Burlington County Institute of Technology

Medford Campus

Career and Technical Programs

Career Cluster: *Information Technology*
Program Name: *Modeling, Virtual Environments and Simulation*
Program Title: *Video Game Design*
CIP Code: 11.0804

Board Approval Date: August, 2025

Program of Study

➔ Grade 9
- Introduction to Computers
- 2D Game Engines I

➔ Grade 10
- History and Exploration of Gaming
- 2D Art Assets
- 2D Game Engines II

➔ Grade 11
- 3D Assets
- 3D Engine Game Development I
- 3D Engine Game Development II

➔ Grade 12
- Game Development Capstone
- Business of eSports and Gaming
- Interactive Media Design
- Python Programming

➔ Program Descriptor

- The Game and Interactive Media Design course offers a comprehensive exploration of game development skills intertwined with a deep dive into gaming history, influential figures, pivotal games, and the contemporary gaming industry landscape. Students will not only learn to construct games but also gain insights into the evolution of gaming. They will craft a portfolio featuring small games that highlight essential mechanics from classic titles, utilizing advanced design tools to create professional-grade assets for their projects.

➔ Program Outcome

- By the end of the course, students will master the art of game design and development. They will learn to create both 2D and 3D art assets, integrating them seamlessly into game projects. Through hands-on experience, students will program games using multiple languages and diverse game engines, gaining proficiency in game development. The curriculum will explore influential games that have shaped the industry and introduce key figures in gaming history. Students will analyze core mechanics of classic game design, develop critical thinking skills by comparing different design approaches, and ultimately build a portfolio of games and assets. This portfolio will serve as a professional showcase for future academic pursuits or careers in game development.

➔ Work Based Learning Opportunities

- Simulated Workplace Experience
- Cooperative Education

➔ Industry Valued Credentials

- Unreal Engine Certified Professional
- Blender Certification

- Certified Game Developer (IGDA)
- Adobe Certified Expert
- OSHA 10

Course Descriptions

1. Grade 9
    a. *Introduction to Computers:* Introduction to Computers is designed to acquaint students with fundamental aspects of technology. Throughout the course, students will gain a comprehensive understanding of PC hardware components, basic networking concepts, and the functionalities of the Windows Operating System. They will also explore essential applications such as the Google Office suite, email management, and best practices for safe internet usage. This foundational knowledge will empower students to navigate and utilize technology effectively in both academic and professional settings.

    b. *2D Game Engines I:* 2D Game Engines I introduces students to the fundamentals of programming basic game mechanics using a programming language. Throughout the course, students will integrate these mechanics with provided art and sound assets to develop simple, playable games. This hands-on approach will equip students with foundational skills in game development, preparing them to create interactive experiences using 2D game engines.

2. Grade 10
    a. *History and Exploration of Gaming:* In History and Exploration of Gaming, students will journey through the evolution of gaming, beginning from the 1970s and progressing to the present day. They will explore pivotal games, influential figures, prominent companies, and cultural phenomena such as Pac-Man Fever, the Video Game Crash of 1983, and the impact of arcades, consoles, and handheld devices on home gaming. Students will engage in playing and critically reflecting on significant games that have shaped the gaming industry over the decades.

b. *2D Art Assets:* In 2D Art Assets, students will gain proficiency in utilizing image editing software tailored for pixel art creation. Throughout the course, they will develop a range of 2D assets and acquire skills in importing these assets into game development environments.

c. *2D Game Engines II:* In 2D Game Engines II, students will advance their programming skills by creating more complex games. They will utilize art and sound resources that they have developed independently to complete their projects. This course emphasizes the integration of custom-made assets into sophisticated game mechanics, enhancing students' abilities to produce polished, fully realized game projects.

3. Grade 11
   a. *3D Assets:* In 3D Assets, students will utilize Blender, an open-source 3D modeling software, to create and manipulate 3D models. They will learn the fundamentals of modeling, texturing, and animating objects using Blender. Additionally, students will gain proficiency in importing these assets into Unreal Engine, a leading game development platform, where they will integrate their creations into interactive environments and games. This course prepares students to effectively utilize industry-standard tools for 3D asset creation and integration in game development.

