Maryland
STATE DEPARTMENT OF EDUCATION

Program of Study Guide: Animation & Game Development DRAFT

Comprehensive guidelines and course standards for the Animation & Game Development pathway

Office of College and Career Pathways

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MARYLAND STATE DEPARTMENT OF EDUCATION

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DOCUMENT HISTORY

Document Version	Date	Summary of Change
1.0	October 2024	Initial Document
1.1	December 2024	Standards Reviewed by OCCP Leadership. Course descriptions reviewed and shortened. LMI data verified and updated. IRC selections reviewed and confirmed.

Purpose

The purpose of this document is to communicate the required Career and Technical Education (CTE) academic standards for the Animation and Game Development Program of Study. The academic standards in this document are theoretical and performance based. The standards contain content from multiple state departments of education, the College Board, and the Adobe Certified Professional and have been reviewed and vetted by members of the Maryland business and industry community.

In addition to academic standards, the Maryland State Department of Education (MSDE) has incorporated into this document Labor Market Information (LMI) definitions and explanations for the Program of Study; program aligned Industry Recognized Credentials; and Work-Based Learning resources and requirements by course level.

This document is intended for use by educational administrators and practitioners. A similar document is available for each state-approved CTE Program of Study.

Sources of Standards

These sources ensure each course in the Animation and Game Development pathway meets high-quality educational and industry standards, preparing students for certification and career success. Here are the sources of the standards for all four courses:

1. **Career and Technical Education (CTE) Standards**
   Description: CTE standards establish guidelines for skills and knowledge in technical education programs, including digital media, game design, and visual communication.
   Usage: CTE standards shape the foundational and advanced skills in Animation and Game Development courses, ensuring alignment with industry standards for career readiness in fields like 3D modeling, animation, and game design.
   Source: CTE Standards – ACTE: https://www.acteonline.org/

2. **Adobe Education Exchange**
   Description: Adobe Education Exchange is a free online resource provided by Adobe, offering lesson plans, project-based learning activities, and instructional guides. It covers the fundamentals of Adobe software, including tools like Premiere Pro, After Effects, and Animate, curated to meet educational standards in creative fields.
   Usage: Teachers can use lesson plans and projects directly related to Adobe software to reinforce software skills, workflow management, and design principles in Animation and Game Development I-IV. Adobe Exchange resources help align course instruction with skills needed for Adobe certification exams, including Adobe Certified Professional in Animate and After Effects.
   Source: Adobe Education Exchange: https://edex.adobe.com/

3. **Autodesk Design Academy**
   Description: Autodesk Design Academy provides free educational resources, tutorials, and certifications on Autodesk software, including Maya and 3ds Max, essential for 3D modeling and animation.
   Usage: This resource supports instruction in Autodesk software skills for Animation and Game Development I-II, aligning course content with the Autodesk Certified User (ACU) in 3D Animation and Modeling certification.
   Source: Autodesk Design Academy: https://academy.autodesk.com/

4. **Unity Learn**
   Description: Unity Learn is an educational platform by Unity Technologies, offering courses, projects, and tutorials on Unity software. It covers game design principles, scripting, asset management, and Unity's visual and programming tools.
   Usage: Unity Learn resources are utilized in Animation and Game Development II-IV to provide students with the skills needed to achieve the Unity Certified User: Artist and Programmer certifications, covering both the artistic and programming aspects of game design.
   Source: Unity Learn: https://learn.unity.com/

5. **National Core Arts Standards (NCAS)**
   Description: The National Core Arts Standards (NCAS) provide a framework for teaching and assessing skills in the arts, emphasizing creativity, production, presentation, and response in visual and media arts.

Usage: NCAS informs course standards for Animation and Game Development I-IV, especially in visual design principles, creative processes, and professional presentation. It ensures that students' creative work meets recognized arts education standards.
Source: National Core Arts Standards: https://www.nationalartsstandards.org/

6. **Unity Certified User Standards**
   Description: Unity provides certification pathways, including the Certified User program, which assesses skills in game design, programming, and asset management. The certification aligns with industry standards for entry-level Unity users, focusing on artistic and programming competencies.
   Usage: Unity certification standards are used in Animation and Game Development II-IV to guide instruction in Unity's software, ensuring students gain the skills necessary for Unity Certified User: Artist and Programmer certifications.
   Source: Unity Certified User Program: https://unity.com/products/unity-certifications

