MAGnUS: Mobile Applications and Game Development Master Study Programme

ASOIU – Azerbaijan State Oil and Industry University

2023

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ADNSU - Azerbaijan State Oil and Industry University

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Master study level
120 ECTS

Language of instruction - English

Conditions of admission - Bachelor's Degree, English skills at level B2, passing the admission exams
Objective - to create conditions for the formation of gaming, programming and criticizing professionals who know how to integrate, develop, and design knowledge with modern information and communications technology, as well as to enable students to continue their studies and introduce them to scientific work in the areas of virtual reality, computer graphics, artificial intelligence.
Description of programme - the curriculum consists of three core areas:

- Mobile applications development

- Interaction design

- Game development

The programme consists of three integrated areas: creativity, technical knowledge, and management. The curriculum is practice-oriented. The graduates will start working as mobile application developers, game designers and creators, entrepreneurs and supporters of mobile applications, and in the game industry. The curriculum is based on the total enrollment for the mandatory basic subjects. Then, according to the chosen field of specialization, modules taught in specialty subjects (mobile developer, game designer)

Learning outcomes: student will be able to

- implement and apply principles of user-friendly design and work with a wide range of technologies;

- identify and apply theoretical knowledge and practical skills related to the development of efficient and secure software applications;

- work in and integrate within an intercultural team, show leadership skills, respect ethical issues;

- analyze current market trends to create highly demanded commercial software;

- acquire and develop the skills of structuring research and development projects, adopting existing process models, planning individual and group tasks, gaining experience in projects, handling time and team management, as well as reporting techniques;

- develop skills in project planning and effectively apply principles of game design;

- critically evaluate and justify the use of programming tools and techniques for developing native and cross-platform applications;

- evaluate their own and others' professional activities as an autonomous and lifelong learner;

- write, present and publish scientific papers based on research in professional areas

Structure of the programme

Name of the module	Mandatory ECTS	Elective ECTS
Mobile applications development or Game development	17	6
Mathematics module	10	6
Programming module	11	6
Interdisciplinary module	12	2
Innovation module	20	0
Internship & thesis	30	0
Total	100	20

Programme modules, their objectives and learning outcomes

1 Professional module - 23 ECTS

Students can select one of the professional modules (Game Design module or Mobile Applications Development module) directly after enrollment in the programme

Game design module

Objective - to establish prerequisites of theoretical knowledge and practical skills related to the development of games

Learning outcomes - student will be able to:

- understand the theories and methods, and applications of games, the principles of game design;

- design games conceptually and to put the knowledge to practical use;

- have both the skills of technical as well as creative storytelling;

- develop skills in project planning and effectively apply principles of game design;

- demonstrate innovative problem-solving skills to represent, integrate and solve problems in the game design and development industry

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 17 ECTS

- Game Development - 5 ECTS (I year fall semester)

- Serious Digital Games - 5 ECTS (I year fall semester)

- 3D Modelling for Computer Games - 7 ECTS (I year spring semester)

Elective courses - 6 ECTS - *students can select one of the following courses*

- Level Design and Prototyping - 6 ECTS (II year fall semester)

- Advanced Game Programming - 6 ECTS (II year fall semester)

Mobile applications development module

Objective - to provide knowledge about the design principles of user interfaces and interaction, rooted in established theories and practical skills, through a shared international educational experience and principles of implementing user-friendly design

Learning outcomes - student will be able to:

- assess a range of technological working environments;
- understand of principles of the implementation of user-friendly design;
- identify and apply theoretical knowledge and practical skills related to developing efficient and secure mobile applications;
- design and develop user interfaces for the cross-platform;
- apply mobile programming concepts to Android and iOS application development

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 17 ECTS

- Mobile Applications Development - 5 ECTS (I year fall semester)
- Security in Mobile Applications - 5 ECTS (I year fall semester)
- Database Design and Data Warehousing - 7 ECTS (I year spring semester)

Elective courses - 6 ECTS - *students can select one of the following courses*

- Mobile Applications Design and Architecture - 6 ECTS (II year fall semester)
- Cross Platform Development - 6 ECTS (II year fall semester)

2 Mathematics module - 16 ECTS

Objectives - To establish prerequisites of theoretical knowledge and practical skills related to the development of software applications

Learning outcomes - student will be able to:

- comprehensively understand the theories and methods for the application in games mobile apps;
- design and implement AI in games;
- optimize the work of the applications and games by using different machine learning, decision making, and parallel programming methodologies;
- procedurally generate levels in games and components of mobile applications;
- program AI to interact with the user, simulate realistic actions

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 10 ECTS

- Parallel and Distributed Algorithms - 5 ECTS (I year fall semester)
- Artificial Intelligence - 5 ECTS (I year spring semester)

Elective courses - 6 ECTS - *students can select one of the following courses*

- Decision Making Methods - 6 ECTS (II year fall semester)
- Predictive Analysis - 6 ECTS (II year fall semester)