   b. *3D Engine Game Development I:* In 3D Engine Game Development I, students will delve into the fundamentals of game design using Unreal Engine, a prominent industry-standard tool favored by colleges, universities, and professional game developers worldwide. Through hands-on projects, students will learn essential skills in game development, including creating environments, implementing gameplay mechanics, and integrating visual effects. This course equips students with foundational knowledge and practical experience necessary to begin crafting interactive 3D games and simulations using Unreal Engine.Students will learn the basics of game design utilizing Unreal Engine, an industry standard development tool used by colleges, universities, and professional game developers to create games and special effects.

   c. *3D Engine Game Development II:* In 3D Engine Game Development II, students will advance their skills by creating more complex games using Unreal Engine, while integrating VR (Virtual Reality) and AR

(Augmented Reality) elements into their projects. Building upon foundational knowledge from the first part of the course, students will explore advanced techniques in game design and development, focusing on immersive experiences and interactive storytelling. By the end of the course, students will be proficient in leveraging Unreal Engine's capabilities to design and implement sophisticated gameplay mechanics that incorporate virtual and augmented realities.

4. Grade 12
    a. *Game Development Capstone:* In the Game Development Capstone course, students will refine and expand upon their existing game projects to build a comprehensive portfolio suitable for presentation to colleges and universities. Emphasizing advanced game design principles, the course will delve into the essential elements that make games engaging and enjoyable for players. Students will analyze current gaming trends to inform their project enhancements, ensuring relevance and innovation in their portfolio pieces. By the end of the course, students will have developed polished versions of their games, equipped with a deep understanding of effective game design and a showcase-ready portfolio.

    b. *Business of eSports and Gaming:* In the Business of eSports and Gaming course, students will explore the dynamic world of eSports, streaming, and the gaming industry. The curriculum will delve into the pathways to becoming a professional eSports player and a successful streamer, focusing on the skills and strategies needed for each role. Students will gain practical experience in using essential streaming applications such as Open Broadcaster Studio, Twitch, and YouTube, learning how to effectively engage audiences and manage their online presence. The course aims to equip students with the knowledge and skills necessary to navigate and thrive in the competitive landscape of eSports and gaming entertainment.

    c. *Interactive Media Design*: In the Interactive Media Design course, students will harness web programming languages to craft engaging and interactive websites and games. The curriculum will focus on practical proficiency in HTML, CSS, and JavaScript, supplemented by the utilization of various JavaScript libraries. Students will learn to integrate these languages effectively to design and develop interactive user interfaces, dynamic content, and immersive gaming experiences. The course aims to

empower students with the skills needed to create compelling interactive media projects that showcase their understanding of web development principles and techniques.

d. *Python Programming for Game Development:* In Python Programming for Game Development, students will delve into the fundamentals of Python programming and harness the PyGame library to develop interactive games. Throughout the course, students will learn essential programming concepts in Python, including variables, loops, functions, and object-oriented programming principles. They will apply these skills to design and implement game mechanics, user interfaces, and game logic using PyGame. By the end of the course, students will have the capability to create functional and engaging games, demonstrating proficiency in Python programming tailored for game development purposes.

Curriculum Maps

Course: Safety	Unit: OSHA 10	Length: 1 Week

Standards

- 9.3.12.AG-FD.1 Develop and implement procedures to ensure safety, sanitation and quality in food product and processing facilities.
- 9.3.12.AC-CST.5 Apply practices and procedures required to maintain jobsite safety.
- 9.3.12.AR.2 Analyze the importance of health, safety and environmental management systems, policies and procedures common in arts, audio/video technology and communications activities and facilities.
- 9.3.12.ED.4 Evaluate and manage risks to safety, health and the environment in education and training settings.
- 9.3.HT-RFB.2 Demonstrate safety and sanitation procedures in food and beverage service facilities.
- 9.3.HU-ED.5 Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.
- 9.3.LW.4 Conduct law, public safety, corrections and security work tasks in accordance with employee and employer rights, obligations and responsibilities, including occupational safety and health requirements.
- 9.3.LW-ENF.8 Explain the appropriate techniques for managing crisis situations in order to maintain public safety.
- 9.3.MN.3 Comply with federal, state and local regulations to ensure worker safety and health and environmental work practices.
- 9.3.MN-HSE.3 Demonstrates a safety inspection process to assure a healthy and safe manufacturing environment.
- 9.3.MN-HSE.5 Evaluate continuous improvement protocols and techniques in health, safety and/or environmental practices.
- 9.3.12.TD.5 Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.

- 9.3.12.TD-HSE.1 Describe the health, safety and environmental rules and regulations in transportation, distribution and logistics workplaces.
- 9.3.12.TD-OPS.3 Comply with policies, laws and regulations in order to maintain safety, security and health and mitigate the economic and environmental risk of transportation operations.

