

UAT-Online: Bachelor of Science in Game Programming

Program Description

All the great game ideas and designs in the world would be for naught without people with the skills to make these ideas reality. That's where the game programmers come in. Electronic games rely on their code base to realize the design, interaction and visual aspects of the play experience. Courses in game programming will emphasize the essential issues and the skills required to develop games for multiple platforms such as web, console, PC and mobile devices. These skills have broader applications in related industries; for example in entertainment, business, research and training.

Game programming students focus on programming principles, skills and techniques shared in all programming disciplines but focus on programming game-specific issues. Game programming emphasizes C++ programming, scripting, data handling, DirectX/Open GL development, game engine architecture, gameplay system, artificial intelligence, networking and more. Students in game programming will also develop a critical approach to the study of gameplay, interaction and design.

How UAT-Online Works

UAT-Online's Bachelor of Science in Game Programming program has been developed to give students the ability to focus 100% of their attention on each individual skill and class needed to become successful in this rapidly growing field. Classes are taken one at a time, and last five weeks each. Three classes will be taken each semester for a total of 15 weeks per semester. Courses are taken sequentially in order to build on the foundation of previous skills learned. This helps to increase overall understanding and comprehension of the material.

Objectives

- Analyze problems and design, build and test software systems in a team environment using industry-standard software engineering processes encompassing all phases of the software lifecycle to solve them.
- Demonstrate the ability to choose the most appropriate programming languages, standards and technologies to meet the requirements of specific projects and communicate these decisions clearly in written and oral forms.
- Using the principles and languages standard in video game programming, create and implement original games utilizing industry standard tools and software for web, console, PC and mobile game platforms.
- Integrate and analyze artificial intelligence programming practices into code structures and designs in order to facilitate the completion of game project and implement a given game design.
- Establish an industry-style programming production timeline and justify its strengths and weaknesses.
- Design and develop the architecture needed to support a complete game project, including but not limited to visualization, data handling, networking and gameplay.

University Core Courses

INT3500/4000	Internship
LAW3700	Legal Issues in Technology
MGT1120	Project Management in a Technology Environment
PRO1020	Professional Skills Development
PRO2510	Senior Innovation Project I/II: Topic Paper and Project Plan
PRO3000/3010	Senior Innovation Project III: Analysis
PRO4810	Senior Innovation Project IV & Portfolio: Presentation
TCH1100	Foresight Development
TCH3010	Ethics in Technology

General Education Courses

BIO1200	Introduction to Biology
COM2260	Public Speaking
ENG1010	Composition I
ENG1020	Composition II
ENG3100	Science Fiction as Literature
ENG4120	Graphic Novel
HIS3050	20th Century Innovation
MAT1740	College Algebra
MAT2200	Statistics
PHY1250	Introduction to Electricity and Magnetism
PSY1500	Psychology of Thinking
PSY3600	Psychology of Creativity
SOC1500	Technology and Society

Degree-Specific Courses

CSC2020	C# Programming I
CSC2150	C/C++ Programming I
CSC2620	C# Programming II
CSC2750	C/C++ Programming II
CSC2800	Data Structures I
CSC3600	Artificial Life Programming
GAM1010	Introduction to Game Design
GAM1040	Introduction to Game Programming I
GAM2050	Gameplay Programming Concepts
GAM2150	Game Scripting
GAM2220	DirectX Programming I
GAM2350	Game AI Concepts
GAM3150	Console Game Development
GAM3220	DirectX Programming II
GAM3270	Game Development in C++
GAM3320	XNA Game Programming
GAM3350	Multiplayer Game Programming
GAM4050	Applied Game Development
GAM4200	Game Engine Development
GAM4700	Advanced Gameplay Project

This list represents the combination of courses necessary for the degree. Course sequence and offerings may change due to software or other scheduling requirements.

To learn about UAT-Online's Associate of Science in Game Programming, please see the UAT-Online catalog.



COURSE DESCRIPTIONS

University Core Courses

INT3500 Internship

An internship is considered a supervised, practical experience that is the application of previously learned theory. Employers/sponsors work with the student to meet specific objectives and/or learning goals and provide special mentoring or networking opportunities. In exchange, the intern helps the employer/sponsor in meeting overall work goals for the agency/company. Students completing 3.0 credit internships must work a total of 150 hours, or 10 hours per week for 15 weeks.