7. **Blender Foundation - Blender Fundamentals Certification Standards**
   Description: Blender Foundation offers a range of educational resources and certification standards, including the Blender Fundamentals Certification, which covers essential skills in 3D modeling, texturing, and animation within Blender.
   Usage: Blender standards are integrated into Animation and Game Development I, ensuring students develop a foundational proficiency in Blender, aligned with certification requirements for entry-level 3D modeling and animation skills.
   Source: Blender Foundation: https://www.blender.org/education/

8. **CG Spectrum - Certified 3D Game Artist Standards**
   Description: CG Spectrum's Certified 3D Game Artist program provides industry-aligned standards and curriculum for mastering 3D modeling, texturing, and asset creation for games. It is designed to meet the practical requirements of a 3D game artist in the gaming industry.
   Usage: Certified 3D Game Artist standards inform advanced skills in Animation and Game Development III-IV, guiding students in creating professional game assets and achieving technical proficiency for certification.
   Source: CG Spectrum: https://www.cgspectrum.com/

9. **Toon Boom Education / Certification Portal**
   Description: Curriculum and exam blueprints for 2D production suites (Storyboard Pro, Harmony)
   Usage: Gives districts an alternate path for 2D animation credentials and additional storyboard resources in Courses I-II
   Source: Toon Boom for Education: https://www.toonboom.com/students

10. **Pixar in a Box – Khan Academy**
    Description: Free, standards-aligned lessons on story structure, cinematography, and the 12 principles of animation.
    Usage: Enriches the "Foundations of Digital Storytelling" strand and provides cross-curricular narrative activities.
    Source: Pixar in a Box (Khan Academy): https://www.pixar.com/pixar-in-a-box

Course Descriptions

Course Level	Course Information	Description
Required Core: Course 1	Animation and Game Development I SCED: <XX> Grades: 9-12 Prerequisite: None Credit: 1	This introductory course immerses students in the foundations of digital storytelling, 2D animation, and entry-level game design. Learners create storyboards and short scripts, then translate drawings into animated sequences with key-framed motion, sound, and basic interactive triggers in an industry-standard game engine.
Required Core: Course 2	Animation and Game Development II SCED: <XX> Grades: 10-12 Prerequisite: Animation and Game Development I Credit: 1	Building on Course I, students refine multi-layer 2D animation techniques and transition into game-ready 3D asset creation. They model, texture, and optimize characters and environments, import original assets into an industry-standard game engine, and script or node-program player interactions, UI elements, and physics.
Optional Flex: Course 1	Animation and Game Development III SCED: <XX> Grades: 11-12 Prerequisite: Animation and Game Development II Credit: 1	In this advanced capstone, students complete the full animation-to-game production pipeline. They execute high-poly-to-low-poly workflows, advanced rigging, real-time shaders, and cinematic cut-scenes, integrating voice-over, music, and UI for a polished vertical slice. Emphasis is placed on collaborative project management, peer review, performance optimization, and portfolio development.

Course Level	Course Information	Description
Optional Flex: Course 2	Career Connected Learning I SCED: <XX> Grades: 11-12 Prerequisite: Animation and Game Development I and II Credit: 1	This flexible, work-based learning course introduces students to real-world applications of classroom knowledge and technical skills through on-the-job experiences and reflective practices. Students engage in career exploration, skill development, and professional networking by participating in youth apprenticeships, registered apprenticeships, pre-apprenticeships, internships, capstone projects, or other approved career-connected opportunities. Variable credit (1–3) accommodates the required on-the-job training hours and related instruction. By integrating industry standards, employability skills, and personalized learning goals, Career Connected Learning I equips students to make informed career decisions, develop a professional portfolio, and build a strong foundation for success in postsecondary education, training, or the workforce.
Optional Flex: Course 3	Career Connected Learning II SCED: <XX> Grades: 11-12 Prerequisite: Career Connected Learning I Credit: 1	Building on the foundational experiences of Career Connected Learning I, this advanced work-based learning course provides students with deeper on-the-job practice, leadership opportunities, and refined career exploration. Students continue to enhance their technical and professional skills, expanding their industry networks and aligning personal goals with evolving career interests. Variable credit (1–3) remains aligned with the required training hours and related instruction. Through elevated responsibilities and skill application, Career Connected Learning II prepares students to confidently transition into higher-level postsecondary programs, apprenticeships, or the workforce.

