

## ***BA DigiPen Academy – 12B***

**District Name: Kamloops/North Thompson**

**District Number: 73**

**Developed by: Justin deVries**

**Date Developed: Spring 2012**

**School Name: Sa-Hali Secondary School**

**Principal's Name: Richard Kienlein**

**Board/Authority Approval Date:**

**Board/Authority Signature:**

**Course Name: BA DigiPen Technical Academy 12A**

**Grade Level Course: Grade 12**

**Number of Course Credits: 4**

**Number of Hours of Instruction: 120**

**Prerequisite(s) recommended:**

- Principals of Math 10
- Principals of Math 11 (or concurrent)
- Physics 11 (concurrent)
- Art course(s)
- BA DigiPen Academy 12A (concurrent)

**Special Training, Facilities or Equipment Required:**

Computer Science background, or experience in similar area along with training provided by DigiPen Institute of Technology. Facilities should include a computer lab with recent model computer, with reasonable video card and memory. Video projector, DigiPen training software (proprietary game development tools), graphics programs for 2D and 3D graphics (preferably PhotoShop CS3, 3D StudioMax). Printed support materials (workbooks, etc) are provided by DigiPen ó students retain their workbooks.

## **Course Synopsis**

This course is the second of four courses that make up the DigiPen Academy Program. The DigiPen ProjectFUN Computer Science Technology Program is a project-based curriculum targeted at high school students that leverages interest in video game development as a learning vehicle. The program is essentially a computer science course made up of seven modules, each with a unique game that students will produce. In addition to teaching computer science, the material also covers topics in mathematics and production art.

This course introduces some basic ideas and tools from computer science and mathematics as used in game programming. These tools will be used in later sections of the course to build new games.

### **Rationale:**

Vancouver is rapidly attracting a concentration of video game production companies. Employment and compensation opportunities provided in this industry are among the fastest growing in Canada's knowledge-based economy. This program will provide our students with an opportunity to participate in the curriculum of an internationally recognized video game university (DigiPen), while gaining experience with real-world video game creation. Students will also acquire the knowledge and skills to enable them to become successful candidates for other roles within the industry. Students will be able to draw on a cross-curricular knowledge and skills from disciplines such as Mathematics, Physics, Music and Art.

This course is one of four and will engage the modules 3 and 4 of 7 modules in the program. The course offers an introduction to real time interactive simulation, motion picture and game elements, and covers computer architecture, and an overview of C programming language. Module 3/4 expand on C/C++ programming languages, Math functions, and Art concepts.

## Organizational Structure

The nature of this course doesn't lend itself to a structured unit-by-unit outline. However, the following table lists the topics and approximate percentage of time spent on these tasks:

Topic	Title	Time
Module 3 ó Pongø		55 hours
Computer Science	OOP ó Object Oriented Programming	
	Class	
	Pointer	
Mathematics	Coordinate Systems	
	2D Geometric Vectors	
Production Art	Digital Illustrations	
	Basic Colors	
Module 2 ó Letterbrickø (Breakout)		65 hours
Computer Science	Arrays	
	Bubble Sort Algorithm	
	Binary Search Algorithm	
	Switch statement	
	Structures	
Mathematics	Linear Equations	
	Straight Lines	
	Quadratic Equations	
	Circles	
	Circles Intersection	
	System of Linear Equations	
	Linear Equations ó 2 unknowns	
	Graphical Solution	
	Intersection Lines	
Production Art	Design Concepts	

## Unit Topic Module Descriptions

Module 3: Pong ó In this module students build their first graphical game. The game consists of a ball and two paddles. Users control one of these paddles by using up and down arrow keys while the other is controlled by the computer, using Artificial Intelligence (AI). Students will learn how to program AI. This will include dealing with mathematical principles that handle movement, position, and the reflection between objects.

### Computer Science

*It is expected students will:*

- Continue to develop their understanding of Object Oriented Programming in C++.
- Acquire an understanding of how programming class structure is applied
- Acquire an understanding of how programming pointers are developed.

### Mathematics:

*It is expected students will:*

- Review coordinate system (position of game graphics), including Cartesian coordinates for 1 dimensional (1D) and 2 dimensional (2D).
- Develop an understanding of 2D geometric vectors (movement of game objects and reflection).

### Production Art

*It is expected students will:*

- Apply digital illustrations such as bitmaps and formats, and receive an introduction to Photoshop©.
- Develop a further understanding of colours and their relationships: subtractive, additive colours; subtractive colour systems; additive colour systems, colour relationships.

## Module 4: òLetter Brick Breakout Actionö

In module 4, students will build a game called òLetter Brick Breakout Actionö. This game consists of a ball, paddle and bricks that represent the letters of the alphabet. The player has to throw the ball and hit the bricks. When the ball collides with the break the brick is removed and the score increases. If the player hits the bricks in a sequence that forms a meaningful word from a list of given words, the player will get a bonus score.

### Computer Science

*It is expected students will:*

- Use more advanced C/C++ language concepts, such as arrays, bubble sort, binary search, switch statements, structures.

### Mathematics

*It is expected students will master the following:*

- Linear equations: properties of linear equations, algebraic solutions, graphical solutions and applications

- Straight lines: normal, parallel vectors, segments
- Quadratic Equations: defined, relationships between functions and equations, solutions, factorization of Quadratic Polynomials (1 var)
- Circles
- Circle Intersection
- System of Linear Equations: defined, linear operations, solving for two unknowns, graphical solutions
- Intersection of lines

#### Production Art

*It is expected students will:*

- Continue design concepts: golden rectangle, guidelines

## Instructional Components

- Direct instruction
- Indirect instruction
- Interactive instruction
- Independent, guided practice
- Modeling
- Group work ó principal component in assessment

## Student Expectations

- Ability to work cooperatively
- High level of classroom maturity
- Leadership in classroom activities, small group interactions
- Good Math skills
- Basic knowledge of computer operation

## Learning Resources

- Printed materials: DigiPen *Technical Academy: Modules 3 & 4*
- Computer Lab
- Video projector
- Software

## Student Fees

- \$150/year

## Assessment

Topic	Title	Percent Value
Module 3 ó Pongø		
Computer Science	OOP ó Object Oriented Programming	
	Class	5
	Pointer	5
Mathematics	Coordinate Systems	5
	2D Geometric Vectors	5
Production Art	Digital Illustrations	10
	Basic Colors	5
Module 2 ó Letterbrickø (Breakout)		
Computer Science	Arrays	5
	Bubble Sort Algorithm	5
	Binary Search Algorithm	5
	Switch statement	5
	Structures	5

Mathematics	Linear Equations	5
	Straight Lines	5
	Quadratic Equations	5
	Circles	3
	Circles Intersection	2
	System of Linear Equations	3
	Linear Equations ó 2 unknowns	2
	Graphical Solution	3
	Intersection Lines	2
Production Art	Design Concepts	10
Total		100

Assessments will be both formative and summative and consist of conversations, group presentations, concept quizzes, class work, projects, and a final assessment piece.