

Courses for 2,5 year program Game programmer (alphabetical order)

- 3D and shader programming
 - 3D mathematics for game development
 - Artificial Intelligence in game production
 - Computer technology for game development
 - Data structures and algorithms
 - Degree project – Game programming
 - Design patterns for game development
 - Development tools in game projects
 - Game Physics
 - Game programming with C #
 - Game programming with C ++
 - Game project 1
 - Game project 2
 - Game project 3
 - Game project 4
 - Industry preparedness Game Programming
 - Internship Game Programming
 - Market analysis, CV and portfolio
 - Network programming for games
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COURSE DESCRIPTIONS

COURSE 3D and shader programming (3 weeks)

Purpose and goal:

The aim of the course is to provide knowledge about the rendering pipeline and how it can be affected with the help of shader programming.

Knowledge:

- Be able to explain the basics of shader programming.
- Be able to explain the basics of how a rendering pipeline works.
- Be able to explain the basics of lighting and visual effects.

- Be able to explain the basics of different rendering concepts, for example HDR, PBR or volumetric rendering),
- Be able to explain the basics of graphic optimization, for example LOD or culling.

Skills:

- Be able to program shaders in a modern rendering API.
- Be able to troubleshoot and measure graphic performance with different tools and techniques.

Competences:

The student should be able to understand how the graphic rendering pipeline works and be able to implement their own shaders to achieve a visual effect.

COURSE 3D mathematics for game development (4 weeks)**Purpose and goal:**

The aim of the course is to create an understanding of the mathematics that is common in game development.

The goal is for the student to be able to solve common mathematical problems in game development.

Knowledge:

- Be able to account for basic concepts in arithmetic.
- Be able to account for basic concepts in linear algebra.
- Be able to account for basic concepts in geometry and trigonometry.

Skills:

- Perform arithmetic calculations.
- Perform calculations in linear algebra in common game contexts.
- Perform calculations in geometry and trigonometry in common game contexts.
- Apply mathematical calculations with programming in common game contexts.

Competences:

- Use programming to calculate and solve common mathematical problems in a game production.
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COURSE Artificial Intelligence in game production (4 weeks)**Purpose and goal:**

The purpose of the course is to create knowledge and skills about common concepts in AI for games.

The goal is for the student to be able to understand different AI solutions for game development and implement AI behaviors for computer games.

Knowledge:

- Understand the structure of AI systems in game development.
- Understand common AI behaviors in game development.
- Understand common problems in modern AI in computer games.

Skills:

- Analyze and evaluate different AI techniques for game productions.
- Implement AI in a game production.

Competences:

The student should be able to understand common AI concepts in game productions and implement AI for computer games.

COURSE Computer technology for game development (4 weeks)**Purpose and goal:**

The aim of the course is to create basic knowledge about the structure and function of the computer.

The aim of the course is to provide basic knowledge about how a computer processes code and how a programmer can optimize code for hardware.

Knowledge:

- Basic understanding of a computer's various components and its function.
- Basic understanding of how the computer's various components work from a software perspective.
- Basic understanding of how to convert code into an executable program.
- Object oriented vs data oriented programming.

Skills:

- Analyze hardware optimization code.
- Implement code optimized for hardware.
- Build an executable program from code.

Competences:

- To use the hardware for a game production.

COURSE Data structures and algorithms (5 weeks)

Purpose and goal:

The aim of the course is to provide understanding and knowledge in problem solving for algorithms. Provide knowledge and skills for common algorithms and data structures in game programming.

The goal is to learn problem-solving techniques to understand or create game programming algorithms. To be able to analyze and consider choices of common data structures for game programming.

Knowledge:

- To select and adapt data structures for different purposes in game programming.

- Analyze performance for different data structures and algorithms.

Skills:

- Implement and adapt data structures and algorithms for game programming.

Competences:

- The student must understand and be able to apply game programming with different computer structures and algorithms as well as solve complex problems with the help of problem-solving techniques.

