**Федеральное государственное автономное образовательное учреждение высшего образования
"Национальный исследовательский университет
"Высшая школа экономики"**

Факультет компьютерных наук
Департамент программной инженерии

Рабочая программа дисциплины
«Разработка и продвижение мобильных игр» –
на английском языке: «Mobile Games Development»

для образовательной программы «Системная и программная инженерия»
направления подготовки 09.04.04 «Программная инженерия»
уровень - магистр

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Одобрена на заседании департамента программной инженерии «___»_____ 2016 г.
Руководитель департамента Авдошин С.М. _____

Утверждена Академическим советом образовательной программы
«___»_____ 2016 г., № протокола_____

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Москва, 2016

1. Course Description

The market of mobile games is rapidly shaped and developed these last two decades. In fact, this market seems to be unique because of distinctive properties of mobile platforms and user-computer interaction experience. Moreover, common marketing strategies for mobiles apps need tuning and adoption in case of games.

A master of software engineering, who works in the field of mobile game development should be familiar with as technological as management features of the mobile gaming business. This course addresses the following questions:

- How we can use mobile devices for electronic entertainment?
- What are the features and constraints of modern mobile devices from the gamer point of view?
- Is there a difference between games, which earned millions, and the projects, which were not compensated even their development cost?
- Is it possible to increase the possibility of success of a new mobile game application?
- How to place a new mobile game in a market properly?
- How to evaluate an overall user's satisfaction and to suggest him the best experience on the mobile platforms?
- How to integrate various development, ranking, feedback tools in mobile game construction?

2. Title of a Course

Mobile Games Development

a. Pre-requisites

(M.2) Basics of Mobile Applications Development

(M.2) Mobile UI

(M.2) Apple iOS applications development or equivalent (.NET/Android applications development)

Swift/Java/C#/C++ programming experience is eligible.

b. Course Type

Elective

c. Abstract

This course provides an introduction to the mobile games development and entrepreneurship. It includes a review of mobile games development approaches and their applications. We will concern on three main topics: the determining and modelling of a game user, developing games for modern mobile platforms, and games monetizing strategies on worldwide market.

3. Learning Objectives

By the end of this course students:

a) will *know* distinctive properties of mobile gaming and mobile games software construction;
b) will be able to *define* a mobile gamer profile;
c) will be able to *select* reasonably a platform and a framework to a mobile game development;
d) will *know* the main components of game mechanics and user interaction;

e) will be able to *develop* a mobile game agreed to the requirements of the particular mobile store (Microsoft Store Marketplace (X-Box), Android Market (Google play), Mac App Store, Valve Steam);
f) will *know* the best practices of mobile marketing;
g) will *understand* the difference between games monetizing strategies;
h) will be able to *implement* a game promotion strategy.

4. Learning Outcomes

Upon successful completion of this course, students will demonstrate:

a) an ability to design a mobile game within realistic constraints such as economics, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (ИК-М1.2.НИД(ПИ), ИК-М3.2. ПД (ПИ));
b) an ability to use mobile development techniques, skills and tools necessary for mobile games development practice (ИК-М4.1.ПТД_ПИ2(ПИ));
c) an ability to design, validate, implement, and maintain mobile games (ИК-М2.1.АД(ПИ), ИК-М2.2.АД (ПИ));
d) an ability of analyzing and interpreting the data from mobile analytics tools
e) an ability to communicate effectively (СК-М7, СЛК-М9);
f) an understanding of professional and ethical responsibility (СК-М5, СЛК-М6).

5. Course plan

Lectures: 10 academic hours.

Seminars: 13 academic hours.

Self-training: 91 academic hours.