Dual Enrollment and Career Connected Learning Experiences Must be Aligned to the CTE Core.

Industry-Recognized Credentials and Work-Based Learning

Industry-Recognized Credentials
By the end of Animation and Game Development I or Animation and Game Development II: Blender Fundamentals Certification, Autodesk Certified User (ACU) in 3D Animation and Modeling, and Unity Certified User: Artist. **Optional Credentials (via the Flex Course options):** Adobe Certified Professional in Animate, Adobe Certified Professional in After Effects, Certified 3D Game Artist (CG Spectrum), and Unity Certified User: Programmer

Work-based Learning Resources		
Animation and Game Development I: Career Awareness	**Animation and Game Development II: Career Preparation**	**Flex Courses: Career Preparation**
• Industry Visits • Guest Speakers • Participation in Career and Technical Student Organizations • Postsecondary Visits – Program Specific Site Tours • Mock Interviews	• All of Career Awareness plus the following: • Job Shadow • Paid and Unpaid Internships	• Paid and Unpaid Internships • Apprenticeships

Labor Market Information: Definitions and Data

Labor market information (LMI) plays a crucial role in shaping Career and Technical Education (CTE) programs by providing insights into industry demands, employment trends, and skills gaps. This data helps education leaders assess the viability of existing programs and identify opportunities for new offerings. By aligning CTE programs with real-time labor market needs, schools can better prepare students for in-demand careers and ensure that resources are effectively used to support pathways that lead to high-quality, sustainable employment.

Standard Occupational Code (SOC) and Aligned Industry:

Indicator	Definition	Pathway Labor Market Data
High Wage[1]	Those occupations that have a 25th percentile wage equal to or greater than the most recent MIT Living Wage Index for one adult in the state of Maryland, and/or leads to a position that pays at least the median hourly or annual wage for the DC-VA-MD-WV Metropolitan Statistical Area (MSA). *Note: A 25th percentile hourly wage of $24.74 or greater is required to meet this definition.*	**Standard Occupational Classification (SOC) Code** 15-1255: Web and Digital Interface Designers 27-1014: Special Effects Artists and Animators 27-1021: Commercial and Industrial Designers 27-1024: Graphic Designers **Hourly Wage/Annual Salary:**
High Skill	Those occupations located within the DC-VA-MD-WV Metropolitan Statistical Area (MSA) with the following education or training requirements: completion of an apprenticeship program; completion of an industry-recognized certification or credential; associate's degree, bachelor's degree, or higher.	**Typical Entry-Level Education:** Careers in these areas typically need a bachelor's degree in computer graphics, animation, fine arts, computer science, or a related field.
In-Demand	Annual growth plus replacement, across all Maryland occupations, is 405 openings between 2024-2029.	**Annual Openings**

[1] Living Wage Calculator: https://livingwage.mit.edu/states/24

Labor Market Information Data Source

Lightcast Q4 2024 Data Set. Lightcast occupation employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates are also affected by county-level Lightcast earnings by industry. Foundational data for the state of Maryland is collected and reported by the Maryland Department of Labor.

Methodology for High Wage Calculations

To combine labor market data across multiple Standard Occupational Classifications (SOCs), a weighted average approach was used to ensure accurate representation of the marketplace. Median wages for each SOC were weighted based on their respective employment levels, reflecting the relative demand for each occupation. This method ensures that occupations with higher employment contribute proportionately to the overall wage calculation. Additionally, job openings from all relevant SOCs were summed to determine the total projected demand. For example, if Mechanical Engineers account for 67% of total employment and Electrical Engineers for 33%, their respective wages are weighted accordingly, and job openings are aggregated to provide a comprehensive view of labor market opportunities. This approach delivers a balanced and accurate representation of both wages and employment demand for the program.

Methodology for In-Demand Calculations

The baseline for annual job openings, taking into account new positions and replacement positions, was determined by taking the average of all annual job openings between 2024 and 2029 across all 797 career sectors at the 5-digit SOC code level. For the 2024-2029 period, average job openings (growth + replacement) is 405.

Course Standards: Animation and Game Development I

1. **GENERAL REQUIREMENTS.** This course is recommended for students in Grades 9-12.