Essential Question(s)

- Why is it important to practice safety?
- What do safe practices look like in my industry?
- How can I keep myself and others safe?

Content

- Walking working surfaces
- Emergency action plans
- Fire protection
- Electrocution hazards
- Personal protective equipment
- Hazard communication
- Materials handling, storage, use and disposal.

Skills

- Explain why OSHA is important to workers.
- Explain workers rights under OSHA
- Discuss employer responsibilities under OSHA.
- Discuss the use of OSHA standards.
- Explain how OSHA inspections are conducted.
- Utilize helpful worker safety and health resources.
- Identify hazards in the workplace associated with walking and working surfaces.

- Identify best practices for eliminating or controlling hazards associated with walking and working surfaces in the workplace.
- Recognize employer requirements to protect workers from walking and working surface hazards.
- Recognize benefits of an Emergency Action Plan.
- Identify elements of the Fire Protection Plan.
- Identify conditions under which evacuation actions may be necessary in an emergency situation.
- Identify conditions under which shelter-in-place may be necessary in an emergency situation.
- Identify characteristics of an effective emergency escape route.
- Recognize the five types of fire extinguishers, including the types of fires they can extinguish.
- Review requirements for proper maintenance of portable fire extinguishers.
- Identify major electrical hazards.
- Describe types of electrical hazards.
- Describe electrical protection methods.
- Recognize employer requirements to protect workers from electrical hazards.
- Recall employer responsibilities toward affected employees regarding PPE.
- Identify when face and head protection should be used.
- Recall which types of hand and foot protection should be used in a specific situation.
- Recognize the differences between respirator types.
- Identify the differences between full-body protection levels.
- Identify the employer's responsibilities under the HCS, including training requirements.
- Identify components of a Hazard Communication program.
- Describe requirements of the different types of Hazard Communication labels.
- Locate pertinent information about chemicals on labels, including other forms of hazard communication, to ensure "right to understanding" provisions of GHS requirements.
- Identify types of material handling equipment.
- Describe hazards associated with material handling activities (e.g., storage, use, and disposal).
- Identify methods to prevent hazards associated with material handling equipment.
- Recognize employer requirements to protect workers from material handling hazards
- Identify the main causes of machinery accidents.

- Recognize basic machinery parts that expose workers to hazards.
- Recognize workplace situations involving machinery that requires guarding.
- Identify the requirements for safeguards.
- Identify types of machine guards including types of devices used to safeguard machines.
- Identify strategies to control chemical hazards.
- Identify strategies to control biological hazards.
- Identify strategies to control physical hazards.
- Identify strategies to control ergonomic hazards.
- Identify OSHA requirements pertaining to bloodborne pathogens.
- List the potential routes of exposure from bloodborne pathogens.
- Identify the risks associated with Human Immunodeficiency Virus (HIV), Hepatitis B, and Hepatitis C Virus.
- Identify methods of preventing transmission of bloodborne pathogens & managing occupational exposures.
- Restate methods of the safe disposal of sharps.
- Recount steps which should be taken in the event of an exposure to a potential bloodborne pathogen.
- Recognize risk factors associated with work-related musculoskeletal disorders (MSD)s.
- Identify good posture.
- Describe safe lifting techniques.
- Identify ergonomic control methods for eliminating/reducing work-related MSDs.
- Identify the number one cause of death for U.S. teens.
- List eight risk factors for young drivers.
- Identify the biggest risk factor for young drivers.
- Define distracted driving.
- Provide examples and/or causes of distracted driving.
- Identify the biggest risk factor for distracted driving
- Discuss the risk of having other young passengers in the car.
- List some actions employers should take to keep employees safe while driving.
- List some actions employees can take to safely drive on the job.
- Define the term violence.
- Recall who is at risk for encountering workplace violence.

- Describe workplace violence prevention strategies.
- Identify how to StartSafe and StaySafe to prevent or lessen workplace violence.
- Recognize the costs of workplace accidents.
- Recognize the benefits of implementing an effective safety and health program.
- Describe the elements of an effective safety and health program.
- Identify three methods to prevent workplace hazards.

