

# GAME DEVELOPMENT & SIMULATION PROGRAMMING (GDS)

## GDS 110 Introduction to Game Programming

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

C++ will be used as the vehicle to introduce flowcharting, control structures, calculations, interactive programming techniques, functions, and array processing. Students will learn to write programs that implement techniques and theory necessary for basic game development. Laboratory projects will grow in complexity as students gain hands-on experience. Both personal and gaming applications will be provided.

## GDS 111 HTML and JavaScript

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

In this course, students will gain an introduction to Internet technologies and basic programming logic through the study of HTML 5, XHTML, Cascading Style Sheets, and JavaScript. File organization and implementation of web graphics will be stressed throughout this course.

## GDS 121 Intermediate Game Programming

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 110

A study of intermediate game programming using C++ will be covered. Topics include string handling, intermediate array processing, passing by reference, pointers, and an introduction to creating, editing, and updating data files.

## GDS 131 Advanced Game Programming

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 121

A study of advanced game programming topics will be covered. Topics include sorting/searching arrays and data files, classes/objects, code libraries, and advanced pointer techniques. This course will also teach students object-oriented principles and implementations including inheritance, composition, encapsulation, data hiding, overloading, overriding, and polymorphism.

## GDS 134 Game Persistence

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: GDS 121

This course will expose students to database design principles such as relational databases, normalization and entity relationship diagrams. These principles will be applied to contemporary database management systems such as MySQL or Access and accessed through a modern object-oriented language such as C++. Students will learn to connect a C++ program to a database to store pertinent game information.

## GDS 137 Game Prototyping

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 110 and VGD 126

In Game Prototyping, students will study the rapid development of 2D game mechanics using paper prototypes, the HTML5 Canvas Element and JavaScript. This course is focused on learning game programming logic through experimentation. Throughout the course, students will be presented with the logic for common game mechanics. They will use this information to develop the basic logic for new or more advanced game mechanics and features. Finally, students will be asked to refactor prototypes into refined, efficient and readable code snippets.

## GDS 252 Algorithms and Data Structures

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 131

This course includes an overview of the algorithms and data structures used in gaming and simulation applications today. Topics include, but are not limited to, linked lists, queues, stacks, user input as well as a variety of AI techniques used in game development.

## GDS 259 Games and Big Data

4 Class Hours, 4 Quarter Credit Hours

Prerequisites: GDS 131

A study of the Python programming language will be used as the vehicle to introduce advanced programming concepts such as data modelling, prediction, and statistical analysis. At the end of the course, students should be able to analyze data and develop routines that will calculate and render a dataset's mean, standard deviation, and data distribution curve. This course will help turn big data into valuable insights effectively through learning data analytics and data mining concepts. Students will learn the theory, strategy, and the practice of using a machine learning tool such as Python.

## GDS 267 Portfolio Development

2 Lab Hours, 1 Quarter Credit Hours

Prerequisites: GDS 111 and (GDS 137 or GDS 135)

Students will put together a portfolio that will be used to demonstrate their school work to potential employers.

## GDS 268 Game Studio

6 Lab Hours, 3 Quarter Credit Hours

Prerequisites: (GDS 134 and GDS 252 and VGD 251) or (GDS 137 and VGD 242 and VGD 251 and VGD 256 and VGD 259)

This course is designed to challenge students' organizational, design and programming skills. Students will be part of a small development team of designer and programmers and tasked with producing the code and materials assets necessary to complete a full game product.

## GDS 370 Advanced Game Design

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: GDS 268

Students will study advanced aspects of game design. Topics include genre-specific design issues, storytelling, level design, puzzle design as well as the game development life cycle.

## GDS 371 2D Game Engine and Tool Development

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Students will learn the development of tools for the game industry and the development of the primitive components of a game engine. Topics include editing tools, asset pipeline management system, converters, database management, networking, interpreter, and defect tracking systems.

