UAT-Online: Bachelor of Science in Game Programming

Program Description

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 such as entertainment, business, research and training. Game programming students begin with the programming principles, skills and techniques shared in all programming disciplines and then specifically focus on game-specific features and techniques. Game programming emphasizes C++ programming, scripting, data handling, DirectX/Open GL development, game engine architecture, gameplay interaction, artificial intelligence, networking and the use of middleware and industry APIs. Students in game programming will also develop a critical approach to the study of gameplay, interaction and design. The UAT game programming student will have a broad, deep skill set and be comfortable on many platforms and with a myriad of languages.

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

1. Create and implement original games, including 3D games, using common tools, languages and software for web, console, PC or mobile platforms.
2. Design and develop the architecture and infrastructure needed to support a complete game project.
3. Describe, implement and analyze fundamental data structures including lists, trees, hash tables, and graphs, and algorithms including sorting and searching.
4. Create a quality object-oriented software solution that meets specified requirements.
5. Follow a software development process to analyze a problem, and to design, build and test a software system in a team environment.
6. Demonstrate applicable skills using more than one programming language, development environment, platform and source control system.
7. Examine and develop advanced and/or experimental topics in game programming.

University Core Courses

LAW3700	Legal Issues in Technology
PRO1030	Professional Skills Development
PRO2120	Student Innovation Project
PRO4830	Student Innovation Project & Portfolio Presentation
TCH1500	Technology and Society
TCH3010	Ethics in Technology
INT3500	Internship

General Education Courses

BIO1200	Introduction to Biology
COM2260	Communication in Technology
ENG1010	Composition I
ENG1020	Composition II
ENG3100	Science Fiction as Literature
HIS3050	20th Century Innovation
MAT1740	College Algebra
MAT1790	Pre-Calculus
MAT2500	Calculus
PHY1250	Introduction to Electricity and Magnetism
PSY3100	Social Psychology
PSY3600	Psychology of Creativity
TCH1150	Strategies of Thinking

Major-Specific Courses

CSC1020	Introduction to Programming
CSC2150	C/C++ Programming I
CSC2800	Data Structures and Algorithms
GAM1040	Introduction to Game Programming
GAM2050	Gameplay Programming I
GAM2400	Game Engine Programming I
GAM2750	Mobile Game Programming
GAM3030	Applied Game AI concepts
GAM3240	Physics Game Programming
GAM3410	Game Tools Development
GAM4030	Advanced Game Programming Topics
GAM4700	Advanced Game Project

Elective Courses

CSC2020	C# Programming I
CSC2030	Java Programming I
CSC2750	C/C++ Programming II
GAM1010	Introduction to Game Design
GAM1120	Introduction to Game Tools
GAM2150	Game Scripting
GAM3150	Console Game Development
GAM3900	Experimental Gameplay

This list represents the combination of courses necessary for the degree. Course sequence and offerings may change due to software or other scheduling requirements. Students have choices of ways to fill their elective block of courses. It is recommended that students choose the elective in their chosen degree to get the most advanced curriculum in that degree program. Should students choose courses from other degree programs to fill their elective blocks, all pre-requisite requirements will be enforced and students will choose from the Major-Specific Courses, not the more advanced elective block, in the second degree listing. All choices outside of the original degree are subject to availability of the course in the schedule of offerings.

COURSE DESCRIPTIONS

University Core Courses

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.

PRO1030 Professional Skills Development
Unlike traditional college introduction courses, students learn brain-based study strategies, how to think critically and how to problem-solve. Topics such as cyber bullying, analysis through different perspectives, leadership skills and emotional intelligence will be explored. Students will demonstrate their knowledge through graphic representations, discussion threads, and interactive discussions and debates in class. Through course activities and discourse, students will be exposed to a variety of critical and strategic thinking skills, which they will need to conduct their student innovation projects.

PRO2120 Student Innovation Project
In this course, students will explore potential topics for their innovation project. They will engage in a series of workshop-based exercises to explore their fields and employ discovery learning techniques to find background information on their selected subject. Students will form their ideas into a plan to be used as the basis for developing their innovation. In the process of exploring and sharing their work, students will engage the various types of innovations and demonstrate the ability to communicate their ideas to others.

PRO4830 Student Innovation Project and Portfolio Presentation
This course completes the innovation project and portfolio process providing guidance and structure for the formal presentation of the students' work. Students will passionately and clearly articulate their innovation and portfolio work through public presentations. Students entering this class are expected to have completed all works included in their portfolio and have their innovation brief completed.