2. **INTRODUCTION**
   A. Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
   B. The Arts, Entertainment and design Career Cluster combines creative roles in visual and performing arts, film, journalism, fashion, interior design, and creative technologies. This Cluster focuses on creating, producing, and sharing artistic and design work across multiple platforms, aiming to entertain, inform, beautify, and inspire.
   C. The Animation and Game Development program of study careers encompasses the creation and production of visually engaging digital content such as visual marketing, graphic design, augmented and virtual reality, web design, and user interfaces/user experiences. This program of study combines artistic talent and technology to produce interactive content, entertainment, commercial product and packaging design, and promotional materials.
   D. Animation and Game Development I is an introductory course within the Arts, Entertainment, and Design Career Cluster, aimed at high school students advancing skills in digital content creation and production. The class introduces simple 3D forms so students can compare 2D and 3D pipelines and begin preparing for an entry-level industry certification focused on foundational animation tools.
   E. Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.
   F. Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.

3. **KNOWLEDGE AND SKILLS**
   A. **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:**
      1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work.
      2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn.
      3. Employ effective reading, writing, and technical documentation skills.
      4. Solve problems using critical thinking techniques and structured troubleshooting methodologies.
      5. Demonstrate leadership skills and collaborate effectively as a team member.
      6. Implement safety procedures, including proper use of software and following privacy guidelines.
      7. Exhibit an understanding of legal and ethical responsibilities in the Animation and Game Development field, following data privacy laws and best practices for security.

8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting.

B. **The student identifies various career pathways in the Animation and Game Development field. The student is expected to:**
   1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in Animation and Game Development.
   2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations.
   3. Demonstrate effective interview skills for roles in media and Animation and Game Development.

C. **The student develops technology and digital literacy skills. The student is expected to:**
   1. Collaborate effectively on complex projects, communicate design concepts clearly, and present professional portfolios that showcase technical and creative expertise on a variety of platforms
   2. Organize, manage, and document projects using file management systems, version control, and industry-standard terminology while adhering to ethical practices and copyright laws.
   3. Use industry-standard tools such as Blender, Autodesk Maya, and Adobe Animate to design, model, rig, and animate 2D and 3D assets, incorporating advanced techniques like texturing, rendering, and lighting.
   4. Use Unity to import assets, manage scenes, and create interactive experiences through animation controls, particle systems, shaders, and scripting using C# programming.
   5. Prepare 3D models, animations, and effects for efficient rendering and real-time performance, using techniques such as polygon reduction, UV mapping, and platform-specific optimization.
   6. Create visually engaging content using Adobe After Effects for compositing, motion graphics, and post-production while applying principles of color theory, composition, and visual hierarchy.

D. **The student integrates core academic skills into Animation and Game Development practices. The student is expected to:**
   1. Document design processes, create project proposals, and present ideas using clear, professional language tailored to technical and creative contexts.
   2. Use geometry, algebra, and proportional reasoning to create accurate 3D shapes, scale models, and optimize animations for timing, resolution, and performance.
   3. Apply concepts of physics, motion, lighting, and optics to simulate realistic environments, effects, and interactions in animations and game design.
   4. Write and debug scripts to control animations, game logic, and interactivity while using algorithms and problem-solving techniques to address technical challenges.
   5. Apply design principles such as balance, contrast, and color theory to create visually engaging animations and interactive environments.

E. **The student demonstrates foundational digital-storytelling skills for animation and game development. The student is expected to:**
   1. Explain the 12 principles of animation in 2-D contexts.
   2. Draft storyboards that visualize camera angles, timing, and action flow.
   3. Write short scripts with basic plot structure and dialogue to guide animation projects

F. **The student demonstrates proficiency in 2D asset creation and animation using industry-standard certification software. The student is expected to:**
   1. Create vector and raster artwork suitable for 2-D animation.
   2. Animate simple characters or objects with keyframes, easing, and onion-skinning techniques.
   3. Export animations in formats appropriate for web publishing and game-engine integration.

G. **The student demonstrates introductory knowledge of the game-development pipeline. The student is expected to:**
   1. Describe the stages of game development, including design, asset creation, programming, testing, and deployment.
   2. Assemble a simple playable scene in an industry-standard game engine using provided assets.
   3. Apply basic programming or visual-scripting logic to trigger character movement and simple interactions.

H. **The student demonstrates digital-literacy and professional practices essential to animation and game development. The student is expected to:**
   1. Apply secure file-management practices, including consistent naming, version control, and backups.
   2. Explain ethical and legal considerations such as copyright, licensing, and accessibility.
   3. Identify career pathways and entry-level industry certifications related to animation and game development.

