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.

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

- Communicating Nonverbally
- Reading Body Language and mixed Messages
- Matching Verbal and Nonverbal communication
- Improving Nonverbal Indicators
- Nonverbal Feedback
- Showing Confidence Nonverbally
- Showing Assertiveness

### Written Communication

- Writing Documents
- Constructive Criticism in Writing
- Small Group Communication
- Large Group Communication
- Making Speeches
- Involving the Audience
- Answering Questions

### Speaking

- Using Language Carefully
- One-on-One Conversations
- Things to Include in a Résumé
- Describing Your Job Strengths
- Visual and Media Aids
- Errors in Presentation

### Applications and Effective Résumés

- Completing a Job Application
- Writing a Cover Letter
- Terms to Use in a Résumé
- Writing an Electronic Résumé
- Dressing Up Your Résumé

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

<table>
<thead>
<tr>
<th>Teamwork and Problem Solving</th>
<th>Meeting Etiquette</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Creatively</td>
<td>Preparation and Participation in Meetings</td>
</tr>
<tr>
<td>Taking Risks</td>
<td>Conducting Two-Person or Large Group Meetings</td>
</tr>
<tr>
<td>Building Team Communication</td>
<td>Inviting and Introducing Speakers</td>
</tr>
<tr>
<td></td>
<td>Facilitating Discussions and Closing</td>
</tr>
<tr>
<td></td>
<td>Preparing Visual Aids</td>
</tr>
<tr>
<td></td>
<td>Virtual Meetings</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Problem Solving</th>
<th>Customer Service</th>
<th>The Application Process</th>
<th>Interviewing Skills</th>
<th>Finding the Right Job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferable Job Skills</td>
<td>Gaining Trust and Interacting with Customers</td>
<td>Providing Information, Accuracy and Double Checking</td>
<td>Preparing for an Interview</td>
<td>Locating Jobs and Networking</td>
</tr>
<tr>
<td>Becoming a Problem Solver</td>
<td>Learning and Giving Customers What They Want</td>
<td>Online Application Process</td>
<td>Questions to Ask in an Interview</td>
<td>Job Shopping Online</td>
</tr>
<tr>
<td>Identifying a Problem</td>
<td>Keeping Customers Coming Back</td>
<td>Following Up After Submitting an Application</td>
<td>Things to Include in a Career Portfolio</td>
<td>Job Search Websites</td>
</tr>
<tr>
<td>Becoming a Critical Thinker</td>
<td>Seeing the Customer’s Point</td>
<td>Effective Résumés:</td>
<td>Traits Employers are Seeking</td>
<td>Participation in Job Fairs</td>
</tr>
<tr>
<td>Managing</td>
<td>Selling Yourself and the Company</td>
<td>Matching Your Talents to a Job</td>
<td>Considerations Before Taking a Job</td>
<td>Searching the Classified Ads</td>
</tr>
<tr>
<td>Handling Customer Complaints</td>
<td>When a Résumé Should be Used</td>
<td></td>
<td></td>
<td>Using Employment Agencies</td>
</tr>
<tr>
<td>Strategies for Customer Service</td>
<td></td>
<td></td>
<td></td>
<td>Landing an Internship</td>
</tr>
</tbody>
</table>
### 1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

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

### 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.

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

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

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