COURSE Degree project – Game programming (10 weeks)

Purpose and goal:

The degree project will give the student an in-depth study of a self-chosen area within game development and game programming with the guidance of professional experts from the game industry. With the support of course leaders, the goal is to either, design a problem definition in the form of a simulated assignment in an in-depth area or, together with a company, identify a real world assignment that leads to the same level of in-depth study.

Knowledge:

- Reflect on their knowledge and skills in relation to current industry needs.
- Understand a specialized area in game development and game programming.
- Understand a specialized role as a game programmer in the computer game industry.

Skills:

- Being able to structure in-depth work on assignments in game development.
- Producing an advanced part of modern game development.
- Reporting on advanced level work.

Competences:

The student must be able to immerse themselves in an independent way in an area specialized for the industry. Be able to structure and benefit from experts to produce an advanced part of game development.

COURSE Design patterns for game development (2 weeks)

Purpose and goal:

The aim of the course is to understand common problems in game programming and its solutions with design patterns.

The goal is for the student to be able to adapt and implement common design patterns in game programming.

Knowledge:

- Being able to explain the basics of a number of design patterns and how they can be used in a game production.
- Being able to account for advantages and disadvantages of design patterns in a modern game production.

Skills:

- Adapt and implement common design patterns in game programming.

Competences:

Customize common solutions with design patterns for a game production.

Understand the pros and cons of design patterns for specific problems in game programming.

COURSE Development tools in game projects (2 weeks)

Purpose and goal:

The aim of the course is for the student to understand the benefits of being able to develop tools adapted to a game developer's needs.

The goal is for the student to be able to create a customized tool for a game developer's needs.

Knowledge:

- Design graphical interfaces adapted for game development.

Skills:

- Program tools adapted for game developers.

Competences:

- Program a simpler tool for game development.
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COURSE Game Physics (3 weeks)**Purpose and goal:**

The purpose of the course is to provide knowledge of whether a modern physics engine for game development is built. Provide knowledge and skills in using game physics in a game production.

The goal is to understand and use game physics in game development.

Knowledge:

- Basic understanding of the structure of a modern game physics engine.
- Basic understanding of collision in game physics.
- Basic understanding of how forces are applied in game physics.
- Understand common physics errors and their solutions in game development.

Skills:

- Simulate collision in a game production.
- Control the forces of a physical body in a game production.
- Use the physics implementation of a modern game engine in a game production.

Competences:

- The student will be able to manipulate game physics and understand its effect in a game production.

COURSE Game programming with C # (5 weeks)

Purpose and goal:

The aim of the course is to develop basic knowledge and skills in the programming language C# for game development. The student will also develop basic knowledge and skills in programming towards a modern game engine with C#.

The aim of the course is for the student to be able to program simpler games with C# for a modern game engine.

The student must be able to complete one of the education's game projects with C ++ with involved game companies.

Knowledge:

- Be able to explain the basics of programming with C#.
- Be able to explain the basics of interpreted programming languages.
- Be able to account for common programming errors (compilation, runtime and logical errors).
- Be able to explain the basics of building a modern gaming engine.

Skills:

Be able to program for a modern game engine with C#.

- Troubleshooting and testing of code.
- Optimization and troubleshooting tools in a modern game engine.

Competences:

- The student should be able to program systems or game mechanics in a game context and program for a modern game engine with C#.

COURSE Game programming with C ++ (10 weeks)

Purpose and goal:

The aim of the course is to develop basic knowledge and skills in the programming language C++ for game development. The student must also develop basic knowledge and skills in programming towards a modern game engine with C++.

The aim of the course is for the student to be able to program a simpler game with C++.

The student should also be able to program game systems with C++ for a modern game engine.

The student must be able to complete one of the education's game projects with C++ with involved game companies.

Knowledge:

- Be able to explain the basics of programming with C++.
- Be able to explain the basics of how source code becomes an executable file or library (compilation, assembly and linking).
- Be able to account for common programming errors (compilation, runtime and logical errors).
- Be able to explain the basics of building a modern game engine.