1. Introduction
2. Determining and modelling of a mobile game user
    2.1. Human psychophysiological characteristics. Perception and cognitive biases.
    2.2. Goal-setting and motivation. Gamification, progress and achievements.
    2.3. Symbolic systems and applied semiotics. Internationalization and localization problems.
    2.4. Behavior and interaction patterns.
    2.5. Education and re-education.
    2.6. User-oriented design principles.
3. Developing games for modern mobile platforms
    3.1. Mobile games classification.
    3.2. Mobile game lifecycle.
    3.3. Mobile technologies stack and main platforms. Microsoft, Google, and Apple approaches.
    3.4. Popular frameworks for mobile games development. 2D and 3D engines, multiplayer support. Unreal engine, Corona SDK, Marmalade, Unity, Autodesk, ARM.
    3.5. Mobile game mechanic implementation. Artificial intelligence for single player and multiplayer modes.
    3.6. Specific mobile games UX.
    3.7. Mobile games distribution tools. Microsoft Store Marketplace (X-Box), Android Market (Google play), Mac App Store, Valve Steam.
4. Games monetizing strategies on worldwide market
    4.1. Mobile games distribution channels.
    4.2. Main monetizing strategies and technologies.
    4.3. Mobile advertising technologies and tools.

4.4. Mobile game feedback and ranking technologies and tools.

4.5. Game statistics analysis. Data gathering the the Key Performance Indicators.

4.6. Best practices of mobile marketing. Branding and franchising.

6. Reading list

a. Required

1. Brockschmidt, Kraig. Programming Windows Store Apps with HTML, CSS and JavaScript. Microsoft Press, 2014. Print.
2. Genadinik, Ales. Mobile App Marketing and Monetization. Semantic Valley LLC, 2014. Print.
3. UBM. "Gamasutra. The Art & Business of Making Games." Web
4. Berne, Eric. Games People Play – The Basic Hand Book of Transactional Analysis. Ballantine, 1964. Print.
5. Kushner, David. Masters of Doom: How Two Guys Created an Empire and Transformed Pop Culture. Random House Trade Paperbacks, 2004.
6. Weston, Mark. *The Mobile App Masterplan*. 2014.
7. Green, Robert, and Zechner, Mario. *Beginning Android Games*. 2nd ed. Apress, 2012. Print.
8. Gibson, Jeremy. *Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#*. Addison-Wesley Professional, 2014.
9. Habgood, Jacob and Mark Overmars. The Game Maker's Apprentice: Game Development for Beginners. Delmar Cengage Learning, 2011.
10. Adams, Ernest. Fundamentals of Game Design. 3rd ed. New Riders, 2013.
11. Mobile Game Design, Chroma Coders, 2012. Print.
12. . MVA. "Building Blocks: Game Development." Web. <https://mva.microsoft.com/en-US/training-courses/building-blocks-game-development-16063?l=OOAAoLZDC_9606218949>
13. ESRB. "Entertainment software rating board." Web. <http://www.esrb.org>.
14. IARS. "International age rating coalition". Web. <https://www.globalratings.com>.
15. CTIA. "App Content Classification and Rating Guidelines.". Web. <http://www.ctia.org/policy-initiatives/voluntary-guidelines/app-content-classification-and-ratings-guidelines>

b. Optional

1. Petzold, Charles. *Creating Mobile Apps with Xamarin.Forms*. Microsoft Press, 2015.
2. Schell, Jesse. The Art of Game Design: A Deck of Lenses – Cards. Schell Games, 2008.
3. Horton, John. *Learning Java by Building Android Games – Explore Java Through Mobile Game Development.* Packt Publishing, 2015.
4. Nardone, Massimo, and Vladimir Silva. *Pro Android Games: L Edition.*3rd ed. Apress, 2015. Print.
5. DeQuadros, Miguel. *Mastering iOS Game Development.* Packt Publishing, 2015. Print.
6. Garrney, Chuck. *iOS 9 Game Development Essentials.* Packt Publishing, 2015. Print.
7. Manning, Jon and Paris Buttfield-Addison. *Mobile Game Development with Unity.* O'Reilly Media, 2015. Print.
8. Misra, Nitish. *Learning Unreal Engine Android Game Development.* Packt Publishing, 2015. Print.
9. Higth, John, and Jeannie Novak. Game Development Essentials: Game Project Management. Course Techology, 2007. Print.
10. Nystrom, Robert. *Game Programming Patterns*. Genever Benning, 2014. Print.

