Visual & Game Programming

DIPLOMA PROGRAM

LaSalle College
Vancouver

QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	QUARTER 5	QUARTER 6
VGP126 Applied Mathematics	VGP128 Geometry and Linear Algebra	VGP248 Physics of Motion, Light and Sound	VGP220 Algorithms and Data Patterns I	VGP244 Algorithms and Data Patterns II	VGP336 Gameplay Programming
VGP105 Intro to Computer Programming-a	VGP111 Object-Oriented Programming in C++ I-a	VGP104 Software Development and Testing	VGP240 3D Graphics and Applications	VGP400 Portfolio I	VGP453 Portfolio II
VGP106 Intro to Computer Programming-b	VGP115 Object-Oriented Programming in C++ I-b	VGP130 Object-Oriented Programming in C++ II	CC310 Preproduction and Project Management	CC450 Production Team I	CC451 Production Team II
GAD100 History of Games	CCM121 Digital Imaging	VGP125 Intro to C# Programming	VGP230 2D Games Programming	VGP333 Programming for Game Engines	
GAD110 Game Design I	GAD130 Intro to Level Design	VGP113 UML and Object Oriented Design	VGP232 Game Tools and Pipelines	Elective	Elective

4 Game Design/Art Design Courses	+	11 Technical Knowledge Building Courses	+	4 Advanced Industry Research Courses	+	5 Math/Algorithm Courses	+	3 Team Production & Management Courses	+	2 Elective Courses	=	TOTAL 90 CREDITS
12 credits		33 credits		12 credits		15 credits		12 credits		6 credits		

LCI EDUCATION NETWORK MEMBER

Visual & Game Programming

COURSE DESCRIPTIONS

QUARTER 1

VGP126 APPLIED MATHEMATICS
This course covers the foundational mathematical curriculum required in any software development environment. Students learn to solve relevant video game development problems by applying simple and complex mathematics and logical solutions. Boolean algebra, logic, bit level operations, number representations, and precision are covered. Furthermore, students learn to solve problems using discrete mathematics, 2D/3D vectors, and basic projectile motion.
Credits: 3

VGP105 INTRODUCTION TO COMPUTER PROGRAMMING-A
This course introduces students to the fundamentals of programming concepts and methods, including variables, types, branching, looping, logical and arithmetic operators, arrays, structures. In this course student learn how to use basics algorithms and simple user-defined functions to implement a simple application. This course is language agnostics and emphasis is on the core concepts of programming. Instructor may use a combination of C and Python to achieve the goals.
Corequisites: VGP106 Introduction to Programming-b
Credits: 3

VGP106 INTRODUCTION TO COMPUTER PROGRAMMING-B
This course compliments VGP105. In this course student learn to apply the concepts they have learned about computer programming and apply problem solving strategies, and basic software development methodologies. Instructor will deepen and expand on the concepts that have been discussed earlier such as functions, pointers, control structures and more. Sessions are a mixture of quick repeat, test, and apply the concept in programming tests excerpts that are provided during the class.
Corequisites: VGP105 Introduction to Programming-a
Credits: 3

GAD100 HISTORY OF GAMES
This course introduces students to the timeline, technological shifts, and key genres in the brief history of electronic video games. The student will develop a written and verbal vocabulary for analyzing games and their cultural significance.
Credits: 3

GAD110 GAME DESIGN I
Students will be introduced to traditional game theory and design and how they relate to their modern electronic cousin. Students work in teams to apply models and strategies for creating traditional games that are based in solid play mechanics. Students will experience an entire game cycle: identifying the audience, pitching the game, prototyping, creating a final product and play testing.
Credits: 3

QUARTER 2

GE129 GEOMETRY AND LINEAR ALGEBRA
This course covers the essential analytic geometry and linear algebra tools and techniques used in 3D games and graphics programming. Topics include coordinate systems, vectors, dot & cross product, projection, lines, planes, matrices, determinants, and transformations. Students apply these concepts to problems in game programming. They learn how to represent objects mathematically, and how to perform translation, rotation, scaling, and basic collision detection.
Prerequisite: VGP126 Applied Mathematics
Credits: 3

VGP111 OBJECT-ORIENTED PROGRAMMING IN C++ I-A
This is an introduction to object-oriented programming in C++ part a. In this course students are introduced to common object-oriented concepts such as classes, namespaces, inheritance, object-oriented designs, polymorphism, type casting, virtual functions, and const-correctness. Students simulate real world types of problems solving using C++ related to video games programming.
Prerequisite: VGP105 Introduction to Programming-a, VGP106 Introduction to Programming-b
Corequisites: VGP115 Object-Oriented Programming in C++ I-b
Credits: 3