## GDS 373 Advanced Algorithms and API

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 252

This course incorporates advanced algorithms with the use of an API such as DirectX. The focus will be on the practical application of these techniques to design efficient algorithms. Topics include asymptotic notation, recurrences, lower bounds for worst case and average case, dynamic programming, searching algorithms, sorting algorithms, advanced computation and related research issues.

**GDS 375 Simulation and Serious Games**

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Prerequisites: GDS 268

This course involves the exploration, design, and development of simulation games and serious games. The questions that will dominate this course are these: How do we represent reality in a simulation? How do we balance simplicity, efficiency, and playability against realism, richness and complexity? Students will also create a serious game in which education (in its various forms) is the primary goal, rather than entertainment.

**GDS 381 Software Testing and Quality Assurance**

2 Class Hours, 2 Lab Hours, 3 Quarter Credit Hours

Testing is an integral part of the system development function. Students will gain an appreciation of why software testing and quality assurance is so important. Topics include the types of testing, the testing team, defect tracking, test software automation, and the testing philosophy.

**GDS 383 2D Game Console Programming**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

This course emphasizes developing games that could be deployed on a popular console system as well as PC systems using industry standards languages like C# and frameworks like XNA. Students will learn how to dissect existing 2D games, interact with console controllers, keyboards, and mice, and manage output using boundary handling, collision detection, texturing, and character animation.

**GDS 388 Web API for Games**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 111 and VGD 256

This course focuses on developing web applications and tools for games and game development using open source web technology like Node.js and Mongo DB. Students will develop games that use REST APIs that supply data to their games and other web applications related to them such as player save data, account information, game analytics, and the security of that data.

**GDS 399 3D Game Console Programming I**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Students will expand their skills by implementing intermediate 2D gaming topics like level design, handling multiple players, and porting their games to consoles. Topics include networks, writing/reading packets, latency, network libraries, and publishing games to a console. Students are also introduced to 3D gaming concepts, where they will explore 3D gaming architecture, modeling via code, texturing, lighting, and camera positioning. Through the use of class discussion and gaming projects, students will create compelling game experiences through environments by designing their own 2D and 3D games.

**GDS 404 Artificial Intelligence**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 252

This course will explore artificial intelligence as a coherent body of ideas and methods to acquaint students with the classic programs in the field and their underlying theory. Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods, and learning. Other topics include intelligent agents, state-space search, game playing, knowledge representation, reasoning under uncertainty, machine learning, and data mining.

**GDS 405 3D Game Console Programming II**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 399

Students will explore 3D gaming architecture, level design, object transformations, and environmental animation and learn to implement industry shortcuts that deal with design issues having to do with 3D hardware, programming objects and camera motions, collision detection, character animation, special effects, and 3D game networking. Through the use of class discussion and gaming projects, students will create compelling game experiences through environments by designing their own 3D games.

**GDS 410 Introduction to Senior Project**

2 Class Hours, 6 Lab Hours, 5 Quarter Credit Hours

Prerequisites: GDS 405 or VGD 404

The objective of the senior project is to integrate skills learned during the students' time at New England Institute of Technology. Within a team of at least 2 and no more than 4 students, students will develop an industrial-strength game. The Introduction to the Senior Project spans the first 10 weeks of this period and the focus of this course is on the design of the game.

**GDS 420 Senior Project**

2 Class Hours, 8 Lab Hours, 6 Quarter Credit Hours

Prerequisites: GDS 410

This course provides an opportunity for each student to develop a substantial project in an area of interest as proposed in GDS 410. The culmination of this course is a major presentation of the project. The project will be evaluated by three faculty members.

**GDS 422 Emerging Technologies in Game Development**

2 Class Hours, 4 Lab Hours, 4 Quarter Credit Hours

Prerequisites: GDS 370

This course is a discussion of emerging and future technologies that are likely to impact the industry. Topics chosen by the instructor will include advances in hardware, software, networking, gaming, the Internet, and leaders in the game development industry. In-depth research of the chosen topics will be conducted, and students will work on hands-on projects that involve specific emerging technologies.