TCH1500 Technology and Society
TCH1500 introduces students to essential elements of the historical, contemporary and possible future interdependencies of technology and society. These elements are discovered through readings, discussions and forecasts related to technological development. This course provides students with tools necessary to understand the role technology plays in society and to prepare students for interaction within a technology-driven world. 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 effects of these technologies on modern culture.

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.

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.

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 Communication in Technology
Through the exploration of technology concepts, students will introduce, demonstrate, inform and/or persuade the audience. Effective use of voice, nonverbal skills and visuals will be applied to topics such as robotics, virtual reality, internet speech and privacy, and/or technology ethics. Presentations will be followed by student-led discussions and brainstorming sessions about each technology topic. The art of seeing pros and cons pertaining to controversial concepts will be explored through group discussions. And, students will have the opportunity to create a resume and be formally interviewed for a technology position.

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.

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.

MAT1790 Pre-Calculus
MAT1790 is a preparatory course for calculus. The focus of the course is to familiarize students with functions (i.e., their behavior, notation, graphical representations, etc.). Additionally, the course will provide a background in trigonometry.

MAT2500 Calculus I
MAT2500 is the study of the differential calculus. Emphasis is placed on differentiating elementary functions and solving application problems.PHY1250 Introduction to Electricity and Magnetism

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.

PSY3100 Social Psychology
Why do people behave a certain way? Can behaviors be predicted, controlled and changed? Have you ever been a victim of somebody who took advantage or tried to manipulate? What are persuasion and brainwashing? This course explores theory, research and application that make up the discipline. It examines both the traditional areas of the field, as well as more recent innovations. The course pays particular attention to the applications developed by social psychologists. The major goal of the course is to explicitly tie social psychology to lives of students.

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.

TCH1150 Thinking Strategies
TCH1150 will offer students a cross-disciplinary, project-oriented approach to applied thinking strategies as they may relate to technologists. Students will learn the logical basis, history, and potential for application of the following dimensions of thinking: critical, systems, creative, lateral, and parallel thinking. Assignments and projects will guide students toward an understanding of how thinking dimensions relate to their intended disciplines in emerging technology industries, as well as to their personal educational aspirations.

Major-Specific Courses
CSC1020 Introduction to Programming
The purpose of this course is to introduce the fundamentals of computer science and programming to students majoring in this area. Students will become familiar with problem-solving techniques and algorithm development using computers, including a structured high-level programming language. Students will also explore object-oriented programming, including the design considerations and conventions used in development of object-oriented applications. Topics will include flow of control, assignment, arrays, functions, and input and output, among others.

CSC2150 C/C++ Programming I
C++ is a general purpose programming language that supports object oriented programming, and is suited for all types of development. This course presents the entire language and the Standard Template Library (STL) to the student. Students will learn the syntax, keywords and constructs, as well as how to leverage the resources of the STL. This is a projects-based class and students will develop applications with C++, using real world tools and practices.

CSC2800 Data Structures and Algorithms
This course explores the specification and implementation of containers as abstract data types. Structures covered include strings, vectors, stacks, queues, sequential lists, binary trees, hashes and graphs. The course also investigates algorithm design and evaluation, such as sorting, search, recursion and algorithmic analysis.

GAM1040 Introduction to Game Programming
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.

GAM205O Gameplay Programming I
Gameplay Programming Concepts teaches students the most important theories and concepts in game programming. Students will be exposed to major game mechanic fundamentals that are expressed in multiple games across several genres. There is a strong focus on analysis and discovery learning. Those taking this class will be expected to observe existing mechanics and attempt to reproduce them both in documentation and in code. The course makes use of an existing game engine in order to focus on gameplay mechanics with the end goal of producing a playable game.

GAM240O Game Engine Programming I
This course introduces the fundamentals of game engine programming by customizing and enhancing an existing framework. Students will learn the core concepts of engine programming. Symptoms of taking Game Engine Programming I may include a greater understanding of: frame rates, synchronization, timing, 2D and/or 3D graphics rendering, timed animation, user input, multiplayer, physics, collision detection and the most common algorithms used in game development. Many of these fundamentals will be implemented into a working engine from which playable games may be developed.

GAM275O Mobile Game Programming
Mobile games are a lucrative industry that is still in a state of rapid growth with tens of millions of users as a potential market for games, all delivered wirelessly on a royalty basis. This course teaches how to develop games for mobile platforms using appropriate languages and toolkits. Students will explore the mobile hardware and learn about the specific techniques and challenges present in developing a game for a small screen and limited user input capabilities.