INT4000 Internship

An internship is considered a supervised, practical experience that is the application of previously learned theory. Employers/sponsors work with the student to meet specific objectives and/or learning goals and provide special mentoring or networking opportunities. In exchange, the intern helps the employer/sponsor in meeting overall work goals for the agency/company. Students completing 6.0 credit internships must work a total of 300 hours, or 20 hours per week for 15 weeks.

LAW3700 Legal Issues in Technology

This course addresses typical legal and business issues in the multimedia field. Rights granted under copyright, principles of fair use, trademarks, intellectual property law, trade secrets, unfair competition, disclosure and privacy laws are covered. Students explore these legal topics with focus on electronic media.

MGT1120 Project Management in a Technology Environment

This course covers every aspect of managing a project in a technology environment, from assembling the right team to figuring out a schedule, estimating needed resources and monitoring its progress. This course will cover determination, examination and critiques of current practices in project management with an emphasis on the use of technology to support project development. Also included are real-life project management problems such as the following: how to get results when there is no direct authority over participants, what to do when team members don't follow through, how to handle differing departmental agendas and how to balance regular work with additional responsibilities. Communication skills will also be emphasized.

PRO1020 Professional Skills Development

This course is designed to develop life-long learning strategies and provides the basic skills for success in the educational, professional and personal environment. Specific topics explored are personality profile analysis, developmental styles, conflict resolution skills, group problem solving and learning style analysis. Collaboration and group skills development will be emphasized.

PRO2510 Senior Innovation Project I/II: Topic Paper and Project Plan

The purpose of this course is to develop students as technologists. Students will explore and critically analyze a potential and emerging topic for a thesis and shape their ideas into a form that represents a clear set of thinking to be used as the basis for developing their innovation. In creating a topic document based upon these investigations, students will demonstrate the ability to communicate technology ideas to others and increase the likelihood that the idea will take form and find a relevant application in society. The course will culminate with the composition and approval of the student's topic paper. The topic paper will include an abbreviated introduction of the innovation, short prior art identification and general methodology.

PRO3000 Senior Innovation Project III: Analysis

This course continues the journey towards the completion of the student thesis and should be taken after the actual innovation or hypothesis has been tested, and students are ready to compose analysis/results and the conclusion to the work. This course will culminate in the composition and approval of thesis chapters including Results (Chapter 4) and Conclusions (Chapter 5).

PRO3010 Senior Innovation Project II: Analysis and Patent Processes

This course continues the journey towards the completion of the student thesis and should be taken after the actual innovation or hypothesis has been tested and students are ready to compose analysis/results and the conclusion to the work. This course is an alternative to PRO3000 and includes the exploration of the student innovation for a patent application. Students will be exposed to the concepts of patents and patent applications. The course will culminate in the composition and approval of thesis chapters including Results (Chapter 4) and Conclusions (Chapter 5).

PRO4810 Senior Innovation Project IV & Portfolio: Presentation

This course completes undergraduate thesis and portfolio process providing guidance and structure for the formal presentation of the student's work. Students will passionately and clearly articulate their innovation, technology concepts and application in a formal defense. Students entering this class are expected to have completed all works included in their portfolio and have their thesis chapters approved through the completion of prior thesis course work prior to enrolling.

TCH1100 Foresight Development

Foresight is the act of looking to the future. This course teaches better global, business and personal foresight to better enjoy and manage your own future. This course will explore the big picture history of accelerating change from universal, historical and technological perspectives, as well as identifying global trends that are affecting individuals, society, businesses and governments. Additionally, the course will examine how organizations make bets on the future and gives the student a chance to explore career prospects in a variety of fields. Finally, discussion of how biology, psychology, community and culture help and hinder personal thinking about the future will be discussed. We will articulate and explain the four fundamental foresight processes: innovating the future (creative development of products and services); planning the future (developing shared goals and processes); profiting in the future (achieving measurable positive results, including environmental, social, and economic benefits); and predicting the future (trend identification and analysis). Assignments will be fun, personalized to foresight goals, and will include brief readings, brief writing, discussions, debates, visuals, film, podcasts and games.

TCH3010 Ethics in Technology

TCH3010 is designed to introduce students to essential concepts necessary to evaluate the ethical implications and potential impacts of the use of new technology within human society and culture. Students will explore modern ethical dilemmas in technology, looking at multiple aspects of how the introduction of technology redefines law and values.