Course Standards: Animation and Game Development II

1. **GENERAL REQUIREMENTS.** This course is recommended for students in Grades 10-12.

2. **INTRODUCTION**
   A. Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
   B. The Arts, Entertainment and Design Career Cluster combines creative roles in visual and performing arts, film, journalism, fashion, interior design, and creative technologies. This Cluster focuses on creating, producing, and sharing artistic and design work across multiple platforms, aiming to entertain, inform, beautify, and inspire.
   C. The Animation and Game Development program of study careers encompasses the creation and production of visually engaging digital content such as visual marketing, graphic design, augmented and virtual reality, web design, and user interfaces/user experiences. This program of study combines artistic talent and technology to produce interactive content, entertainment, commercial product and packaging design, and promotional materials.
   D. Animation and Game Development II is the second course within the Arts, Entertainment, and Design Career Cluster, aimed at high school students building skills in digital content creation and production. This course includes expanded units on interactive narrative design to teach learners to revise scripts and storyboard branching storylines. Coursework aligns to intermediate certifications in 3D modeling or game-engine artistry, depending on local software choices
   E. Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.
   F. Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.

3. **KNOWLEDGE AND SKILLS**
   A. **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:**
      1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work.
      2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn.
      3. Employ effective reading, writing, and technical documentation skills.
      4. Solve problems using critical thinking techniques and structured troubleshooting methodologies.
      5. Demonstrate leadership skills and collaborate effectively as a team member.
      6. Implement safety procedures, including proper use of software and following privacy guidelines.
      7. Exhibit an understanding of legal and ethical responsibilities in the Animation and Game Development field, following data privacy laws and best practices for security.

8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting.

B. **The student identifies various career pathways in the Animation and Game Development field. The student is expected to:**
   1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in Animation and Game Development.
   2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations.
   3. Demonstrate effective interview skills for roles in media and Animation and Game Development.

C. **The student develops technology and digital literacy skills. The student is expected to:**
   1. Collaborate effectively on complex projects, communicate design concepts clearly, and present professional portfolios that showcase technical and creative expertise on a variety of platforms
   2. Organize, manage, and document projects using file management systems, version control, and industry-standard terminology while adhering to ethical practices and copyright laws.
   3. Use industry-standard tools such as Blender, Autodesk Maya, and Adobe Animate to design, model, rig, and animate 2D and 3D assets, incorporating advanced techniques like texturing, rendering, and lighting.
   4. Use Unity to import assets, manage scenes, and create interactive experiences through animation controls, particle systems, shaders, and scripting using C# programming.
   5. Prepare 3D models, animations, and effects for efficient rendering and real-time performance, using techniques such as polygon reduction, UV mapping, and platform-specific optimization.
   6. Create visually engaging content using Adobe After Effects for compositing, motion graphics, and post-production while applying principles of color theory, composition, and visual hierarchy.

D. **The student integrates core academic skills into Animation and Game Development practices. The student is expected to:**
   1. Document design processes, create project proposals, and present ideas using clear, professional language tailored to technical and creative contexts.
   2. Use geometry, algebra, and proportional reasoning to create accurate 3D shapes, scale models, and optimize animations for timing, resolution, and performance.
   3. Apply concepts of physics, motion, lighting, and optics to simulate realistic environments, effects, and interactions in animations and game design.
   4. Write and debug scripts to control animations, game logic, and interactivity while using algorithms and problem-solving techniques to address technical challenges.
   5. Apply design principles such as balance, contrast, and color theory to create visually engaging animations and interactive environments.

E. **The student demonstrates advanced 2D animation techniques and begins foundational 3D asset development. The student is expected to:**
   1. Produce multi-layer 2D animations incorporating parallax, virtual-camera moves, and synchronized audio.
   2. Translate 2-D concept art into basic 3D forms through blocking or gray-boxing methods.

F. **The student demonstrates core skills in 3D modeling and texturing using industry-standard certification software. The student is expected to:**
   1. Model game-ready assets with correct topology and edge flow.
   2. UV-unwrap models and create physically based texture maps, evaluating texel density for target platforms.
   3. Optimize meshes for real-time performance, including polygon budgeting and level-of-detail strategies.