11. Annuzzi Jr, Josef, Darcey, Lauren and Shane Conder. *Advanced Android Application Development*. Addison-Wesley Professional, 2014. Print.
12. Gibson, Jeremy. *Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#*. Addison-Wesley Professional, 2014. Print.
13. Cho, James S. *The Beginner's Guide to Android Game Development.* Glasnevin Publishing, 2014. Print.
14.
15. Rettig, Pascal. *Professional HTML5 Mobile Game Development*. Wrox, 2012. Print.
16. Fernandez, Michelle M. *Corona SDK Mobile Game Development: Beginner's Guide*. Packt, 2015. Print.
17. Unger, Kimberly, and Jeannie Novak. *Game development essentials: Mobile Game Development*. Course Technology, 2011. Print.
18. Habgood, Jacob, and Nana Nielsen. *The Game Maker's Companion (Technology in Action)*. Apress, 2010. Print.
19. Dunniway, Troy and Jeannie Novak. *Game development essentials: Gameplay Mechanics.* Delmar Cengage Learning, 2008. Print.
20. Juul, Jesper. *Half-Real: Video Games between Real Rules and Fictional Worlds*. The MIT Press, 2005. Print.
21. Salen, Katie and Eric Zimmerman, *Rules of Play: Game Design Fundamentals*, The MIT Press, 2003. Print.
22. Rouse, Richard III. *Game Design: Theory and Practice*. 2nd ed. Jones & Bartlett Learning, 2004. Print.
23. Morrison, Michael. Beginning Mobile Phone Game Programming. SAMS, 2004.
24. Microsoft. "Microsoft Store Marketplace. Windows phone games." Web. <https://www.microsoft.com/en-us/store/games/windows-phone?icid=en_US_Store_UH_games_WinPho&icid=en_US_Store_UH_games_WinPho_V1>.
25. Google. "Google play. Apps" Web. <https://play.google.com/store/apps?hl=en>
26. Apple. "Mac App Store." Web. <https://itunes.apple.com/en/genre/mobile-software-applications/id36?mt=8>
27. Valve. "Steam." Web. <http://store.steampowered.com>
28. Epic Games. Inc. "Unreal engine. Overview" Web. <https://www.unrealengine.com/what-is-unreal-engine-4>
29. Corona Labs. "Corona SDK" Web. <https://coronalabs.com/products/corona-sdk/>
30. Marmalade Technologies Ltd. "Marmalade. The developer's platform." Web. <https://www.madewithmarmalade.com>
31. Unity Technologies. "Tutorials." Web. <https://unity3d.com/ru/learn/tutorials>
32. Autodesk Inc. "Autodesk University." Web. <http://au.autodesk.com/au-online/overview>
33. GameSalad Inc. "GameSalad for Education." Web. <http://gamesalad.com>
34. Shoukry, Laila H. "Child-Centered Design of Preschoolers Mobile Educational Games". Web. <https://www.academia.edu/4325529/Child-Centered_Design_of_Preschoolers_Mobile_Educational_Games>
35. Bea, Francis. "40 iOS and Android mobile monetization strategies for app developers" Web. <http://appflood.com/blog/40-ios-and-android-mobile-monetization-strategies-for-app-developers>
36. Cross, Jamie. "Introduction to Mobile Games Development with Gamesalad" Web. <https://www.udemy.com/introduction-to-mobile-games-development/>

7. Grading system

Students' final grades are based on the following activities: reports on home assignment, an in-class assignment, and a final exam.

Ongoing assessment is delivered as *home assignment* (HA) and *in-class assignment* (ICA). Grades, which are gained by students while ongoing assessment, are the parts of the *cumulative grade* (CG).

As far as home assignment consists of several parts, each part is finalized with a printed report. *Reports* on *home assignment* (RHA$_i$, where i = 1,2,3) are used to evaluate the work over the duration of the course (see Section 8 for details). Reports, which are received after a hard deadline, are evaluated as zero. If a product is not submitted to a store RHA$_2$ is evaluated as Fail (1-3 at 10-point scale).