Skills:

- Be able to program a simpler game with C++.
- Program against a modern game engine with C++.
- Troubleshooting and testing of code.
- Optimization and troubleshooting tools in a modern game engine.

Competences:

- The student should be able to program systems or game mechanics in a game context and program against a modern game engine with C++.

COURSE Game project 1 (2 weeks)

Purpose and goal:

The purpose of the course is to participate in a game production in a group with several game developers from different disciplines. Game project 1 is a project with less control and fewer requirements for work processes and results but where great emphasis is placed on reflection for insights that are intended to be preparatory for future game projects with more responsibility and higher complexity.

The goal is to produce a simpler game with a modern game engine with feedback from representatives from the gaming industry.

Knowledge:

- Be able to explain the basics of different professional roles in a game production.
- Be able to explain the basics of a game production's different phases.
- Be able to explain the basics of planning, work processes and working in a group with several game developers.

Skills:

Be able to program a simpler game with a modern game engine with several game developers.

- Be able to reflect on work processes and results in a game production with several game developers.

Competences:

- With multiple game developers delivering a simpler game created with a modern game engine.

COURSE Game project 2 (4 weeks)

Purpose and goal:

The purpose of the course is to participate in a game production in a group with several game developers from different disciplines. Game project 2 is a project with expanded control and slightly higher requirements regarding work processes and results and where great emphasis is placed on reflection for insights that are intended to be preparatory for future game projects with more responsibility and higher complexity.

The goal is to produce a simpler game with a modern game engine with feedback from representatives from the gaming industry.

Knowledge:

- Be able to account for different professional roles in a game production.
- Be able to account for the different phases of a game production.
- Be able to report on planning, work processes and working in a group with several game developers.

Skills:

Be able to program a simpler game with a modern game engine with several game developers.

- Be able to reflect on work processes and results in a game production with several game developers.

Competences:

With multiple game developers delivering a simpler game created with a modern game engine.

COURSE Game project 3 (7 weeks)

Purpose and goal:

The purpose of the course is to participate in a game production in a group with several game developers from different disciplines. Game project 3 is a project with higher demands on work processes and results where great emphasis is placed on reflection for insights that are intended to be preparatory for future game projects with more responsibility and higher complexity.

The goal is to produce a simpler game with a modern game engine with feedback from representatives from the gaming industry.

Knowledge:

- Be able to account for different professional roles in a game production.
- Be able to account for the different phases of a game production.
- Be able to report on planning, work processes and working in a group with several game developers.

- Be able to report on agile working methods for a game production.

Skills:

- Be able to program a game with a modern game engine with several game developers.
- Be able to reflect on work processes and results in a game production with several game developers.
- Be able to work with an agile working method.

Competences:

- With multiple game developers deliver a game created with a modern game engine.
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COURSE Game project 4 (4 weeks)**Purpose and goal:**

The purpose of the course is to be involved in a group with several game developers from different disciplines in a shorter game production at a high level. Game project 4 is a project with high demands on work processes and results where great emphasis is placed on reflection for insights that are intended to be preparatory for future game projects with more responsibility and higher complexity.

The goal is to produce a game with a modern game engine with feedback from representatives from the gaming industry.

Knowledge:

- Be able to account for different professional roles in a game production.
- Be able to account for the different phases of a game production.
- Be able to report on planning, work processes and working in a group with several game developers.
- Be able to report on agile working methods for a game production.

Skills:

- Be able to program a game with a modern game engine with several game developers.

- Be able to reflect on work processes and results in a game production with several game developers.
- Be able to work with an agile working method.

Competences:

- With multiple game developers delivering a game created with a modern game engine.
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COURSE Industry preparedness Game Programming (3 weeks)

Purpose and goal:

The aim of the course is to provide an understanding of the gaming industry's current skill expectations of game programmers and how different gaming companies work with programming.

The goal is to give the student insight into game programming at different game companies and be able to adapt to the needs of the industry.