Assessments

- OSHA 10 Assessment and Certificate

Course: CTE	Unit: Career Awareness	Length: Woven Throughout

Standards

- 9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.
- 9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
- 9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans. ·
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

- 9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
- 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.
- 9.2.12.CAP.9: Locate information on working papers, what is required to obtain them, and who must sign them.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans)
- 9.2.12.CAP.11: Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education
- 9.2.12.CAP.12: Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients.
- 9.2.12.CAP.13: Analyze how the economic, social, and political conditions of a time period can affect the labor market.
- 9.2.12.CAP.14: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income
- 9.2.12.CAP.15: Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income.
- 9.2.12.CAP.16: Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments. ·
- 9.2.12.CAP.17: Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice. ·
- 9.2.12.CAP.18: Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding). ·
- 9.2.12.CAP.19: Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income.
- 9.2.12.CAP.20: Analyze a Federal and State Income Tax Return

- 9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business.
- 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible.
- 9.2.12.CAP.23: Identify different ways to obtain capital for starting a business

Essential Question(s)

- How does one prepare for a career?
- How does one improve marketability?
- Why is career planning important?
- What are the risks in starting a business?

Content

- There are strategies to improve one's professional value and marketability.
- Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
- An individual's income and benefit needs and financial plan can change over time.
- Securing an income involve an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans
- Understanding income involves an analysis of payroll taxes, deductions and earned benefits.
- There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals

Skills

- Act as a responsible and contributing community member and employee.
- Attend to financial well-being.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.

- Use technology to enhance productivity, increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Assessments

- Career Research Project
- Resume/Cover Letter

Course: Introduction to Computers | Length: Marking Period

Standards

- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behavior
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.

Essential Question(s)

- What is a computer?
- What do the parts of a computer do?
- How do the parts of a computer work together to create a user's experience?
- How do computers send data and work with each other?
- How does the variety of available hardware affect the plans for creating a new game?
- How do peripherals such as controllers work?

Content

- Understanding Computer Components:
  - Identify and explain the functions of various parts of a computer, including CPU, RAM, hard drive, motherboard, and peripherals, and understand how they work together to process information.
- Networking Concepts:
  - Describe networking concepts such as LAN, WAN, routers, switches, and IP addresses, and explain how computers connect and communicate over networks.
- Operating System Functionality:
  - Explain the basic functions of an operating system (e.g., Windows), including file management, software installation, system settings, and user interface navigation.
- File Management in Windows:
  - Demonstrate proficiency in saving, loading, organizing, and managing files using the file explorer and file management features of the Windows operating system.
- Internet and Password Safety:
  - Identify best practices for internet safety, including safe browsing habits, recognizing phishing attempts, creating strong passwords, and managing online accounts securely.
- Office Software Skills:

        - Utilize office software (e.g., Microsoft Office suite) to create documents (e.g., Word), spreadsheets (e.g., Excel), and presentations (e.g., PowerPoint), including formatting, editing, and using basic and advanced features.
    - Research Skills:
        - Conduct effective online research using search engines, evaluate the credibility of sources, and cite information properly, adhering to academic standards.
    - Collaborative Project Skills:
        - Collaborate with peers to plan, execute, and complete projects, including assigning tasks, communicating effectively, managing deadlines, and integrating contributions into a cohesive final product.
    - Project Management Skills:
        - Manage time effectively, allocate resources, coordinate with partners, and oversee the progress of lengthy projects to ensure timely completion and quality outcomes.

Skills

- Understanding Computer Components and Building a PC:
    - Identify and describe the function of various computer components (CPU, RAM, motherboard, etc.) and peripherals needed to build a PC.
    - Assemble and configure a functional PC system, including hardware installation and basic BIOS setup.
- Networking Concepts and Connecting PCs:
    - Explain networking concepts such as LAN, WAN, Ethernet, wireless protocols, and IP addressing.
    - Setup and configure a basic network by connecting PCs together using cables (Ethernet) and wireless connections (Wi-Fi).
- Operating System (Windows) Navigation:
    - Navigate the Windows operating system proficiently, including desktop navigation, file management, system settings adjustment, and troubleshooting common issues.
- Utilizing Office Software for Productivity:
    - Create and format documents, spreadsheets, and presentations using office software (e.g., Microsoft Office suite), incorporating advanced features like formulas, charts, and animations.