In-class assignment (ICA). Only a student, who participates in-class assignment gains ICA grade. Repeating of in-class assignment is not permitted, because ICA appears in CG.

Summarizing, ICA and RHA$_i$ form CG, which is calculated as follows:

$$CG = 0,3*ICA + 0,2* RHA_1 + 0,3*RHA_2 + 0,3*RHA_3$$

Final exam (FE) grade has two components: a teacher's grade (TG) and a peer grade (PG).

$$FE = 0,5*TG + 0,5*PG$$

In general, final grade (FG) is calculated as follows:

$$FG = 0,4*FE + 0,6*CG$$

If a student verified the completion of one of MOOC listed below (Section 9), the extra credit (EC) is calculated. EC $\in [0;1]$ and calculates as a transformation of MOOCs grading scale to [0;1]. Consequently, the final grade includes extra credit and is calculated as follows:

$$FG = 0,4*FE + 0,6*CG + EC$$

Only rounded grades take place in calculations. The arithmetic rules are used. *Example, 4,5 -> 5; 4,49 -> 4.*

Attendance is graded according to 10-point scale applied in HSE.

10-point scale	Russian grading framework	ECTS grading scheme	
10	Excellent	A+	Excellent
9	Excellent	A	Very good
8	Excellent	A–	Very good
7	Good	B+	Good
6	Good	B–	Good
5	Satisfactory	C+	Satisfactory
4	Satisfactory	C–	Satisfactory
3	Fail	F	Fail
2	Fail	F	Fail
1	Fail	F	Fail

8. Guidelines for Knowledge Assessment
Ongoing assessment

Home assignment is implemented as a semester project, which is prepared by a small collaborative team. The home assignment project consists of three stages:

   a) Working group introducing, targeted audience definition, concept of a game declaration and argumentation, the project planning;
   b) Selection and argumentation of means, a game prototyping and development, a product submitting to a selected mobile store;
   c) Monetizing and promoting strategy selection and implementation.

Each collaborative team introduces a printed report at the end of every stage of the home assignment. The report contains the argumentation of project solutions and the results of a stage. Deadlines are hard. A teacher evaluates reports and provides each group with a *formative feedback*. Every member of a team gains the same grade.

In-class assignment is individual assignment. The assignment is implemented in a WebQuest form. The most preferred categories of WebQuests are *design tasks* and *analytical tasks* (for details see WebQuest taxonomy of tasks: http://webquest.org/sdsu/taskonomy.html). Students are given the various of WebQuests and in-class prepare a report with project solutions and their justification.

<u>WebQuest Variant Example</u>

You are going to design, develop and promote an educational mobile game for three- and four-year-old children.

You have an obligation to develop your game using *GameSalad for Education*.

WebQuest activities:

   1. Study your targeted audience via visiting Academia web site and studying Child-Centered Design of Preschoolers Mobile Educational Games
      at: https://www.academia.edu/4325529/Child-Centered_Design_of_Preschoolers_Mobile_Educational_Games.
   2. Meet your developer's framework. Visit The GameSalad website
      at: http://gamesalad.com.
   3. From these sited define a set of keywords and prepare a body of knowledge (links, document) for your project.
   4. Prepare a MS Word document with a report about your project design solutions.

Report requirements:

   1. *Project name*. Make up a name for your game.
   2. *The idea*. In a few words describe the idea of the game.
   3. *Targeted audience*. Describe the audience of your application, constraint possible use cases and formulate informal requirements.
   4. *First chapters of Software Requirement Specification*. List some functional and nonfunctional requirements.
   5. *Project solutions*. List the solutions, which follows from your requirements.
   6. *Development tools*. Describe the developer's tools set you are going to use. Describe the features of GameSalad significant to your project.
   7. *Game mechanics*. Give a brief description of the solutions about game mechanics you are going to implement in your application.
   8. *Project solutions*. List the solutions, which follows from sections 6 and 7.