G. **The student demonstrates the ability to integrate assets and scripts within a game engine. The student is expected to:**
   1. Import custom assets into a game engine and organize scenes, prefabs, and materials efficiently.
   2. Develop player controls, simple AI behaviors, or user-interface events using scripting or node-based logic.
   3. Implement lighting, post-processing effects, and basic physics to enhance gameplay.

H. **The student demonstrates narrative and level-design skills for interactive media. The student is expected to:**
   1. Revise storyboards and scripts to support branching narratives and player choice.
   2. Apply level-design heuristics, including readability, onboarding, and difficulty curves.
   3. Conduct play-testing sessions, gather feedback, and iterate on prototypes to improve engagement

I. **The student demonstrates mastery of end-to-end project workflows, applies professional practices, and prepares evidence for intermediate industry credentials. The student is expected to:**
   1. Plan, develop, and present an original 2-D or 3-D animation/game asset or short scene from concept through final output, documenting each production stage.
   2. Optimize models, textures, and scene assets for real-time performance (e.g., polygon budgeting, LODs, texture compression) in an industry-standard game engine.
   3. Implement and iterate on peer/external feedback to improve visual quality, technical accuracy, and user experience.
   4. Map personal skill growth to the requirements of intermediate certifications in 3-D modeling, animation, or game-engine artistry and set specific goals to close any gaps.
   5. Curate a professional portfolio that showcases finished projects, work-in-progress evidence, and reflection notes aligned to certification rubrics and industry standards

Course Standards: Animation and Game Development III

1. **GENERAL REQUIREMENTS.** This course is recommended for students in Grades 10-12.

2. **INTRODUCTION**
   A. Career and Technical Education (CTE) instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
   B. The Arts, Entertainment and Design Career Cluster combines creative roles in visual and performing arts, film, journalism, fashion, interior design, and creative technologies. This Cluster focuses on creating, producing, and sharing artistic and design work across multiple platforms, aiming to entertain, inform, beautify, and inspire.
   C. The Animation and Game Development program of study careers encompasses the creation and production of visually engaging digital content such as visual marketing, graphic design, augmented and virtual reality, web design, and user interfaces/user experiences. This program of study combines artistic talent and technology to produce interactive content, entertainment, commercial product and packaging design, and promotional materials.
   D. Animation and Game Development III is an advanced course within the Arts, Entertainment, and Design Career Cluster, aimed at high school students advancing skills in digital content creation and production. The course prepares learners to sit for comprehensive industry-standard credentials (e.g., game-engine artist/programmer or professional animation exams) and to showcase a demo reel for postsecondary programs or entry-level employment.
   E. Students will participate in at least two Career-Connected Education and Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study.
   F. Students are encouraged to participate in extended learning experiences through aligned Career and Technical Student Organizations (CTSOs). CTSOs are a cocurricular requirement in the Carl D. Perkins Act, and alignment to CTSO activities is an expectation for CTE programs in the state of Maryland.

3. **KNOWLEDGE AND SKILLS**
   A. **The student demonstrates the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. The student is expected to:**
      1. Identify and demonstrate positive work behaviors that enhance employability and job advancement, such as regular attendance, promptness, proper attire, maintenance of a clean and safe work environment, and pride in work.
      2. Demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, active listening, and a willingness to learn.
      3. Employ effective reading, writing, and technical documentation skills.
      4. Solve problems using critical thinking techniques and structured troubleshooting methodologies.
      5. Demonstrate leadership skills and collaborate effectively as a team member.
      6. Implement safety procedures, including proper use of software and following privacy guidelines.
      7. Exhibit an understanding of legal and ethical responsibilities in the Animation and Game Development field, following data privacy laws and best practices for security.

8. Demonstrate time-management skills and the ability to prioritize tasks in a technical setting.

B. **The student identifies various career pathways in the Animation and Game Development field. The student is expected to:**
   1. Develop a career plan that includes the necessary education, certifications, job skills, and experience for specific roles in Animation and Game Development.
   2. Create a professional resume and portfolio that reflect skills, projects, certifications, and recommendations.
   3. Demonstrate effective interview skills for roles in media and Animation and Game Development.