3   Programming module - 17 ECTS

Objectives - to provide advanced skills in programming through the different examples of mobile application and game development

Learning outcomes - student will be able to:

- to model and implement scientific concepts related to the game and mobile app interaction and design;
- create and reuse software basic building blocks;
- design and develop secure and user-friendly game content and mobile applications;
- procedurally generate levels in games and components of mobile applications using advanced programming techniques;
- critically evaluate and justify the use of programming tools and techniques for developing native and cross-platform applications

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 11 ECTS

- Computer Graphics - 5 ECTS (I year fall semester)
- UI/UX Design - 6 ECTS (II year fall semester)

Elective courses - 6 ECTS - *students can select one of the following courses*

- Computer Animation - 6 ECTS (II year fall semester)
- AR/VR Technology - 6 ECTS (II year fall semester)

4   Interdisciplinary module - 14 ECTS

Objectives - to develop the traditional arts skills of precision and clarity in reading, writing, speaking and thinking

Learning outcomes - student will be able to:

- evaluate the testimony of experts;
- respect ethical issues;
- synthesize or integrate;
- develop more advanced epistemological beliefs, enhanced critical thinking ability and metacognitive skills;
- understand of the relations among perspectives derived from different disciplines

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 12 ECTS

- Foreign language - 6 ECTS (I year fall semester)
- Pedagogy of High School - 4 ECTS (I year spring semester)
- Psychology - 2 ECTS (II year fall semester)

Elective courses - 2 ECTS - *students can select one of the following courses*

- Philosophy Problems of Science and History - 2 ECTS (I year fall semester)
- Philosophical-Methodological Basics of the Dynamic Progress of Society - 2 ECTS (I year fall semester)

5 Innovation module - 20 ECTS

Objectives - to empower students to critically analyse scientific and popular literature, invent, launch, run, and successfully complete innovative game and mobile applications projects that have a significant and meaningful impact on users, players, organizations and industries

Learning outcomes - student will be able to:

- organize and lead an innovative project, using the design-thinking approach, develop new products and services;
- define the strategic frames where the product/service innovation should be implemented by using scenario and system analysis;
- work in and integrate within an intercultural team, show leadership skills, respect ethical issues;
- evaluate their own and others' professional activities as autonomous and lifelong learners using critical thinking skills;
- apply design methods to develop innovative solutions to answer the potential customer's needs and meet the design specification

Assessment - Grading is based on exams or assessments taken during the courses

Courses
Mandatory courses - 20 ECTS

- History and Methodology of Specialty Area - 2 ECTS (I year fall semester)
- Contemporary Problems on Specialty Area - 4 ECTS (I year spring semester)
- Project Management - 5 ECTS (I year spring semester)
- Entrepreneurship - 5 ECTS (I year spring semester)
- Research Methods - 4 ECTS (II year fall semester)

6 Internship & thesis - 30 ECTS

Objectives - to shape the skills to apply the knowledge acquired during the master studies in the professional activities, to develop interdisciplinary problem solving skills through practical and purposeful projecting and teaching work under the guidance of the supervisor, to create an opportunity to practically apply the knowledge, skills and experience to a creative or development process

Learning outcomes - student will be able to:

- apply the theoretical knowledge to practice;
- define the strategic frames where the product/service innovation should be implemented by using scenario and system analysis;
- know how to adopt existing process models;
- possess experience in project, time, and team management;
- know and understand his or her role in the project team;
- analyze and evaluate their own specialization and to plan further professional development by participating in doctoral studies or in the lifelong-learning programme

Assessment - Based on internship reports and defense of the thesis

Education plan

I semester - Fall

1. MHF - B01.1 - Foreign Language

2. MHF-B01.3 - Philosophy Problems of Science and History or Methodological Basics of the Dynamic Progress of Society

3. MİF-BO2 - History and Methodology of Specialty Area

4. MİF-BO4 - Parallel and Distributed Algorithms

5. MİF-BO5 - Computer Graphics

6. MİF-BO10 - Game Development or Mobile Applications Development

7. MİF-BO11 - Serious Digital Games or Security in Mobile Applications

II semester - Spring

1. MHF - B01.2 - Pedagogy of High School

2. MİF-BO1 - Contemporary Problems on Specialty Area

3. MİF-BO6 - Artificial Intelligence

4. MİF-BO7 - Project Management

5. MİF-BO9 - Entrepreneurship

6. MİF-BO10 - - 3D Modelling for Computer Games or - Database Design and Data Warehousing

III semester - Fall

1. MHF - B01.3 - Psychology

2. MİF-BO3 - Research Methods

3. MİF-BO8 - UI/UX Design

4. MİF-BO13 - Decision Making Methods or Predictive Analysis

5. MİF-BO14 - Computer Animation or AR/VR Technology

6. MİF-BO15 - Level Design and Prototyping or Advanced Game Programming or Mobile Applications Design and Architecture or Cross-Platform Development

IV semester - Spring

1. Research practice

2. Scientific and pedagogical practice

3. Preparation and defense of a master's thesis