Course/Module objectives

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| O1 | Familiarizing students with the basics of mobile use opportunities |
| O**2** | Familiarizing students with the basics of programming applications for mobile systems (Android/Windows Phone) |
| O3 | Familiarizing students with the basics of testing applications for mobile systems (Android/Windows Phone) |

3.2. Course/Module Learning Outcomes (to be completed by the coordinator)

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| --- | --- | --- |
| Learning Outcome | The description of the learning outcome defined for the course/module | Relation to the degree programme outcomes |
| LO\_01 | The student knows the basic operating systems for mobile devices | K\_W02, K\_U02 |
| LO\_02 | The student has knowledge of the most important features of mobile devices and the possibilities of their use. | K\_W02, K\_U02 |
| LO\_03 | The student knows the principles of designing applications for mobile platforms such as Android/Windows Phone. | K\_W02, K\_U07 |
| LO\_4 | He has general knowledge covering key issues in the field of computer science and econometrics; knows the basic concepts, principles and theories in this field. He also has basic knowledge of disciplines related to computer science and econometrics - electronics, economics, management. | K\_W03, K\_U11 |
| LO\_5 | He knows how to apply selected methods and tools of designing, manufacturing, validating and testing software, as well as team software development. | K\_U02, K\_U10 |

**3.3. Course content (to be completed by the coordinator)**

1. Lectures

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| Content outline |
| 1. Introduction to mobile systems (the essence and importance of mobile computing, the multitude of potential applications, benefits of application, basic mobile architectures, mobile and wireless systems, cellular systems, satellite systems, mobile processing problems, operating systems for mobile systems)
2. Introduction to mobile device operating systems (Android / iOS / Symbian / Windows 10).
3. Getting acquainted with the creation of a mobile application on the selected mobile platform.
4. The ability to create advanced solutions using the selected mobile platform.
5. A detailed discussion of the selected mobile operating system as the selected computing platform for building complex mobile systems.
6. Getting acquainted with the basics of creating mobile applications on the selected mobile platform.
7. Programming sample services on the selected mobile platform, including services related to reading the geographical location of the mobile device.
8. Testing mobile applications.
9. The ability to program applications on a selected platform, taking into account the client-server architecture.
10. Further development prospects for mobile systems.
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1. Classes, tutorials/seminars, colloquia, laboratories, practical classes

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| Content outline  |
| 1. Install and configure the Android Studio development environment
2. Familiarization with different versions of ADK and programming for different versions of the Android operating system
3. Programming basics for Android (basic GUI components, layouts, activity lifecycle, USB debugging)
4. Handling click events on the GUI component, intentions
5. Multithreading
6. Data recording and storage
7. Operation and use of sensors available in the phone (m.in GPS, orientation sensor, proximity)
8. Multimedia support (taking photos, playing audio and video)
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3.4. Methods of Instruction

Lecture: a problem-solving lecture/a lecture supported by a multimedia presentation/ distance learning

Laboratory classes: designing and implementing applications

4. Assessment techniques and criteria

4.1 Methods of evaluating learning outcomes

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| Learning outcome | Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes) | Learning format (lectures, classes,…) |
| LO-01 | written test | lecture |
| LO-o2 | written test | lecture |
| LO-03 | activity, project | laboratory |
| LO-04 | activity, project | laboratory |
| LO-05 | activity, project | laboratory |

4.2 Course assessment criteria

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| Passing the subject is based on the assessment from the written colloquium on the topics of lectures and the assessment from the passing of the project.Completion of the project is based on a personal presentation of the mobile application, discussion of the source code and project documentation.The final grade in the whole subject is determined as the arithmetic mean of the grades from the colloquia and the project. The student passes the entire subject when the grades from both colloquia and the project are not lower than 3.0. Failure to pass any of the detailed effects on a positive assessment results in failure to pass the subject.

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| Learning outcome | Grade | Assessment criteria |
| LO\_01 | C | The student knows the basic operating systems for mobile devices. |
| B | The student knows the basic operating systems for mobile devices and is able to indicate the differences between them. |
| A | The student knows the basic operating systems for mobile devices and is able to indicate the differences between them. The student is able to make a justified choice of a mobile system in order to use it for the implementation of a given project. |
| EK\_02 | C | The student has knowledge of the most important features of mobile devices and the possibilities of their use. |
| B | The student has knowledge of the most important features of mobile devices and the possibilities of their use and is able to choose technologies present in mobile devices for the implementation of a given project. |
| A | The student has knowledge of the most important features of mobile devices and the possibilities of their use and is able to choose the technologies present in mobile devices for the implementation of a given project. The student has the knowledge to choose the best technology to carry out the task. |
| LO\_03 | C | The student knows the development tools used to create applications for mobile platforms such as Android/Windows Phone. |
| B | The student knows the development tools used to create applications for mobile platforms such as Android and Windows Phone and uses their capabilities to improve the software being created. |
| A | The student knows the development tools used to create applications for mobile platforms such as Android and Windows Phone and uses their capabilities to improve the software being created. The student is able to test code and applications. |
| LO\_04 | C | The student is able to program an application using functionalities characteristic for mobile devices (GPS, Bluetooth, etc.) |
| B | The student is able to program an application using functionalities characteristic for mobile devices (GPS, Bluetooth, WiFi, etc.). With the help of the above-mentioned function, the student is able to communicate with each other devices of the same type. |
| A | The student is able to program an application using functionalities characteristic for mobile devices (GPS, Bluetooth, WiFi, etc.). With the help of the above-mentioned function, the student is able to communicate with each other mobile devices of the same and different types. |
| LO\_05 | C | The student is able to design and implement an application taking into account the appropriate user interface and the limitations of mobile devices. |
| B | The student is able to design and implement the application taking into account the appropriate user interface and limitations of mobile devices, as well as propose a set of functional tests to verify the correctness of the written application. |
| A | The student is able to design and implement the application taking into account the appropriate user interface and limitations of mobile devices, as well as propose a set of functional and unit tests to verify the correctness of the written application. |

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5. Total student workload needed to achieve the intended learning outcomes

– number of hours and ECTS credits

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| Activity | Number of hours |
| Scheduled course contact hours | 15 |
| Other contact hours involving the teacher (consultation hours, examinations) |  |
| Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.) | 40 |
| Total number of hours | 55 |
| Total number of ECTS credits | 2 |

\* One ECTS point corresponds to 25-30 hours of total student workload

6. Internships related to the course/module

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| Number of hours |  |
| Internship regulations and procedures |  |

7. Instructional materials

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| Compulsory literature:* Introduction to Android – <http://developer.android.com>
* Shane Conder, Lauren Darcey, Android Wireless Application Development
* Jeff Friesen,Learn Java for Android Development
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| Complementary literature: * Wildermuth S.: Essential Windows Phone
* Gail Rahn Frederick, Rajesh Lal: Beginning Smartphone Web Development
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Approved by the Head of the Department or an authorised person