- Internet and Data Security Practices:
    - Implement internet safety measures, understand data privacy concerns, and practice safe online behavior, including managing passwords and recognizing cyber threats.
- Research and Information Management:
    - Conduct efficient online research using various sources, critically evaluate information for credibility and relevance, and properly cite sources in academic or professional work.
- Collaborative Project Management:
    - Collaborate effectively with team members to plan, coordinate, and execute projects using project management tools and techniques.
    - Manage project timelines, allocate resources, track progress, and resolve conflicts to ensure project goals are met.
- PC Troubleshooting and Maintenance:
    - Diagnose and troubleshoot common hardware and software issues in PCs, apply troubleshooting steps, and perform basic maintenance tasks to optimize system performance.
- Advanced PC Skills (Optional):
    - Explore advanced topics such as virtualization, cloud computing, data backup strategies, and emerging technologies relevant to computer systems and networking.

Assessments

- PC Building Project
- Does This Work? Challenge

Course: 2D Game Engines I Length:Semester

Standards

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a)
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.

Essential Question(s)

- What is a game mechanic?
- What is a game genre?
- What are some examples of classic mechanics?
- How do you create a game mechanic programmatically?

Content

- Utilizing a Drag and Drop Programming Language:
  - Understand how to navigate and utilize a drag and drop programming environment to create basic game logic and interactions.
  - Develop familiarity with visual programming tools for sequencing actions, controlling flow, and managing game states.
- Understanding Algorithms:
  - Define algorithms and their fundamental role in programming and game development.
  - Describe and implement basic algorithms such as sorting, searching, and pathfinding in the context of game mechanics.
- Organizing Program's Code and Art Assets:
  - Organize and manage code files and art assets within a structured game development project.
  - Explain best practices for naming conventions, file organization, and asset management to ensure project clarity and efficiency.
- Explaining Game Genres:
  - Define and categorize game genres based on their specific gameplay mechanics, thematic elements, and intended audience.
  - Analyze well-known game genres to identify their defining characteristics and understand player expectations associated with each genre.
- Understanding Simple Game Mechanics:
  - Identify and describe fundamental game mechanics such as player movement, collision detection, scoring systems, and user interface interactions.

        - Discuss how these game mechanics contribute to the overall gameplay experience and influence player engagement.
    - Recreating Game Mechanics Programmatically:
        - Implement game mechanics programmatically using a programming language or game development framework.
        - Apply coding principles to replicate and customize basic game mechanics, demonstrating the ability to achieve desired gameplay features through programming.

Skills

- Programming:
    - Write and understand code in a programming language suitable for game development (e.g., Python, JavaScript, C#).
    - Implement basic programming concepts such as variables, data types, loops, conditionals, functions, and object-oriented programming principles.
- Organizing Assets such as Art and Sounds:
    - Manage and organize art assets (e.g., sprites, textures) and sound assets (e.g., audio clips, music) effectively within a game development project.
    - Apply best practices for file naming conventions, asset directories, version control, and asset optimization for game performance.
- Project Management:
    - Plan and execute game development projects by defining goals, timelines, milestones, and task assignments.
    - Utilize project management tools (e.g., Trello, Asana) to track progress, manage resources, and coordinate team efforts effectively.
- Creating Simple Games:
    - Design and develop simple games from concept to completion using game development frameworks or engines (e.g., Unity, Godot, Construct).
    - Implement core gameplay mechanics, user interfaces, game logic, and win/lose conditions based on game design specifications.

- Collaborating with Peers on Projects:
    - Work collaboratively in teams to brainstorm ideas, divide tasks, and contribute effectively to game development projects.
    - Communicate and share progress, feedback, and resources with team members to achieve project goals and deadlines.

Assessments

- Maze Game
- Multi-Level Game
- 2 Player Battle Game

Course: History and Exploration of Gaming — Length: Semester

Standards

- 9.3.12.AR-AV.1 Describe the history, terminology, occupations and value of audio, video and film technology
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a). .
- 9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations (e.g., NJSLSA.R6, 7.1.AL.IPRET.6)
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork.

- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Pr6b: Evaluate the benefits and impacts at the global level from presenting media artworks, such as new understandings gained by the artist or audience.
- 1.2.12adv.Re7a: Analyze and synthesize the qualities and relationships of the components and audience impact in a variety of media artworks.
- 1.2.12adv.Re7b: Survey an exemplary range of media artworks, analyzing methods for managing audience experience, creating intention and persuasion through multimodal perception and systemic communications when addressing global issues including climate change.
- 1.2.12adv.Re8a: Analyze the intent, meanings and impacts of diverse media artworks, considering complex factors of context and bias.

