SCHOOL DISTRICT NO. 73
(Kamloops -Thompson)

Board/Authority Authorized Course Framework Template

School District/Independent School Authority Name: School District No. 73 (Kamloops-Thompson)	**School District/Independent School Authority Number (e.g. SD43, Authority #432):** SD73
Developed by: Andres Ruberg	**Date Developed:** Mar. 1, 2019
School Name: Sa-Hali Secondary School	**Principal's Name:** Rachael Sdoutz
Superintendent Approval Date (for School Districts only):	**Superintendent Signature (for School Districts only):**
Board/Authority Approval Date:	**Board/Authority Chair Signature:**
Course Name: SD73 Tech Academy 12B	**Grade Level of Course:** 12
Number of Course Credits: 4	**Number of Hours of Instruction:** 120

Board/Authority Prerequisite(s):

None

Special Training, Facilities or Equipment Required:

Instructor should have Computer Science background, or experience in similar area. Facilities should include a computer lab with a digital projector and computers purchased within the last 5 years, each equipped with dedicated video cards. Additionally, 2D/3D art generation software, a programming environment with a 2D game creation library, and 2D/3D digital game-making software need to be installed on all computers.

Course Synopsis:

This course is the second of four courses that make up the SD73 Tech Academy Program. This academy is a unique opportunity for students to gain experience working in a collaborative, inquiry-based environment where they develop the skills necessary to create video games. The abilities developed are a blend of generic skills that will serve them in almost any future opportunity (project management, collaborative problem-solving, time management, and creative expression) and industry-specific skills (computer science, programming, mathematics, physics, digital animation, game design, and user interface design). Students finishing the Academy will have a strong sense of whether or not they are interested in pursuing future opportunities in the digital arts or software development industries, and have an awareness of the opportunities that are available in these fields.

Goals and Rationale:

Rationale:

British Columbia 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 academy will provide our students with an opportunity to participate in curriculum that can be tied to nearly any future employment opportunity, while gaining skills specific to the fields of video game creation, digital animation and programming. Additionally, students will develop cross-curricular knowledge and skills in disciplines such as Mathematics, Science, and Art. Additionally, this academy connects students to post-secondary institutes that offer either scholarship opportunities or dual credit for Computer Science courses.

Goals:

- 2D and 3D digital art generation in addition to 3D and 2D animation
- Programming principles common to every programming language
- Game design concepts that create enjoyable experiences
- Principals of art and animation that create a pleasing aesthetic
- Proficiency in using a modern game engine to create a video game
- Time-management and project-management strategies
- Collaborative problem-solving
- Mathematics and Physics concepts utilized to create real-time interactive simulations (video games)

Aboriginal Worldviews and Perspectives:

The opportunities to explore aboriginal perspectives within Art and Game Design are significant. This is a heavily project-based course with numerous opportunities to explore topics of personal or societal interest. Students will be encouraged to both incorporate aboriginal artistic elements in their projects as well as to explore culturally relevant topics.

Aboriginal speakers can be invited into the classroom to comment on the appropriateness of integrating their culture into a product such as a video game and the considerations students would want to take into account when developing projects inspired by aboriginal cultural elements.

Some of the First Peoples Principles of Learning closely tied to this course include:

- Learning is holistic, reflexive, reflective, experiential and relational
- Learning involves recognizing the consequences of one's actions
- Learning is embedded in memory, history and story
- Learning involves patience and time
- Learning requires exploration of one's identity

Course Name: SD73 Tech Academy 12B

BIG IDEAS

Game design is a complex process requiring thoughtful planning and time management	Mathematics and Physics underlie every modern game engine and animation program	How others perceive and interact with our products should shape how those products are developed and evolve over time	Art skills can be practiced and learned and can result in ability improvement regardless of current proficiency.	Programming is a general skill with many concepts independent of programming language.

Learning Standards

Curricular Competencies

Students are expected to do the following:

Programming:

- Develop artificial intelligence (AI) algorithms using pseudo-code
- Create classes within code
- Include meaningful comments within their code that will allow others using their code to understand how that code works and extend it if necessary
- Write code in the context of a scripting language utilized by a game engine (examples include javascript, GDscript and Zilchscript)

Design:

- Expand on an existing video game both in functionality and aesthetic
- Provide meaningful feedback to peers on their mechanical and aesthetic design decisions with the aim of creating projects that are more universally accessible
- Understand the philosophy of a particular game engine and how to develop an efficient work-flow in the context of that engine

Art:

- Generate animated 2-dimensional elements using simple 2D digital art software
- Use psychology to develop art that can impact a viewer's emotional reaction (psychology of colour, shape etc.)