Knowledge:

- Be able to account for the gaming industry's hiring process for junior game programmers.
- Be able to account for the gaming industry's competence requirements for junior game programmers.

Skills:

- Programming following the gaming industry's requirements for junior game programmers.

Competences:

- Familiarize themselves with, and undertake, the set tasks and tests the gaming industry has as part of their hiring process for junior game programmers.
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COURSE Internship Game Programming (30 weeks)

Purpose and goal:

An internship (LIA) aims to introduce and strengthen the student in their new professional role in the gaming industry, while the student continues their learning under supervision in real

world context at a self-chosen workplace. The goal of LIA is an employment with the LIA company or with one of its partners. Thus, another purpose of LIA is for the student to strengthen and broaden their network in the gaming industry.

To ensure that the goals are fulfilled based on the student's competence level and the hiring needs of a company, the internship (LIA) is prepared through meetings at the school with potential LIA companies, recommendations from previous students and dialogue with the Head of Education and the management team. Before each LIA period, an LIA agreement is written, which is approved by the Head of Education, the LIA company supervisor and the student.

The LIA supervisor is quality assured by the school and is prepared for their role through supervisor meetings and written information about expectations and requirements for content and review.

During the LIA period, there are ongoing reviews and meetings with the school and the Head of Education. If the LIA company or its partners do not have the opportunity to offer employment, the school supports the student in the work of applying for a job in their new professional role.

The LIA period ends with an evaluation from the LIA supervisor, as well as an evaluation / reflection and an LIA presentation/recommendations from the student. This forms the basis for the Head of Education for grading.

Skills:

- Understanding the work of the LIA company, its partners, suppliers and other stakeholders in the industry.
- Industry structure, growth, trends and opportunities / threats.
- The tasks and areas of responsibility of one's own professional role.
- Other related professional roles and competencies.
- The structure and make up of key people in professional team.
- Customers, sponsors, financiers and other stakeholders.
- Trends, pace of development and new technologies.

Competences:

- deepen a student's knowledge from their education in professional practice.
- Produce as part of a team working with game development.
- Act and work with a student's specific key competence in a gaming team.

- Plan and produce syntax for games.
- Create functions based on the customer's and user's needs and wishes.
- Adapt and set program structure for an existing game layout and interface.
- Participation in the production of games in a real workplace.
- Analysis of one's own work. The analysis is described in an interim report and a final report, respectively.
- Through their LIA, the student gets a clear insight into developing a game developer role in real world game projects and gets the opportunity to specialize in the valuable roles a game programmer can take responsibility for.

COURSE Market analysis, CV and portfolio (3 weeks)

Purpose and goal:

The purpose of this course is to create an understanding of the world of the gaming companies in the computer game industry and at the same time map the gaming companies' current competence needs.

The goal is to study and analyze a larger number of gaming companies and learn to relate a student's own competence to the gaming companies' needs. Students learn to write custom CVs and create digital portfolios.

Knowledge:

- Knowledge of the Swedish computer game industry
- Knowledge of Sweden's computer game companies
- Understanding of one's own career choice

Skills:

- Create industry analysis
- Create a CV
- Write personal application letters
- Create a custom designed and digital portfolio for computer game companies

Competences:

- Competence to map the computer game industry and relate the gaming companies to a student's own competence and career choices. Competence to create professional presentation material in the form of CV and digital portfolio.
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COURSE Network programming for games (5 weeks)**Purpose and goal:**

The aim of the course is to provide basic knowledge of network communication in game development. Provide knowledge of common network technical problems and their solutions in game development.

The goal is for the student to be able to create simpler network-based games.

Knowledge:

- understand the most common protocols in network communication.
- different network concepts.
- network management for game development.
- to program network games in a modern game engine.
- solve common synchronization problems in game development.

Skills:

- Be able to design and implement server / client solutions for computer games.
- Troubleshoot and manage common problems in network-based games.

Competences:

The student must understand problems with network programming for game productions and be able to create simpler network-based games.