Essential Question(s)

- What are the advances in technology that led to the first video games?
- What was the Golden Age of gaming and why is it called that?
- Who were some of the people involved early on in the industry and what did they do?
- What companies participated in the early days of the industry and what were their contributions?
- What cultural events occurred that had a profound effect on the industry?
- What hardware and software existed during this time?
- What were the Console Wars and why was it called that?
- What are some of the advances in gaming that have only existed in the past decade?

Content

- Technology Advances that Made Electronic Games Possible
    - Understand key technological advancements (such as transistors, microprocessors, and graphical displays) that enabled the development of electronic games.

- Early Electro-Mechanical Games
    - Describe the characteristics and operation of early electro-mechanical games.
    - Compare and contrast electro-mechanical games with later electronic games.
- Evolution of Pinball
    - Trace the evolution of pinball machines from mechanical to electronic versions.
    - Explain the impact of technological advancements on pinball design and gameplay.
- The First Arcades
    - Analyze the emergence of arcades as a popular venue for gaming.
    - Identify significant arcade games and their contributions to gaming culture.
- Japan’s Contribution to Early Gaming
    - Discuss Japan's role in pioneering early video game development.
    - Identify influential Japanese game developers and their contributions.
- The Crash of 1983
    - Explain the factors leading to the video game crash of 1983.
    - Analyze the consequences of the crash on the gaming industry and its subsequent recovery.
- Overview of the Companies Involved in Game Development
    - Identify major companies and studios involved in game development during different eras.
    - Discuss their impact on game innovation, genres, and industry trends.
- Exploration of Games During This Time
    - Examine notable games released during different periods of gaming history.
    - Analyze the cultural and technological influences reflected in these games.
- Breakdown of Hardware and Its Restrictions on Game Design
    - Understand the hardware limitations of various gaming platforms (e.g., consoles, PCs).
    - Explain how hardware constraints influence game design choices and innovation.
- Popular Game Mechanics
    - Identify and describe common game mechanics such as platforming, RPG elements, and puzzle-solving.
    - Discuss how these mechanics contribute to gameplay dynamics and player engagement.
- Overview of Popular Designers

        - Recognize influential game designers and their contributions to the gaming industry.
        - Analyze the impact of their design philosophies on game development and player experiences.
    - History of How Games Are Discovered by Players
        - Trace the evolution of game distribution and discovery methods, from physical media to digital platforms.
        - Discuss the role of marketing, reviews, and word-of-mouth in game discovery.
    - Gaming Marketplaces and Their Effect on the Industry
        - Describe the impact of digital distribution platforms (e.g., Steam, App Store) on the gaming industry.
        - Analyze how these marketplaces influence game sales, accessibility, and developer-player interactions.
    - Mobile Gaming Overview
        - Explain the growth and evolution of mobile gaming.
        - Identify key trends, genres, and technological advancements in mobile game development.

Skills

- Utilizing Word Processing Software
    - Basic Skills:
        - Create, edit, and format documents using word processing software (e.g., Microsoft Word, Google Docs).
        - Apply styles, formatting options, and templates effectively.
- Use tools such as spell check, grammar check, and word count.
    - Advanced Skills:
        - Utilize features like headers, footers, tables, and images.
        - Incorporate hyperlinks, citations, and references.
        - Understand version control and collaboration tools within the software.
- Organizing and Presenting an Educational Paper
    - Organization:
        - Outline and structure an educational paper effectively, including introduction, body, and conclusion.
        - Use headings, subheadings, and logical transitions to organize ideas coherently.

- Presentation Skills:
    - Prepare and deliver presentations based on the paper's content.
    - Use presentation software (e.g., PowerPoint, Google Slides) to create slideshows.
    - Incorporate visuals, multimedia elements, and speaker notes appropriately.
- Researching Information Utilizing Primary Sources
    - Research Skills:
        - Identify primary sources relevant to a given topic or research question.
        - Evaluate the credibility, reliability, and relevance of primary sources.
        - Properly cite primary sources using a recognized citation style (e.g., APA, MLA).
    - Effective Use of Sources:
        - Integrate primary sources into research papers or projects to support arguments or analyses.
        - Analyze primary sources critically and interpret findings within a historical or contextual framework.
- Project Management
    - Planning and Organization:
        - Develop project plans outlining objectives, tasks, timelines, and resources.
        - Implement strategies for task delegation, scheduling, and tracking progress.
    - Execution and Monitoring:
        - Monitor project milestones, assess risks, and adjust plans as needed.
        - Coordinate team activities, foster collaboration, and resolve conflicts.
- Collaboration with Peers
    - Communication and Teamwork:
        - Communicate effectively with team members, both verbally and in writing.
        - Contribute actively to group discussions, meetings, and collaborative activities.
    - Conflict Resolution:
        - Resolve conflicts constructively, mediate disagreements, and maintain team cohesion.
        - Acknowledge and respect diverse perspectives and contributions within the team.