C. **The student develops technology and digital literacy skills. The student is expected to:**
   1. Collaborate effectively on complex projects, communicate design concepts clearly, and present professional portfolios that showcase technical and creative expertise on a variety of platforms
   2. Organize, manage, and document projects using file management systems, version control, and industry-standard terminology while adhering to ethical practices and copyright laws.
   3. Use industry-standard tools such as Blender, Autodesk Maya, and Adobe Animate to design, model, rig, and animate 2D and 3D assets, incorporating advanced techniques like texturing, rendering, and lighting.
   4. Use Unity to import assets, manage scenes, and create interactive experiences through animation controls, particle systems, shaders, and scripting using C# programming.
   5. Prepare 3D models, animations, and effects for efficient rendering and real-time performance, using techniques such as polygon reduction, UV mapping, and platform-specific optimization.
   6. Create visually engaging content using Adobe After Effects for compositing, motion graphics, and post-production while applying principles of color theory, composition, and visual hierarchy.

D. **The student integrates core academic skills into Animation and Game Development practices. The student is expected to:**
   1. Document design processes, create project proposals, and present ideas using clear, professional language tailored to technical and creative contexts.
   2. Use geometry, algebra, and proportional reasoning to create accurate 3D shapes, scale models, and optimize animations for timing, resolution, and performance.
   3. Apply concepts of physics, motion, lighting, and optics to simulate realistic environments, effects, and interactions in animations and game design.
   4. Write and debug scripts to control animations, game logic, and interactivity while using algorithms and problem-solving techniques to address technical challenges.
   5. Apply design principles such as balance, contrast, and color theory to create visually engaging animations and interactive environments.

E. **The student demonstrates advanced 3-D production techniques for professional animation and game assets. The student is expected to:**
   1. Execute high-poly sculpting, retopology, baking, and texturing workflows for hero assets.
   2. Implement advanced rigging and inverse kinematics to achieve expressive character motion.

3. Develop node-based or code-based shaders to create stylized or photoreal visual effects.

F. **The student demonstrates comprehensive game-development skills by producing a polished vertical slice. The student is expected to:**
   1. Build custom levels, user interfaces, and audio elements that support a cohesive gameplay loop.
   2. Integrate particle systems, cinematic sequences, and real-time lighting pipelines.
   3. Optimize builds for performance, including frame-rate profiling and platform-specific settings.

G. **The student demonstrates narrative design and cut-scene production for interactive media. The student is expected to:**
   1. Write branching dialogue trees and event charts aligned with core game mechanics.
   2. Produce animated cut-scenes (2D or 3D) that advance plot and character development.
   3. Synchronize voice-over, music, and sound effects to enhance emotional impact.

H. **The student demonstrates capstone project management and readiness for advanced industry credentials. The student is expected to:**
   1. Plan, scope, and manage a collaborative capstone project that aligns with selected industry-standard certifications.
   2. Conduct peer and external reviews using professional rubrics and iterate on deliverables accordingly.
   3. Present a professional demo reel, portfolio, and résumé to postsecondary programs or potential employers.

I. **The student develops proficiency in 2D animation techniques using industry-standard 2D animation software for game design applications. The student is expected to:**
   1. Create and animate characters, objects, and backgrounds using software vector tools.
   2. Apply principles of traditional animation, such as exaggeration and timing, to develop engaging 2D sequences.
   3. Integrate 2D animations within Unity to add layers of interaction and depth to game environments.
   4. Export 2D animations in appropriate formats for integration into game and multimedia projects.

J. **The student showcases project-based skills and professional-quality work in a portfolio format. The student is expected to:**
   1. Plan, execute, and present a comprehensive animation or game project, documenting each stage from concept to final output.
   2. Incorporate feedback from peers and instructors to refine projects and meet quality standards.
   3. Prepare a professional portfolio that includes completed projects, assets, and animation sequences relevant to certification exams and industry expectations.
   4. Demonstrate readiness for certification exams by showcasing mastery of required skills in software such as, Unity, Adobe Animate, and 3D game art.

Course Standards: Career Connected Learning I and II

Career connected learning is an educational approach that integrates classroom instruction with real-world experiences, enabling high school students to explore potential careers and develop relevant skills before graduation. By participating in work-based learning opportunities—such as apprenticeships, internships, capstone projects, and school-based enterprises—students apply academic concepts in authentic settings, gain practical industry knowledge, and build professional networks. This hands-on engagement helps students connect their studies to future career paths, strengthens their problem-solving and communication skills, and supports a smoother transition into college, vocational programs, or the workforce.

All Career and Technical Education Programs of Study include aspects of work-based learning, and almost all of the programs include two Career Connected Learning (CCL) courses. Below are the course descriptions for CCL I and CCL II. The CCL standards can be found via this link: