IT FACULTY

UNIVERSITY OF GOTHENBURG

Game Design & Technology Master's Programme, 120 credits

Game Design & Technology masterprogram, 120 högskolepoäng

Programme code: N2GDT

Second cycle / Avancerad nivå

1. Confirmation

This programme syllabus was confirmed by the IT Faculty Board on 10-10-2018 (G 2018/470) and was last revised on 15-10-2020 (GU 2020/2619) to be valid from 30-08-2021, Autumn semester 2021.

Responsible Department/equivalent: Department of Computer Science and Engineering

2. Purpose

The aim of the study programme is to educate professional developers within the areas of programming which are central to advanced game engine development. The programme provides a competitive set of skills for both professional roles related to the development of game technology – for example graphics engine architect, physics engine architect, AI developer, and network architect – and for continued studies at PhD level.

The profile of the study programme is characterized by a combination of advanced technological knowledge and a development methodology that allows the creation of large and technologically complex system in interdisciplinary development teams where the requirement specification are mutable and strongly dependent on the user experience of the intended end users. The study programme applies a battery of different perspectives and approaches that combine to educate highly qualified developers that can both design and implement game engines and equivalent systems (e.g. interactive simulations) to high levels of quality. Further, it allows students to continue their studies at PhD level and become researchers that can innovate and conduct advanced technological experiments within the areas of computer graphics, physics simulation, network optimization, and gameplay design.

A central stance in the study programme is to be close to the current research in all the technical areas within the study programme, and to connect the development of technology to the design of user experiences.

3. Entry requirements

Bachelor's degree 180 credits including an independent project (degree project) of at least 15 credits or equivalent within the field of Software Engineering, Computer Science, Information Technology, Information Systems, or equivalent.

7.5 credits in linear algebra.

Knowledge in programming with a minimum of:
4.5 credits object-oriented programming,
7.5 credits model- or process-driven software development,
7.5 credits algorithms and data structures, and

Applicants must prove their knowledge of English: English 6/English B from Swedish Upper Secondary School or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Specific entry requirements for admission to a course within the study programme

Within the study programme there can be specific entry requirements for admission to individual courses. These specific entry requirements are documented in each course syllabus and state which entry requirements are necessary to be registered on a course within the study programme.

Selection

Selection is according to the Higher Education Ordinance and the University of Gothenburg admission regulations for education on first and second cycle.

4. Higher education qualification and main field of study

This programme leads to a Degree of Master of Science (120 credits) with a major in Interaction Design (Filosofie masterexamen med huvudområdet Interaktionsdesign).

5. Outcomes

General outcomes for Degree of Master (120 credits)

Knowledge and understanding

For a Degree of Master (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.

Competence and skills

For a Degree of Master (120 credits) the student shall

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- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
- demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
- demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and approach

For a Degree of Master (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Local outcomes

Knowledge and understanding

For a Degree of Master of Science (120 credits) with a major in Interaction Design the student shall

- exhibit deep knowledge about the primary technology areas important for developing game engine and similar systems, as well as the current research questions within these areas,
- display knowledge and understanding of the complexity of handling requirements in software development projects which depend on both advanced technological development and strict requirements on what user experiences these provide,
- display knowledge and understanding regarding theories and methods related to
  - the development, improvement, and verification of rendering systems,
  - the development, improvement, and verification of physics simulations,
  - the development, improvement, and verification of real-time network systems,
  - the development, improvement, and verification of AI systems,
  - the design and evaluation of game experiences, including tools to measure and analyze user experiences of systems that are to be deployed on large scales,
  - the design and evaluation of game engines and similar system that make use of the parts above as components, and specifically how these can be continued to be developed, and,
  - dedicated tools for the areas above and how these can be developed and verified.

Competence and skills

For a Degree of Master of Science (120 credits) with a major in Interaction Design the student shall

- be able to design new game engines and modules modified to the requirements present in modern games and interactive simulations,
- be able to design tools to support the testing and verification of game engines as well as tools to ease the development of game content to these systems,
- be able to plan and communicate design suggestions and development processes for the above system given mutable development contexts, and
- show theoretical knowledge and practical ability related to the research methodology relevant to software development of game engines and expansions of these.