Assessments

- Student Research Project
- Game Report Project

Course: 2D Art Assets	Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.

- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.
- 1.2.12adv.Pr5a: Employ mastered artistic, design, technical, and soft skills in managing and producing media artworks.

Essential Question(s)

- What are the most common tools and settings when creating 2D pixel art assets?
- What makes something pixel art?
- What is a color palette and why does it matter when talking about games?
- What are the settings you need to create a usable art asset for game design?
- How do print assets differ from art assets made for the computer screen?

Content

- Overview of an Image Editing Toolset and Commonly Used Tools
    - Tool Familiarity:
        - Understand the purpose and functionality of commonly used tools in image editing software (e.g., Photoshop, GIMP).
        - Demonstrate proficiency in tools such as selection tools, brushes, layers, masks, and filters.
        - Apply adjustments like brightness/contrast, hue/saturation, and levels effectively.

- Compare and Contrast File Types and Their Advantages and Disadvantages
  - File Formats:
    - Identify and differentiate between common image file formats (e.g., JPEG, PNG, GIF, BMP).
    - Explain the advantages and disadvantages of each file format in terms of quality, compression, transparency, and suitability for different purposes.
- Asset Organization Strategies
  - Organizational Skills:
    - Develop strategies for organizing digital assets (images, sprites, textures) effectively within a project.
    - Implement file naming conventions, folder structures, and metadata tagging to maintain clarity and accessibility.
- Exploration of Pixel Art Styles Throughout Gaming History
  - Historical Context:
    - Explore the evolution of pixel art styles from early gaming (8-bit, 16-bit) to contemporary pixel art.
    - Analyze the characteristics, limitations, and creative techniques associated with different pixel art styles and eras.
- Hardware-Restricted Color Palettes of Common Gaming Systems
  - Color Limitations:
    - Understand the color palette restrictions imposed by older gaming hardware (e.g., NES, Sega Genesis).
    - Experiment with creating artwork within limited color palettes to understand constraints and creative solutions.
- Utilizing Art Created in an Image Editor in Game Development
  - Integration Skills:
    - Integrate artwork created in image editing software into game development projects.
    - Optimize images for game engines, ensuring compatibility, resolution, and performance considerations.

        - Understand the workflow from image creation to implementation in game engines or development environments.

Skills

- Utilizing an Image Editor to Create Pixel Art Assets
    - Pixel Art Creation:
        - Utilize pixel art techniques to create sprites, textures, or backgrounds for games.
        - Demonstrate proficiency in using drawing tools, pixel-perfect editing, and working at low resolutions typical in pixel art.
- Manipulating Existing Assets
    - Asset Modification:
        - Modify and customize existing pixel art assets to fit specific game requirements.
        - Understand techniques such as resizing, cropping, flipping, and recoloring to adapt assets for different purposes.
- Creating Animations and Utilizing the Timeline
    - Animation Skills:
        - Create sprite animations using frames and timelines within an image editor.
        - Understand keyframe animation principles, frame sequencing, and timing adjustments for smooth animation effects.
- Creating a Color Palette that Matches Hardware Requirements
    - Color Limitations and Palettes:
        - Research and understand the color limitations imposed by specific gaming hardware (e.g., NES, Game Boy).
        - Develop and refine a color palette suitable for the target hardware's color capabilities.
        - Apply dithering and color reduction techniques to optimize artwork within limited color palettes.

Assessments

- Pixel Art Layout Project

Course: 2D Game Engines II	Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a)
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.

- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.
- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.

Essential Question(s)

- What is a game mechanic?
- What is a game genre?
- What are some examples of classic mechanics?
- How do you create a game mechanic programmatically?
- How do you combine mechanics to make a specific genre of game?

Content

- Utilizing a Drag and Drop Programming Language
    - Tool Proficiency:
        - Navigate and utilize a drag and drop programming environment effectively.