General Education Courses**BIO1200 Introduction to Biology**

This course explores the basic issues of living organisms. The material covered emphasizes molecular and organic biology, as well as the structure and function of plants and animals. Learning activities include lectures, group activities and various practical exercises that help students to better understand biology and to use their knowledge in everyday life, as well as in their future careers.

COM2260 Public Speaking

Public Speaking in Technology offers instruction and practice in speech organization and delivery with purpose and audience in mind. Students will create effective presentations to introduce, demonstrate, inform and persuade through technology-related topics. Information on effectively utilizing voice, nonverbal skills and visuals will also be included.

ENG1010 Composition I

This course is designed to present effective techniques in organizing, developing and writing academic essays that reflect a collegiate level of writing. The purpose of this course is to help students write correctly, clearly and thoughtfully. Students will receive an introduction to basic writing and reading skills required for success in college, with emphasis on fluency in personal, descriptive, argumentative and process analysis prose.

ENG1020 Composition II

ENG1020 is designed to introduce students to the essential language, theories and strategies of

argumentation and research. The purpose of the course is to provide students with the tools necessary to develop arguments for specific audiences within specific rhetorical situations. Students will also develop their critical reading skills: analyzing, evaluating and critiquing the claims and evidence used by various authors. Finally, students will learn proper research skills and write an in-depth research essay/project.

ENG3100 Science Fiction as Literature

A long time ago, in a galaxy not so far away, science fiction evolved from a variant pulp magazine topic to a literary genre in its own right. Students will study how this genre has evolved from the dark fantasy narratives of the 19th century through the start of the 21st century. Be immersed in novels and engage cutting-edge theories, and be prepared to write intelligently about the reading.

ENG4120 Graphic Novel

This course will consider a selection of contemporary graphic novels specifically centered on those that have received either critical acclaim or notoriety. Until recently, this genre of literature has been dismissed as "childish" or, even worse, as "funny books" not worthy of critical consideration. As part of the class, students will engage some of the fledgling criticism about graphic novels as well as related concerns regarding visual theory. Students will test theories with hands-on projects and some challenging but intriguing readings. Students will place each work in its unique historical and political context... a journey that will cross the globe and hearken back to the 19th century all within the span of a few weeks.

HIS3050 20th Century Innovation

This course examines the role of technology in the 20th century and how it affects us culturally. Key themes include invention of new technologies and debates over the advantages and drawbacks of industrialization, mass production and information technologies. Students participate in a variety of innovative activities designed to understand the changes that took place socially and economically because of these innovations.

MAT1740 College Algebra

This course will include a thorough treatment of relations and functions; polynomial functions; exponential and logarithmic functions; systems of equations and inequalities; matrices; conic sections; sequences; induction; and probability.

MAT2200 Statistics

MAT2200 presents the student with basic statistical concepts and methods. This course introduces descriptive and inferential statistics including elementary probability, linear regression and hypothesis testing.

PHY1250 Introduction to Electricity and Magnetism

This course will introduce the student to basic concepts of electricity and magnetism with discussion of practical applications. Charges and fields will be used to understand the concepts of potential, resistance, capacitance and inductance and solve basic DC circuits. Math through college algebra required.

PSY1500 Psychology of Thinking

PSY1500 will examine the writings of Pythagoras, the father of formal mathematical thinking; Aristotle's major works, including his 100-plus tests for the truth of any proposition; and other major thinkers from the classical period to modern times, including Francis Bacon, Galileo and other progenitors of the natural and behavioral sciences. The course will close with a survey of living thinkers, including "system thinkers" and a study of the major books by Edward de Bono.

PSY3600 Psychology of Creativity

What do Einstein, Picasso and Bill Gates have in common? What are inspiration, insight and improvisation? Are the Muses necessary or is there another way to develop imagination? Students can get answers to these and other questions in this highly interactive course. Discover the genius inside. This course provides a historical review of a variety of approaches to creativity. The material covered emphasizes psychological components of the creative process, the application of creativity in the writing process, the visual arts as well as music, leadership, problem solving and science, the preconditions for creativity and the general characteristics of creative people. Learning activities include practical activities and exercises that can be used to improve personal traits and attributes as well as enhance creative potential.

SOC1500 Technology and Society

SOC1500 is designed to introduce students to the essential understanding, development, theories, strategies and historical interrelation of technology and society. The purpose of the course is to provide students with the tools necessary to understand the role technology has played in society and to prepare students for interaction in a technology driven world with a comprehensive look at the relationship between technology and culture. Technology will be recognized as a driving force in cultural revolutions and as a foundational concept of human development. The course will consider rapidly changing technologies in modern society, the problems associated with these changes and the affects of these technologies on the societies and cultures around the world.

