Information Technology Career Cluster
Game Design: Animation and Simulation
Course Number: 11.42900

Course Description:

Students completing this course will gain an understanding of the fundamental principles used at every stage of the game creation process. First, game genres and modes of play are explored in terms of the psychology of incentives, motivation to play, and social networking. Next, virtual characters and non-player characters are reviewed from concept drawing to 2D and 3D art, rigging, and animation. Next, level design, storytelling, and animation are added to develop a virtual world around the characters. These same techniques are at work in training simulator systems, virtual shopping experiences, augmented reality, and a number of other important career options. Schools offering this program can provide a foundation of traditional drawing, illustration, and art courses to make way for the 2D and 3D animation, storytelling, character development, audio, and game technology.

Students taking this program are strongly encouraged to add an internship to their curriculum which will give them real world experience, understanding how the computer game industry works. Game Design: Animation and Simulation is the third course in the Game Design pathway. Students enrolled in this course should have successfully completed Introduction to Digital Technology and Computer Science Principles. After mastery of the standards in this course, students should be prepared to earn an industry-recognized credential in this career area.

Course Standard 1

IT-GDAS-1

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.

The following elements should be integrated throughout the content of this course.

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies
Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening

	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback
				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads
	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship

				Staying Motivated to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss
Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture

Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates
Behavior at Conventions			Accepting Criticism
International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Course Standard 2

IT-GDAS-2

Demonstrate conceptual understanding of the game design process.

2.1 Identify the primary steps in the design process (e.g., conceptualize, prototype, test, analyze).
2.2 Evaluate basic gameplay from an existing game.
2.3 Compare and contrast the narratives in gameplay and explain how and when the storyline could pertain to game design.
2.4 Evaluate and describe various 2D & 3D, single & multi-user genre in games.
2.5 Plan and layout the steps needed to execute a team project, from skills to dependencies and parallelization of tasks.

Course Standard 3

IT-GDAS-3

Apply complex and abstract thinking to programming and scripting.

3.1 Introduce script binding, components, and prefabricated objects to projects.
3.2 Determine appropriate programming and scripting languages to create desired game mechanics, control the environment, user interface (UI), and gameplay.
3.3 Demonstrate an understanding of “if” and “switch” statements.
3.4 Demonstrate an understanding of states for game, player, item, and other objects in the game universe.
3.5 Demonstrate an understanding of loops to manage recurring events.
3.6 Retarget motion data and animation setups between character rigs.
3.7 Import and use Motion Capture (Mocap) data to drive character animation.
3.8 Demonstrate an understanding of Object Oriented Programming.
3.9 Demonstrate an understanding of the mathematical concepts, logic, and syntax of programming languages.
3.10 Compare and contrast game creation tools including scripting languages, extensibility, 2D/3D support and others.

Course Standard 4

IT-GDAS-4

Analyze and synthesize the relationship of mathematics to game design.

4.1 Use algebraic, geometric, and trigonometric relationships to define game object characteristics and properties as well as Heads-Up Display (HUD) interface placement and scaling.

4.2 Demonstrate functions of linear algebra and vector mathematics (dot product, cross product, quaternions, etc.) to determine character perspective and field of view.
4.3 Explain how quaternion calculations are used in video game development.
4.4 Apply mathematical concepts to interactive application and video game design.
4.5 Explain the use of collision geometry and "hit testing" for physics-based interactions and programming triggers.

Course Standard 5

IT-GDAS-5
Construct two-dimensional models using concepts of physics.

5.1 Explore the phenomena and apply Newtonian physics to static & dynamic systems for animation.
5.2 Explore mass, velocity, acceleration, torque, force, and other related measurements.
5.3 Use physics to create realistic motion of objects and characters (gravity, angular momentum, momentum, friction).
5.4 Apply the use of colliders and rigged bodies (kinesthetics).
5.5 Demonstrate a working knowledge of two dimensional digital bitmap art tools.
5.6 Demonstrate a working knowledge of two dimensional digital vector art tools.

Course Standard 6

IT-GDAS-6
Develop three-dimensional models, backgrounds, and scenes.

6.1 Create 3D Models with appropriate highlights and shading.
6.2 Determine the effect of various camera angles and emphasize perspective.
6.3 Demonstrate a working knowledge of 3D modeling & animation tools.

Course Standard 7

IT-GDAS-7
Analyze 2D/3D character animation and character controls.

7.1 Create character states, and transition between states when a specified event occurs.
7.2 Manipulate state-based animations and transitions.
7.3 Define volumes and entrance/exit events.
7.4 Create fire particle events, audio events, and object state events (e.g., inventory levels, timers).
7.5 Construct a 2D and 3D maze and maneuver through it in first and third person as a character.

Course Standard 8

IT-GDAS-8
Explain how to create an Augmented Reality experience.

8.1 Understand geo-location, geo-fencing principles, and location event models.
8.2 Understand and implement environmental events such as camera inputs, accelerometers, and audio inputs.
8.3 Create a map and navigation for UI (user interface) with transparent overlays superimposed on real world sensors.
8.4 Define how to create an Augmented Reality experience.
8.5 Create an asset to use in your Augmented Reality experience (e.g., 3D Model, Animation).

Course Standard 9

IT-GDAS-9

Design an augmented reality experience into a location-based game.

9.1 Use the assets created in Standard 8 and incorporate into a location based game.

Course Standard 10

IT-GDAS-10

Design and develop a game in teams.

10.1 Create a plan working with the skills of team members and the requirements of the game.
10.2 Develop a solid game – building, versioning, debugging, and optimization.
10.3 Create a hypothetical technology pipeline for an interactive application or video game project.

Course Standard 11

IT-GDAS-11

Deploy a student-team created game for beta testing.

11.1 Coordinate and produce a game that contains lighting and sound.
11.2 Demonstrate a working knowledge of video capture, editing, and post-processing tools.
11.3 Apply the correct graphic file formats and file interoperability.
11.4 Apply video file formats and file interoperability.
11.5 Apply audio file formats and file interoperability.
11.6 Use interactive and real-time editing within the game.
11.7 Deploy the game to a mobile device for testing and peer review.

Course Standard 12

VSAG-IDM-12

Examine how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects and competitive events.

12.1 Explain the goals, mission, and objectives of the career-technical student organization (CTSO).
12.2 Explore the impact and opportunities a student organization can develop to bring business and education together in a positive working relationship through innovative leadership and career development programs.
12.3 Explore the local, state, and national opportunities available to students through participation in related student organization including but not limited to conferences, competitions, community service, philanthropy, and other CTSO activities.
12.4 Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.
12.5 Explore the competitive events related to the content of this course and the required competencies, skills, and knowledge for each related event for individual, team, and chapter competitions.