VGP115 OBJECT-ORIENTED PROGRAMMING IN C++ I-B
This course runs alongside VGP111 and helps to internalize and practice the C++ concepts are being learnt in that course. Practical and common practice projects are introduced to students to work on by design and implementing the code base using the concepts being discussed in VGP111. In this course students will design and implement mini projects involving object-oriented concepts such as classes, namespaces, inheritance, object-oriented designs, polymorphism, type casting, virtual functions, basic dynamic memory allocations, and const-correctness. This course is project oriented which includes the midterm and final exam as well.
Prerequisite: VGP105 Introduction to Programming-a, VGP106 Introduction to Programming-b
Corequisites: VGP111 Object-Oriented Programming in C++ I-a
Credits: 3

CCM121 DIGITAL IMAGING
Students develop basic image manipulation skills in a raster-based computer environment.
Credits: 3

GAD130 INTRODUCTION TO LEVEL DESIGN
In this course students will be introduced to level design theory, terminology and development process in a hands on practical setting. Focus will be on researching, deconstructing, analyzing and documenting various pre-existing levels from shipped games, as well as designing and building multiplayer and single player levels in a game engine.
Credits: 3

QUARTER 3

VGP248 PHYSICS OF MOTION, LIGHT AND SOUND
This course covers Newtonian mechanics, rigid body dynamics, simple harmonic motion, and the basic physics of light and sound propagation in media. Students learn how to apply these principles to problems encountered in physics based games. Emphasis is placed on formulating solutions in pseudocode.
Prerequisite: VGP128 Geometry and Linear Algebra
Credits: 3

VGP104 SOFTWARE DEVELOPMENT AND TESTING
This course is an introduction to software engineering techniques used in modern application and game development. The course will cover topics relating to software development process such as requirement gathering, planning, designing, implementing, maintaining, and testing. Additionally, there will be introductions to software implementation, maintenance, quality assurance, and application troubleshooting.
Prerequisite: VGP111 Object-Oriented Programming in C++I-a, VGP115 Object-Oriented Programming in C++ I-bCredits: 3

VGP130 OBJECT-ORIENTED PROGRAMMING IN C++II
This course introduces more complex objectoriented programming techniques in C++. This includes templates, operator overloading, smart pointers, reference counting, exception handling, and standard template libraries. The fundamentals of object-oriented programming in C++ through applied design, implementation, troubleshooting, maintenance and testing are reinforced.
Prerequisite: VGP111 Object-Oriented Programming in C++I-a, VGP115 Object-Oriented Programming in C++ I-bCredits: 3

VGP125 INTRO TO C# PROGRAMMING
This course is designed to give students the fundamentals of C# development on the .NET platform. Students will learn the syntax of C#, as well as learning about using the object-oriented programming paradigm to develop solutions in C#. Revisiting the principles and practices of object-oriented programming (OOP), the course provides students with a foundation in OOP that they need to progress to next level of studies in software development. Key object-oriented concepts such as abstraction, encapsulation, inheritance, polymorphism, and interfaces will be covered. Students will also become more familiar with tools such as Visual Studio, NuGet, and Disassemblers.
Prerequisite: VGP111 Object-Oriented Programming in C++I-a, VGP115 Object-Oriented Programming in C++ I-b
Credits: 3

VGP113 UML AND TECHNICAL DOCUMENTATION
This course is an introduction to software documentation and planning techniques used in modern software development. The course will focus on utilizing the practical software engineering use-case approach to drive software specifications, requirement gathering, object-oriented design analysis, user documentation, and software designs. Technical design documentation using UML and other technical writing techniques are emphasized.
Prerequisite: VGP111 Object-Oriented Programming in C++I-a, VGP115 Object-Oriented Programming in C++ I-b
Credits: 3

QUARTER 4

VGP220 ALGORITHMS AND DATA PATTERNS I
This course is an introduction to algorithms and design patterns. Students learn to recognize the importance of developing fast and efficient algorithms for solving common complex problems in a simple and elegant manner. Students learn efficient sorting, pattern matching, tree traversal, data retrieval, time performance analysis and memory efficiency analysis. Students will explore the standard template library, abstract data types, trees, heaps, hash tables and other advanced object-oriented data types in C++.
Prerequisite: VGP111 Object-Oriented Programming in C++I-a, VGP115 Object-Oriented Programming in C++ I-b
Credits: 3