Degree-Specific Courses**CSC2020 C# Programming I**

Based on the .NET framework, C# provides a full-fledged development system for creating powerful, stand-alone applications. This course introduces the student with the C# code structure and syntax. Topics include data types, control structures, functions, file management, string manipulation, windows forms fundamentals, console-based applications and an introduction to object-oriented design in C#.

CSC2150 C/C++ Programming I

This course provides an introduction to the syntax of C++ as a programming language, as well as an introduction to related concepts in C. Topics include data types, control structures, arrays, pointers, functions, classes, inheritance, virtual functions and polymorphism.

CSC2620 C# Programming II

C# Programming II concentrates on object-oriented principles. Students will learn how to create and integrate class objects. Topics will include the use of inheritance, files access, error handling, collections, user-defined types, events and polymorphism. Student will also create assembly libraries.

CSC2750 C/C++ Programming II

Built upon CSC2150, this course explores advanced coding techniques in C++. Topics include interface-based programming, basic data structures, exception handling, advanced algorithms, sockets, templates and the Standard Template Library.

CSC2800 Data Structures I

This course surveys the specification and implementation of containers as abstract data types (ADTs). Structures covered include strings, vectors, stacks, queues, sequential lists and binary trees. Other topics include running time analysis, recursion, generic programming and dynamic memory management. Object design and object tools are emphasized.

CSC3600 Artificial Life Programming

This course uses computer science as a test bed to attempt to answer such questions as "What is life?", "How can we measure evolution?" and "Under what conditions does life-like behavior emerge?" Students will design and implement computer programs and computer simulations using methodologies like evolutionary algorithms, genetic algorithms, swarm intelligence, ant colony optimization, agent-based models and cellular automata. Using these methodologies, students will create models of real-life organisms and situations. The strengths, weaknesses and applications of various models and methodologies will also be discussed.

GAM1010 Introduction to Game Design

Whether the goal is to become a game designer, artist or programmer, this course is a path into the world of video game production. Students will explore what career paths lay ahead in the respective areas of game development through an understanding of the game design process and develop awareness of the many positions within the game industry. By learning fundamental design and visualization techniques needed to express complex game ideas, students will apply professional documentation techniques to their projects. Students will also learn how to convert their own game-playing skills to tools used to analyze popular games and break down game play elements to discover what makes the greatest games tick.

GAM1040 Introduction to Game Programming I

Recommended for students with little or no prior programming experience. Students will use a scripting language to study the basics of computer programming: variables, data types, looping, conditional logic, functions, arrays, types, and other basic concepts. The ability to explore these concepts prior to learning a more complex language such as C++ allows the student to learn game concepts without a language course and prepares the student for future courses in this program during the first year. Students will gain valuable programming experience by writing simple tutorial-based games.

GAM2050 Gameplay Programming Concepts

Gameplay Programming Concepts teaches students the most important theories and concepts in game programming, and is the prerequisite for most of the game programming curriculum. Students learn concepts such as the game loop, frame rates, synchronization, timing, 2D and 3D graphics rendering, timed animation, user input, collision detection and the most common algorithms used in game development. The platform used in this course to study these concepts is Microsoft's XNA Game Studio. Although XNA is based on the C# language, this course does not require C# as a prerequisite because a custom framework within the XNA environment is provided to students, with no significant programming requirement. However, students will benefit from prior knowledge of C#.

GAM2150 Game Scripting

High-level scripting languages allow for rapid development, content creation and interactive events, and drive all of today's professional game engines and tools. Used for both game logic and automation tools, scripting has become a crucial tool in game production. Some scripting languages are so well integrated with a given game engine that users can create an entire game with script code. Students will learn one or more scripting languages during this course, which may include LUA, Python, TorqueScript, Ruby or ActionScript. Projects will include stand-alone script programs as well as game engine scripting projects.

GAM2220 DirectX Programming I

DirectX is the core game and graphics library used for game development on the Windows and Xbox 360 platforms today, which represent the largest majority of users in the game industry. This first course provides students with an introduction to the DirectX API using the C++ language with coverage of Windows programming with WinMain, the Direct3D graphics library, DirectInput/XInput and the XACT audio library. This first course on DirectX focuses on developing a working knowledge of Windows and DirectX programming with projects based primarily on 2D graphics rendering and 2D game projects.