GAM303O Applied Game AI Concepts
Quality implementations of artificial intelligence can make or break a game. This course will synthesize the theories and concepts of artificial intelligence with the skills of game programming. Students will program a wide variety of artificial agents utilizing a variety of tradition, modern and theoretical techniques. The student will apply algorithms for pathfinding, strategy, personality and other behaviors. Player interactions with these behaviors will be examined to provide challenging, balanced and enjoyable gameplay.

GAM324O Graphics Programming
Compared to graphics, no other gaming technology has evolved more quickly over the years. With the gaming industry driving hardware manufacturers, today's graphics are preeminently better and literally millions of times faster than systems of only a few years ago. This course covers the basics of 3D graphics systems, which cornerstone today's games. Concepts such as cameras, lighting, motion, mesh processing, animation, shaders and particle systems are presented. 3D math theory as it relates to graphics processing and the rendering pipeline are also discussed.

GAM341O Game Tools Development
A game is only as good as its tool chain. The engine, art, asset management, editors, physics, AI and sound are all tools that create a game. Almost every aspect of game development requires several custom-designed tools. This course teaches fundamentals of tool development. Art tools such as game-specific plug-ins are almost always required. Most of these plug-ins use scripting systems and this course will give an overview of those most commonly used. Levels used in today's games are often complex and the amount of data itself can be overwhelming, thus the need for efficient data asset management systems for monitoring the integrity of game data. Data asset management methods are covered in both C++ and scripting languages such as Python or Lua. Basic editor creation and image manipulation are also covered.

GAM403O Advanced Game Programming Topics
Note: A student may take this up to 3 times for credit towards their degree This course covers advanced material not generally covered by other courses. Game programming consists of both science and art. The "art" of the process comes by learning advanced concepts and applying them in an efficient, cohesive manner. Students at this level will have learned the fundamentals of several topics. This course allows the opportunity to delve deeper into subjects such as advanced collision detection, game audio, motion planning, Advanced AI, ray casting, advanced 3D game programming, physics and new technologies that may become available. Since this course covers a variety of topics with each semester possibly differing from the previous, students are allowed to take this course up to 3 times for credit towards their degree.

GAM470O Advanced Gameplay Project
This comprehensive course brings Game Design, Game Programming, and Game Art and Animation majors together to 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 game production itself, quality communication and teamwork will be stressed throughout the course.

Elective Courses
CSC202O C# Programming I
C# is a general-purpose, object-oriented programming language suited for all types of development. This course presents the entire language and gives an introduction to the Base Class Library (BCL) to the student. Students will learn the syntax, keywords, and constructs, as well as how to leverage the resources of the BCL. This is a projects-based class and students will develop applications with C#, using real world tools and practices.

CSC203O Java Programming I
Java is a general-purpose, object-oriented programming language suited for all types of development. This course presents the entire language and the standard libraries to the student. Students will learn the syntax, keywords and constructs, as well as how to leverage the resources of the standard libraries. This is a projects-based class and students will develop applications with Java, using real world tools and practices.

CSC2750 C++ Programming II
This course focuses on the craft of software. Students will build upon their previously acquired programming and language fundamentals and develop additional skills essential for crafting high quality and maintainable software. This is a projects-based class and students will apply C++ and real world tools and practices to solve common programming problems involving advanced object oriented programming with design patterns, advanced Standard Template Libraries, dynamic memory management including smart pointers, shared code, multi-threading and network I/O.

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.

GAM1120 Introduction to Game Tools
The purpose of this project-based course is to allow a student to explore game toolsets, SDK or "mod" environments and produce simple projects with a focus on learning the tool itself and its quirks, limitations and workarounds. Game development environments are often unfriendly, under development and design with the expert user in mind, and thus the ability to learn a new tool quickly and adapt to nearly constant change is a core skill set for the game designer, artist or programmer.

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 of tools, scripting has become a crucial element of 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. Projects will include stand-alone script programs as well as game engine scripting projects.

GAM3150 Console Game Development
Developing games for dedicated hardware comes with its own set of challenges. This usually requires the game programmer to think in new and different ways. Students will explore techniques to optimize algorithms, memory usage and operations that are often taken for granted. The class will examine the architecture of these systems, the development tools, compilers, and any available libraries and development kits. The class will conclude with a game project.

GAM3900 Experimental Gameplay
Beyond the conventions of genre and the limitations of the commercial market lies the unexplored territory of radical new styles and types of gameplay. This course will toss out traditional genre in favor of blended designs and fresh ideas and explore such diverse topics as ARGs, user-generated content, physics and graphics toys, algorithmic games, one-button games, and alternative interfaces and input devices. Students will produce game projects based on nontraditional approaches to gameplay and original designs that innovate beyond static genres.