

# Game Design: Animation and Simulation (11.42900) (2015)

Adopted 2015

Demonstrate employability skills required by business and industry. IT-GDAS-1

1. Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities. IT-GDAS-1.1
2. Demonstrate creativity by asking challenging questions and applying innovative procedures and methods. IT-GDAS-1.2
3. Exhibit critical thinking and problem-solving skills to locate, analyze and apply information in career planning and employment situations. IT-GDAS-1.3
4. Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity. IT-GDAS-1.4
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. IT-GDAS-1.5
6. Present a professional image through appearance, behavior, and language. IT-GDAS-1.6

Demonstrate conceptual understanding of the game design process. IT-GDAS-2

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

Apply complex and abstract thinking to

1. Introduce script binding, components, and prefabricated objects to projects. IT-GDAS-3.1

**programming and scripting.** IT-GDAS-3

- 2. Determine appropriate programming and scripting languages to create desired game mechanics, control the environment, user interface (UI), and gameplay.** IT-GDAS-3.2
- 3. Demonstrate an understanding of "if" and "switch" statements.** IT-GDAS-3.3
- 4. Demonstrate an understanding of states for game, player, item, and other objects in the game universe.** IT-GDAS-3.4
- 5. Demonstrate an understanding of loops to manage recurring events.** IT-GDAS-3.5
- 6. Retarget motion data and animation setups between character rigs.** IT-GDAS-3.6
- 7. Import and use Motion Capture (Mocap) data to drive character animation.** IT-GDAS-3.7
- 8. Demonstrate an understanding of Object Oriented Programming.** IT-GDAS-3.8
- 9. Demonstrate an understanding of the mathematical concepts, logic, and syntax of programming languages.** IT-GDAS-3.9
- 10. Compare and contrast game creation tools including scripting languages, extensibility, 2D/3D support and others.** IT-GDAS-3.10

**Analyze and synthesize the relationship of mathematics to game design.** IT-GDAS-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.** IT-GDAS-4.1
- 2. Demonstrate functions of linear algebra and vector mathematics (dot product, cross product, quaternions, etc.) to determine character perspective and field of view.** IT-GDAS-4.2
- 3. Explain how quaternion calculations are used in video game development.** IT-GDAS-4.3
- 4. Apply mathematical concepts to interactive application and video game design.** IT-GDAS-4.4
- 5. Explain the use of collision geometry and "hit testing" for physics-based interactions and programming triggers.** IT-GDAS-4.5

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

- 1. Explore the phenomena and apply Newtonian physics to static & dynamic systems for animation.** IT-GDAS-5.1
- 2. Explore mass, velocity, acceleration, torque, force, and other related measurements.** IT-GDAS-5.2
- 3. Use physics to create realistic motion of objects and characters (gravity, angular momentum, momentum, friction).** IT-GDAS-5.3

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**4. Apply the use of colliders and rigged bodies (kinesthetics).** IT-GDAS-5.4

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**5. Demonstrate a working knowledge of two dimensional digital bitmap art tools.** IT-GDAS-5.5

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**6. Demonstrate a working knowledge of two dimensional digital vector art tools.** IT-GDAS-5.6

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

**1. Create 3D Models with appropriate highlights and shading.** IT-GDAS-6.1

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**2. Determine the effect of various camera angles and emphasize perspective.** IT-GDAS-6.2

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**3. Demonstrate a working knowledge of 3D modeling & animation tools.** IT-GDAS-6.3

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

**1. Create character states, and transition between states when a specified event occurs.** IT-GDAS-7.1

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**2. Manipulate state-based animations and transitions.** IT-GDAS-7.2

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**3. Define volumes and entrance/exit events.** IT-GDAS-7.3

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**4. Create fire particle events, audio events, and object state events (e.g., inventory levels, timers).** IT-GDAS-7.4

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**5. Construct a 2D and 3D maze and maneuver through it in first and third person as a character.** IT-GDAS-7.5

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

**1. Understand geo-location, geo-fencing principles, and location event models.** IT-GDAS-8.1

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**2. Understand and implement environmental events such as camera inputs, accelerometers, and audio inputs.** IT-GDAS-8.2

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**3. Create a map and navigation for UI (user interface) with transparent overlays superimposed on real world sensors.** IT-GDAS-8.3

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**4. Define how to create an Augmented Reality experience.** IT-GDAS-8.4

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**5. Create an asset to use in your Augmented Reality experience (e.g., 3D Model, Animation).** IT-GDAS-8.5

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**Design an augmented reality experience into a location-based game.** IT-GDAS-9

**1. Use the assets created in Standard 8 and incorporate into a location based game.** IT-GDAS-9.1

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**Design and develop a game in teams.** IT-GDAS-

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

**Deploy a student-team created game for beta testing.** IT-GDAS-11

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

**IT-GDAS-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.** IT-GDAS-12

- 1. Explain the goals, mission, and objectives of the career-technical student organization (CTSO).** IT-GDAS-12.1
- 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.** IT-GDAS-12.2
- 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.** IT-GDAS-12.3
- 4. Explain how participation in career and technology education student organizations can promote lifelong responsibility for community service and professional development.** IT-GDAS-12.4
- 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.** IT-GDAS-12.5