Orange Unified School District
Video Game Design II
Year Course

Grade Level: **10-12**

Prerequisites: Video Game Design 1

Introduction to the Subject
Video Game Design II is an advanced comprehensive, self-contained, fully-computer integrated one-year course with a final project or internship as a culminating activity. This course utilizes project-based learning to develop 2D and 3D PC, web, mobile device (i.e., cell phone), and DDR (Interactive Dance, Dance Revolution) games. In addition, students will demonstrate knowledge of artificial intelligence with robotics. Students will demonstrate their practical programming skills introduced in the Video Game Design 1, such as object-oriented programming using logical data structures, sequences, Boolean logic, loops, lists, arrays, functions, methods, and graphics. The class will provide a solid foundation of programming skills which will carry over into future college-level computer science courses

This course supports the California Business Education Career Path and Model Curriculum Standards for the Information Technology Industry sector, Programming and Systems Development Pathway.

Course Objectives:

By the end of the course:

- Students will learn to express themselves creatively with new technologies.
- Students will obtain advanced computer literacy skills to be able to understand the importance of effective interfaces in the interaction between humans and computer system.
- Students will explore computational ideas through person and meaningful projects.
- Students will maintain a digital portfolio that highlights completed projects.
- Students will communicate both verbally and in writing in a professional manner with peers, faculty, and members of the community.
- Students will apply knowledge and principles of the creation and design of video game, website, and animation programs, as well as the software development cycle.
- Students will have an intermediate understanding of the core concepts and techniques of computer science (software development cycle, determining hardware requirements, operating systems, networking, algorithms, logic flows), software applications, and programming languages using Adobe Flash, DarkBasic, GameMaker, Alice, Python, and the iSupport Learning Virtual Internship program, that can be applied to more mainstream projects.
- Students will demonstrate originality, inventiveness, and critical thinking, as well as real world constraints.
- Students will develop, implement, and communicate new ideas to others effectively using verbal, written and visual descriptions.
- Students will use peer reviews to analyze peer work and provide problem solving feedback.
- Students will refine their knowledge and understanding of the concepts of game development (storyboarding, designing, programming, testing, debugging) to create projects from conception to completion.

- Students will refine their understanding of creating a video game suited to the needs of a business model or venture that fits the budget and timeline criteria of the customer, meets the short- and long-term goals of the customer, and meets the project specifications.
- Students will explore intellectual property, privacy, non-disclosure agreements, and open-source licensing.
- Students will continue to expand career knowledge and goals in the computer science and video game development industries.
- Students will continue to expand their employability skills such as time management, problem solving, critical thinking, and cooperative planning while working on projects.
- Students will develop an organizational system to maintain information including specifications, pertinent research, and design choices.
- Students will develop innovative solutions to non-familiar problems by demonstrating various types of reasoning as appropriate for the needs of the situation.
- Students will develop ethical considerations and basic values by considering both the business and ethical ramifications of a decision before the decision is made. This enables them to gain knowledge and insight into how their decisions affect society.
- Students develop critical thinking skills by comparing and contrasting concepts, solving problems, making decisions, analyzing and evaluating, synthesizing and transferring knowledge
- Students will develop and practice metacognition skills by analyzing what they already know about the topic, what they need to know about the topic, how they learn best, how to get information they need, whether they fully understood what they heard, read, or learned, and do they know when they made a mistake and why they made it.

Recommended text(s):
- Dawson, Michael, *Python Programming, 2nd Edition, For the Absolute Beginner*, Thompson Course Technology, 2006.
- Habgood, Jacob and Overmars, Mark, *The Game Maker's Apprentice, Game Development for Beginners,* APress 2006
- Harbor, Jonathan S., *Game Programming, All in One, 3rd Edition,* Thompson Course Technology, 2007

Supplemental Text/Materials:
- Artificial Intelligence and Robotics Internship software, iSupport Learning, Inc., PO Box 398, Olathe, Kansas 66051, 877-828-1216, 866-596-5109 fax, Email – Steve Waddell at swaddell@isupportlearning.com
- Grandar ASM robots
- Documentaries from The Discovery Channel and The History Channel.
- Episodes/excerpts from Pokémon, Dragonball Z, Yu-Gi-Oh animated TV shows and movies

Course Overview and Approximate Time Allotments

First Semester   **Weeks**

I. Review of concepts learned from the Introduction to Video Game Design class.
  A. Careers in Computer Science and Game Development industries – Students review   2
      job openings, salaries, education requirements needed to obtain these careers, and the
      higher-education programs that can provide degrees in each field.
  B. Software Development Cycle – Students complete multiple projects using Python,   2

GameMaker, and Alice in Java Mode to teach and reinforce the software development cycle and learn software features and functionality.

C. Students complete chapters 7-12 of the Python Programming, 2nd Edition, textbook to   6
    design, develop, test, and debug animations and video games using Python and Adobe
    Flash
    1. Students will create projects that will help them learn advanced concepts and
        reinforce programming skills: by reading from and writing to text files and
        intercepting and handling errors during a program's execution, creating objects of
        different classes in the same program, allow objects to communicate with each
        other, derive new classes from existing ones, extend the definition of existing
        classes, create and fill frames, create and use textboxes, check buttons and radio
        buttons, create a graphics window, create and manipulate sprites test for
        collisions between sprites, and create animations and video games using
        command-driven and event-driven code.
    2. After completing animation and programming projects using step-by-step
        instructions, students will program a video game or animation from scratch.