GAM2350 Game AI Concepts

Artificial Intelligence is at the core of the modern interactive experience in video games. This course is a survey of the many approaches to creating realistic, interesting behavior from a design point of view, while experimenting with concepts such as pathfinding, sensory systems, flocking, scripted events, heuristics and genetic algorithms. Students will use a variety of tools to create functioning projects that demonstrate class concepts and study various game AI systems and theories.

GAM3150 Console Game Development

This course teaches console video game system programming using professional software development kits and the C++ language. Students will learn the black art of development for current and recent generation systems such as the PSP, GameCube, PS2 and newer systems that become available. Students will learn about the architecture of these systems, about the development tools and compilers, and they will learn how to tap into libraries and development kits provided

by hardware developers. Students will gain valuable console development experience while learning about the compiler tool chain, 2D graphics, 3D graphics, controllers, memory management, timing and audio systems, and concludes with a game project.

GAM3220 DirectX Programming II

DirectX is the core game and graphics library used for game development on the Windows and Xbox 360 platforms today, which represent the largest majority of users in the game industry. This second course extends the subjects learned in DirectX I with a primary focus on the Direct3D graphics library. Students will learn the fundamentals of 3D graphics and then move on to camera control, direct lighting, motion, 3D mesh loading and rendering, 3D mesh animation (key frame and skeletal) and 3D collision detection. These core subjects will prepare the student for the latter part of the course, which covers pixel shaders, vertex shaders, particle systems, indoor and outdoor environments, and terrain and water rendering.

GAM3270 Game Development in C++

This course introduces the student to the concepts of game programming in C++ using an open source, cross-platform game library called Allegro. In this course, students will dig beneath the surface and examine C++ in detail to learn the advantages of the language and gain experience using a modern C++ IDE such as Visual C++. This course follows Gameplay Programming Concepts by going a step further with the C++ language and a game library. Students will continue to explore gameplay programming concepts with an applied approach, creating numerous small games to demonstrate the various concepts learned in previous courses. Since Allegro is a cross-platform library, students may have an opportunity to explore game development on Mac and Linux systems as well.

GAM3320 XNA Game Programming

This course will teach the aspiring gameplay programming student the ins and outs of programming games using the XNA Game Studio environment. XNA provides a unique opportunity to the game programming student. The student will simultaneously program for multiple platforms using the C# language and DirectX, allowing them to experience the challenges of multiplatform development—both for Windows and Xbox 360. The distribution model of XNA provides the student with an opportunity to release their game to the public using a developer account on Xbox Live Arcade. Students will study gameplay programming concepts such as 2D and 3D rendering; device input from the keyboard, mouse and Xbox 360 controller; the XACT audio system; the graphics pipeline; and animation.

GAM3350 Multiplayer Game Programming

Multiplayer online games are the most lucrative in the game industry, with games like *World of Warcraft* bringing in a billion dollars of subscription revenue. This course teaches the fundamental concepts in networked game programming. Students begin by learning about network architecture (such as peer-to-peer and client/server), network hardware (such as LAN cards and routers) and network protocols (TCP/IP), before moving on to network programming in C++. Students will write a networked game using a Socket library and DirectX. Several projects will be developed to fully explore

networking, packet format efficiency and latency, including a chat room, a server broadcast detection project and a multiplayer game.

GAM4050 Applied Game Development

This course concentrates on techniques to produce a game from the standpoint of production. Students will tackle topics such as people management, team building, communication and workflow in order to grasp the complexities of running a development team. Game teams and projects continue to grow in size and complexity and it is essential to have an understanding of everything is involved in game development.

GAM4200 Game Engine Development

This course covers the design and implementation of a game engine using the C++ language and the DirectX API on the Windows platform. The goal of this course is to build a game engine based on the skills developed in DirectX II and the other prerequisites. Students who will have already completed DirectX II will expand their advanced rendering systems into a full engine with the addition of device input, an audio system, a timed animation system, scripting language support, a linked list-based entity manager, a resource system and multiplayer support. Students will demonstrate a proof of concept game that demonstrates their engine's API through both the C++ interface and script code.

GAM4700 Advanced Gameplay Project

This comprehensive course allows the student to fully synthesize the techniques and skills learned to create a fully realized gameplay project. This course is dedicated toward producing a high quality player experience. Students will set a development schedule and work toward meeting their goals. Aside from programming, quality communication and teamwork will be stressed throughout the course.