Judgement and approach

For a Degree of Master of Science (120 credits) with a major in Interaction Design the student shall

- analyze the advantages and disadvantages with various approaches to develop game engines and expansions of game engines,
- modify the development of complicated software systems based on requirements specifications that partly build upon intended user experiences and gameplay, and
- independently handle mutable development contexts and be active in seeking new knowledge and skills related to development processes.

6. Content and structure

The education consists of courses related to the development and testing of software that is part of game engines and interactive simulations. The study programme consists of 120 credits in total, of which 75 credits are in terms of compulsory courses within the main field of Interaction Design, including 30 credits independent work (the master thesis). In addition, there is a possibility of including a maximum of 30 credits optional courses within or outside the main field of study. Students wishing to follow a course within the main field of study, but where the course is not part of the programme, shall consult the programme management.

The courses are given in a progressive order so they both independently and together develop the students' competences and abilities within the main field, with the overarching aim of ensuring that the examination goals are met. A foundational understanding of the main field is provided through the compulsory courses during the first semester. Further compulsory courses continue to develop this understanding until the master thesis, while the optional courses provide incremental deepening or broadening of the students' skill sets. This structure provides the students with an academic and theoretical foundation within the fields that characterize game engine development.

The education is implemented through lectures, seminars, teacher led exercises, labs, and supervision, as well as projects where students apply and deepen their knowledge.

The study year is divided into two semesters and four study periods. A semester contains two study periods of 15 credits each. Normally, a student attends two courses in parallel each study period.

Study process

The first semester consists only of compulsory courses and introduces important parts and characteristics of the game engine development field. The second and third semester contains one compulsory course each study period and the possibility for students to choose between deepening and broadening their education through optional courses. The study programme consists of the following compulsory courses:

TIA248 An introduction to Game Research, 7.5 credits
DIT223 Computer Graphics, 7.5 credits
TIA098 Gameplay Design, 7.5 credits
TIA103 Simulation Engines, 7.5 hp credits
DIT460 Game Development Project, 7.5 credits
DIT465 Technology-driven Experimental Game Design, 7.5 credits
DIT910 Master's Thesis in Computer Science and Engineering, 30 credits or DIT920 Master's Thesis in Computer Science and Engineering, 60 credtis

Within Software Engineering:
DIT276 Requirements Engineering, 7.5 credtis
DIT191 Agile Development Processes, 7.5 credits

The course "Master Thesis" contains independent work (master thesis) of 30 credits. Students attending the course "Master Thesis 60 credits" do not need to take the courses DIT460 Game Design & Technology Project, 7.5 credits and DIT465 Technology-Driven Experimental Gameplay Design, 7.5 credits.

Students can apply to take alternative courses of studies. These can be in preparation for research- or development work.

Optional Courses

Students can take optional courses within the study programme totaling 30 credits. The courses can be taken at Gothenburg University or at other universities within or outside Sweden. The choice of courses within the main field of study outside the programme's courses shall consult the programme management. Examples of possibilities to specialize within in the programme include:

- Computer Graphics
- Distributed Real-Time Games
- AI and Game Agents
- Naturalistic Simulations
- Game Development on mobile and other non-traditional platforms

Language of tuition

Language of tuition is English.

7. Guaranteed admission

Students who follow the study programme at the prescribed pace are guaranteed admission to all compulsory and elective courses stated in the programme syllabus, provided that the student in question is eligible for the course/courses provided that specific entry requirements are

fulfilled and the student applies to the course within the study programme within the prescribed application period.

For elective courses outside the study programme local admission regulations are valid and there is no guaranteed admission.

8. Other information

Credit transfer of former education

In some cases, the student has the right to be given credit for former higher education according to the legislative regulations of the Higher Education Ordinance.

Evaluation

The courses of the study programme are evaluated according to each course syllabus. The result will be used for planning and implementation of upcoming courses. A summary is given to students at the start of the courses.

The study programme will be followed up and evaluated in accordance with the applicable Policy för kvalitetssäkring och kvalitetsutveckling av utbildning vid Göteborgs universitet (Policy for the Quality assurance and Quality Development of Education at the University of Gothenburg).

Revision of the syllabus

This syllabus is a revision of the syllabus confirmed by the IT Faculty Board, University of Gothenburg, on 01-06-2016 (reg. no. G 2016/181).