II. Design, develop, test, and debug animations and video games by learning the basics of the   7
     Eclipse Integrated Development Environment (IDE) and begin transitioning to Java.
     A. Students learn to use variables and constants, understand the difference between Java's
        fundamental and class types. Students will learn to build java methods, define
        parameters and pass arguments, distinguish between class and instance methods, and
        build a method library.
     B. Students will create projects that will help them learn concepts and reinforce
        programming skills. The basics of Alice are taught which include: how to add an
        object to a world, how to set its initial position, orientation and pose; how to animate
        an object by sending it a message; how to select an object's subparts; how to change
        an object's properties, and how to send messages simultaneously. Students create
        storyboards with scenes, camera movements within shots, and transitional diagrams.
        This includes the basic description of what happens when the user runs the program
        and the chronological flow of actions in the story that tell students what has to happen
        first, next, and so on. This leads to the understanding of an algorithm by providing a
        concise series of steps that specify, in order, the behavior of each object in the story
        and ultimately solves a problem.
     C. The basic syntax of the Java language is reviewed. Java language libraries are
        introduced. Students divide their world-level methods into scenes and shots and break
        down their coding structure by using divide-and-conquer strategies. Students are
        introduced to the difference between class-level and world-level objects and methods,
        and will define new behaviors for each object. Class-level methods are reused from
        world to world. Students refine programming of camera movements by learning
        point-of-view. Students define an object's position in their virtual world determining
        where the object is located as the orientation is combined with the object's pitch, roll,
        yaw, and point-of-view is combined with position and orientation.
     D. After completing complex animation and programming projects using step-by-step
         instructions, students will program a video game or animation from scratch

Second Semester   **Weeks**

III. Design, develop, test, and debug an autonomous Grandar ASM robot and complete a   7
virtual internship simulation using ISupport Learning software.
   A. Students use Dark Basic to learn DarkBasic syntax by creating projects that will help
       them learn and reinforce general computing concepts, such as: types, variables,
       input/output, conditions, objects, classes, flowcharts, sequences (linear, branching,
       looping), Boolean logic, software objects and classifications, graphics, sound, and
       program development. Students must be able to successfully complete several mazes
       with increasing difficulty.
   B.   Students use the virtual internship software from ISupport Learning to obtain
        employability skills.
   C. Students use Grandar ASM robots (similar to rumba vacuum cleaners) to complete a
       maze while avoiding increasingly difficult obstacles. The scenario is an autonomous
       search and rescue robotics challenge to find a victim of a catastrophe.

IV. Design, develop, test, and debug PC/web games using GameMaker.   5
   A. Students use GameMaker to reinforce programming skills and learn scripting skills.

V. Create their end of year e-portfolio and website.   3
   A. Students use Microsoft MovieMaker to create and render a movie highlighting their
      top five projects of the year.
   B. Students use html, xml, xhtml, and javascript to create a website that will contain
       descriptions of what the student learned this year and include the end of year movie.

VI. Careers in Computer Science and Game Development industries – Students create their   2
resume and cover letter, learn proper emailing techniques, follow-up with a thank you
letter and email, and practice interviewing techniques.

DATE OF LAST CONTENT REVISION: **February 2006**

DATE OF CURRENT CONTENT REVISION: August 2011

DATE OF BOARD APPROVAL:

THE CALIFORNIA CONTENT STANDARDS

California Business Education Career Path and Model Curriculum Standards for the Information Technology Industry Sector and Programming and Systems Pathway are:

Information Technology Sector

1.0   Academics
        Students understand the academic content required for entry into postsecondary education and employment in the Information Technology sector.

2.0   Communications
        Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.

3.0   Career Planning and Management
        Students understand how to make effective decisions, use career information, and manage personal career plans.

4.0   Technology
        Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.

5.0   Problem Solving and Critical Thinking
        Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques.

6.0   Health and Safety
        Students understand health and safety policies, procedures, regulations, and practices, including the use of equipment and handling of hazardous materials.

7.0   Responsibility and Flexibility
        Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings.

8.0   Ethics and Legal Responsibilities
        Students understand professional, ethical, and legal behavior consistent with applicable laws, regulations, and organizational norms.

9.0   Leadership and Teamwork
        Students understand effective leadership styles, key concepts of group dynamics, team and individual decision-making, the benefits of workforce diversity, and conflict resolution.

10.0 Technical Knowledge and Skills
        Students understand the essential knowledge and skills common to all pathways in the Information Technology sector.

11.0 Demonstration and Application
        Students demonstrate and apply the concepts contained in the foundation and pathway standards.

Programming and Systems Development Pathway

D1.0 Students understand the strategies necessary to define and analyze systems and software requirements.

D2.0 Students understand programming languages.

D3.0 Students understand the creation and design of a software program.

D4.0 Students understand the process of testing, debugging, and maintaining programs to meet specifications.

D5.0 Students understand the importance of quality assurance tasks in producing effective and efficient products.

D6.0 Students understand the importance of effective interfaces in the interaction between humans and computer systems.