VGP240 3D 3D GRAPHICS AND APPLICATIONS
Students are introduced to the fundamentals of 3D graphics and the underlying mathematics. The students will cover 3D geometry, interpolations, rendering, clipping, matrix transformations, graphics pipelines, lighting, materials, texturing, rasterization, and shading. The class implements each of these concepts in an existing industry standard graphics framework.
Prerequisites: VGP128 Geometry and Linear Algebra and VGP130 Object-Oriented Programming in C++ II
Credits: 3

CC310 PREPRODUCTION AND PROJECT MANAGEMENT
Students work on a game prototype and learn to invent new game ideas. The students are introduced to the theory of project management and how it applies to modern game development. A project or projects are then selected to move forward to Production Team.
Prerequisite: VGP130 Object-Oriented Programming in C++ II or upon approval of Academic Director
Credits: 3

VGP230 2D GAMES PROGRAMMING
This class is a project focused course where the student is responsible for the design, documentation, implementation and testing of a simple two-dimensional game. Students will be provided the 2D engine framework and will be shown how to use and extend the engine for their final game project. This course will introduce game engine architecture including 2D graphics, resource management, data driven design, physics, motion, collision detection, basic artificial intelligence, user interface, and special effects.
Prerequisites: VGP111 Object-Oriented Programming in C++ I-a, VGP115 Object-Oriented Programming in C++ I-b, VGP126 Applied Mathematics
Credits: 3

VGP232 GAME TOOLS & PIPELINES
The role and function of a tools programmer on a games team is introduced to the students. Emphasis is on replacing repetitive tasks in the development process with effective and functional tools. The course will cover productivity tools, pipeline solutions, automated build process and reusable tools. Students will learn how to multiply team efficiency through building tools and pipelines to increase development productivity.
Prerequisite: VGP111 Object-Oriented Programming in C++ I-a, VGP115 Object-Oriented Programming in C++ I-b
Credits: 3

QUARTER 5

VGP244 ALGORITHMS & DATA PATTERNS II
This course introduces advanced algorithms including shortest path, advance sorting, hashing, compression, graphs traversal, tree traversal, Greedy method, breath first search, depth first search, divide & conquer, and randomization algorithms. Students will apply their knowledge of algorithmic efficiency analysis to devise more complex algorithms and data structures including both recursive and non-recursive algorithms. Problem solving, algorithm analysis, recursions, and divide and conquer techniques are the main focus to this course.
Prerequisite: VGP220 Algorithms and Data Patterns I
Credits: 3

VGP400 PORTFOLIO I
Students assemble and critique works from completed courses, and discover the limits of their programming knowledge. Students research potential employers and learn about the different positions available for them. Students are expected to present a plan that leads up to their Senior Portfolio which enables them to plan on a focused programming career objective.
Prerequisite: Permission of the Academic Director
Credits: 3

CC450 PRODUCTION TEAM I
In this course, students work as a team on the production of an electronic games project in a studio environment.
Prerequisite: CC310 Preproduction and Project Management or Approval of the Academic Director
Credits: 3

VGP333 PROGRAMMING FOR GAME ENGINES
Students will learn how to work in a pre-existing modern game engine framework. They will learn a brand new pipeline and import game assets, prototype gameplay features, build networking gameplay, manipulate audio assets, use a modern 3rd party physics engine, and learn how to integrate all major systems through advanced scripting.
Prerequisite: VGP125 Intro to C# Programming
Credits: 3

ELECTIVE
Credits: 3

QUARTER 6

VGP336 GAMEPLAY PROGRAMMING
This course is an introduction to game play programming that is focused around building and working with modern game programming architectures to produce and prototype game mechanics. Game play programming will focus on developing, expanding, and utilizing existing technologies to produce fun and interactive game mechanics. A high level of emphasis will be working hands-on with numerous game subsystems including enemy behaviors, artificial intelligence, player interactions, physics and networking.
Prerequisites: VGP128 Geometry and Linear Algebra and VGP130 Object-Oriented Programming in C++ II
Credits: 3

VGP453 PORTFOLIO II
This course focuses on the completion of a students' portfolio and enables the student to begin their career search. Students are introduced to games interview screening process, technical interviews, whiteboard questions, programming tests, complex problem solving and verbal presentation of tough technical challenges.
Prerequisite: Permission of the Academic Director
Credits: 3

CC451 PRODUCTION TEAM II
In this course, students continue to work as a team on the production of an electronic games project in a studio environment.
Prerequisite: CC450 Production Team I
Credits: 6

ELECTIVE
Credits: 3

***Where no prerequisite is provided, none is required.*
**Course descriptions describe the learning opportunities that are provided through the classroom and coursework. It is each student's responsibility to participate in the activities that will lead to successfully meeting the learning outcomes.*