Content

Students are expected to know the following:

- the difference between code and pseudo-code
- process for developing an algorithm
- elements of a Minimum Viable Product (MVP) in the context of video game develoment
- reflection procedures that can be drawn upon to assist in meeting future goals
- equations of dynamics (forces and non-linear acceleration)
- industry terminology (engine, minimum viable project, game object, sprite, model, visual target, game design document etc.)
- components of a simple class in the context of a

Project Management: • Identify and implement Minimum Viable Product (MVP) features before adding additional elements to a project • Build a framework for a multi-week project, with self-determined time-frames and deadlines • Reflect on a project in a post-mortem activity, in which a student will identify areas of success and potential improvements for future projects **Mathematics & Physics:** • Create vectors from a diagram, list of points or visual description using cartesian coordinates, distances and angles • Normalize, scale, and add vectors • Solve problems involving both kinematics and dynamics using forces, acceleration, and vector diagrams	programming language (variables, functions, constructors, getters/setters etc.) • simple commands and functionality of a 2D game engine • common commenting standards in the context of programming • fundamentals of event-based flow control (used by most modern video game engines) • exporting procedures in order to share work created using specialized software that by default saves work using a proprietary file format • vector terminology (direction, magnitude, normalization etc.)

Big Ideas – Elaborations

None

Curricular Competencies – Elaborations

None

Content – Elaborations

None

Recommended Instructional Components:

- Direct Instruction
- Demonstration
- Modeling
- Peer Teaching

- Experiential Learning
- Reflective Writing
- Project-based Learning

Recommended Assessment Components: Ensure alignment with the Principles of Quality Assessment

- Journaling
- Self-assessment
- Performance Assessment
- Skills-based Assessment
- Formative feedback
- Iterative Assessment

One Working Model:

Students will be given formative feedback during the instructional components of the course. This feedback is to help students understand their areas of strength and areas of challenge so that they can properly scope their projects and identify areas in which they may need to seek additional assistance and/or resources.

During formal assessments and projects, key skills will be identified to students at the project outset along with levels of proficiency within each of those skills. Each level of proficiency will have descriptive statements of what a student needs to demonstrate in order to achieve that level. Students will be reminded of this document throughout a project so that they can plan accordingly. At the conclusion of the project students will be asked to self-assess themselves and indicate what proficiency level they believe they have achieved for each skill attached to that project. For each skill students will be asked to provide evidence for the indicated level. The student self-assessment will be considered alongside teacher observations and in the event of a discrepancy the student and teacher will engage in dialogue to ensure a fair outcome.

Skills can be re-assessed at any time a student has new evidence to present that supports of a higher level of achievement. Students are always welcome to ask how they might demonstrate a higher level of achievement and/or request mini-projects that will give them the opportunity to develop additional evidence of improved ability. Several skills will be attached to multiple projects. Only the highest level of achievement will be reported (there is no averaging).

The instructor should make clear what percentage is tied to each level of achievement and how those percents will be averaged. One model is to break each skill into a Basic, Advanced and Mastery levels and attach 60%, 80% and 100% to those levels of achievement (respectively).

Interims summarizing current student ability should be sent home 4 times per semester. All project assessment documents should be available for students and parents to view online at any point for reference.

Learning Resources:

Python Arcade Documentation by Paul Craven: https://media.readthedocs.org/pdf/arcade-book/latest/arcade-book.pdf

DigiPen Technology Academy Manuals (Modules 1-5)

Guide to Writing SMART Goals: https://www.smartsheet.com/blog/essential-guide-writing-smart-goals

Guide to Agile Project Management: https://www.cio.com/article/3156998/agile-development/agile-project-management-a-beginners-guide.html

Khan Academy: https://www.khanacademy.org/

Extra Credits Game Design / Career Videos: https://www.youtube.com/user/ExtraCreditz/featured

Mark Brown Game Design Videos: https://www.youtube.com/channel/UCqJ-Xo29CKyLTjn6z2XwYAw

DigiPen Technology Academy Java Introductory Materials and Alpha Game Engine

The Zero Engine Workshop Website: https://zero.digipen.edu/Workshops/2016/index.html

Additional Information:

None