<u>Interim assessment</u>

Final exam consists of two parts. The first is a *report session*, where small collaborative teams present products and the results of their conceiving, development and promotion. A teacher

evaluates presentation using a checklist, every member of a team gains the same grade. The second part of exam is a *peer assessment session*. Each member of a group anonymously fills in a check list, where he evaluates the other members of a group.

<u>**Assessment schedule**</u>

Week	Assessment type
Week 4	Report 1 (RHA1)
Week 8	In-class assignment (IC)
Week 11	Report 2 (RHA2)
Week 15	Report 3 (RHA3)
Exam week	Final Exam (FE)

9. Methods of Instruction

The course combines direct and indirect teaching techniques and contains: lectures, collaborative learning, problem based learning, blended learning, reports, feedback and formative assessment.

Direct teaching is carried out by a lecture method. The preferred informal lectures (lectures with discussion), where students play an active role. The main purpose of lectures is to introduce course's topics, to overview basic information and to discuss and form the directions of further course activities.

Collaborative and *problem based learning* is implemented through *home assignments* and *in-class activity*.

Home assignment means that students work in small collaborative teams on a mobile game. Home project consists of three blocks: (1) conceiving the idea of a mobile game, domain and targeted audience studying; (2) developing an application and its submitting to a particular mobile apps store; (3) the application monetizing and promotion. Moreover, home assignment is fully agreed with CDIO initiative for engineering education.

<u>**Home assignment schedule**</u>

Week	Project activity
Week 1	Meeting the project. Form groups and approve an idea of a game.
Week 2-3	Work on targeted audience and project planning.
Week 4	Demonstrate and discuss the results of field and users' analysis. Report 2 introducing (graded)
Week 5-6	Work on working prototype.
Week 7	Demonstrate and discuss preliminary results of prototyping.
Week 8-9	Work on application, submitting preparation
Week 10	Submitting a game to a store
Week 11	Report 2 introducing (graded)
Week 12-14	Working on game promotion
Week 15	Demonstrate the results of promotion. Report 3 introducing (graded)
Final exam	Final presentation of a group

In-class activity (*seminars*) consists of short programming and project assignments. Students works in pairs (*think share pare technique*) or in small randomly generated groups.

Blended learning in represented in two forms.

At first we use MOOCs to support students' *self-training*. This course suggests students will complete MOOCs listed below to gain or improve game developers' skills.

At second we implement *formative assessment* in a WebQuest form. The course supposes an *in-class assessment* in a WebQuest form. Moreover, being a powerful constructivists' educational technique, the WebQuest plays a *formative* role.

The list of MOOCs, which may bring an EC:

Course Title	Affiliation	Link
Coursera		
Game Development for Modern Platforms	Michigan State University	https://www.coursera.org/learn/gamedev-platforms/
Multiplatform Mobile App Development with Web Technologies	The Hong Kong University of Science and Technology	https://www.coursera.org/learn/hybrid-mobile-development
EdX		
Mobile Application Experiences Part 3: Building Mobile Apps	MIT	https://www.edx.org/course/mobile-application-experiences-part-3-mitx-21w-789-3x
Microsoft Virtual Academy		
Building Windows 10 Games with Unity 5	Microsoft	https://mva.microsoft.com/en-US/training-courses/building-windows-10-games-with-unity-5-12572?l=EJJiCpxPB_8401937557
Developing Games with Marmalade and C++ for Windows and Windows Phones	Microsoft	https://mva.microsoft.com/en-US/training-courses/developing-games-with-marmalade-and-c-for-windows-and-windows-phone-8977?l=j8uteKS3_3004984382

10. Special Equipment and Software Support

Equipment for in-class and home activity:

1. Classroom multimedia projector;
2. Smartphone or tablet (recommended);

Software recommended for in-class and home activity:

1. Microsoft Visual Studio 2013 or upper (with mobile device emulators).
2. Xamarin platform (https://developer.xamarin.com).
3. Unity (https://unity3d.com/ru/get-unity).
4. Web-browser with HTML5+JavaScript support.
5. Microsoft Power Point 2010 or upper.