        - Create basic game logic and interactions using visual programming tools.
- Understanding Algorithms
    - Conceptual Understanding:
        - Define algorithms and their significance in programming and game development.
        - Implement basic algorithms (e.g., sorting, searching) within the context of game mechanics.
- Organizing a Program's Code and Art Assets
    - Project Management:
        - Organize and manage code files and art assets systematically within a game development project structure.
        - Adhere to best practices for naming conventions, file organization, and asset management to ensure project clarity and efficiency.
- Explaining What a Genre Is in Relation to Games
    - Genre Definition:
        - Define and classify game genres based on gameplay mechanics, thematic elements, and target audience.
        - Analyze popular game genres to identify their defining characteristics and player expectations.
- Understanding Simple Game Mechanics
    - Fundamental Knowledge:
        - Identify and explain basic game mechanics such as movement, collision detection, scoring, and user interface interactions.
        - Discuss how game mechanics contribute to gameplay dynamics and player engagement.
- Recreating Game Mechanics Programmatically
    - Programming Skills:
        - Implement game mechanics programmatically using a programming language or game development framework.
        - Apply coding principles to replicate and customize basic game mechanics to achieve desired gameplay features.

Skills

- Programming
  - Scripting Languages:
    - Write scripts using scripting languages supported by the 2D game engine (e.g., C#, JavaScript, Python).
    - Implement basic game mechanics such as player movement, collision detection, and scoring using scripts.
- Organizing Assets Such as Art and Sounds
  - Asset Management:
    - Organize art assets (sprites, backgrounds, animations) and sound files within the project directory structure of the game engine.
    - Apply naming conventions and folder organization to maintain clarity and accessibility of assets.
- Project Management
  - Planning and Execution:
    - Create and maintain project plans outlining tasks, milestones, and deadlines for game development using project management tools or methodologies.
    - Allocate resources effectively, including time and assets, to meet project goals and deadlines.
- Creating Simple Games
  - Game Development Skills:
    - Develop and prototype 2D games using the game engine's editor and scripting capabilities.
    - Implement core game mechanics, level design, user interfaces, and game loops to create playable game prototypes.
- Collaborating with Peers on Projects
  - Team Collaboration:
    - Work collaboratively within a team environment to contribute to different aspects of game development (programming, art, sound, design).
    - Communicate effectively with team members, sharing progress updates, addressing challenges, and integrating contributions seamlessly.

Assessments

- Top Down Adventure Game
- Side Scrolling Action Game
- Arena Shooter Game

Course: 3D Game Assets	Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.

- 1.2.12adv.Pr5b: Fluently employ mastered creativity and adaptability in formulating inquiry and solutions to address complex challenges within and through media arts productions.
- 1.2.12adv.Pr5c: Independently utilize and adapt tools, styles and systems in standard, innovative and experimental ways in the production of complex media artworks.
- 1.2.12adv.Pr6a: Curate, design and promote the presentation and distribution of media artworks through a variety of contexts.
- 1.2.12adv.Pr6b: Evaluate the benefits and impacts at the global level from presenting media artworks, such as new understandings gained by the artist or audience.
- 1.2.12adv.Re7a: Analyze and synthesize the qualities and relationships of the components and audience impact in a variety of media artworks.
- 1.2.12adv.Re7b: Survey an exemplary range of media artworks, analyzing methods for managing audience experience, creating intention and persuasion through multimodal perception and systemic communications when addressing global issues including climate change.
- 1.2.12adv.Re8a: Analyze the intent, meanings and impacts of diverse media artworks, considering complex factors of context and bias.
- 1.2.12adv.Re9a: Independently develop rigorous evaluations of work, strategically seek feedback for media artworks and production processes and considering complex goals and factors.
- 1.2.12adv.Cn10a: Independently and proactively access relevant and qualitative resources to inform the creation of impactful media artworks.
- 1.2.12adv.Cn10b: Interpret the use of media artworks in order to demonstrate a high degree of skill to create new meaning, knowledge, and impactful cultural experiences.
- 1.2.12adv.Cn11a: Through relevant and impactful media artworks, demonstrate the relationships of media arts ideas to personal and global contexts, purposes and values.
- 1.2.12adv.Cn11b: Critically investigate and strategically interact with legal, technological, systemic, and vocational contexts of media arts.

Essential Question(s)

- What are the three axes that a 3d model takes up?
- What is a texture?

- What settings do we need to use to create a 3D asset for game development?

Content

- Modeling Basics:
  - Understand the principles of 3D modeling using primitive shapes to create complex objects.
  - Explain how scaling, rotating, and translating affect the appearance and functionality of 3D models.
- File Formats and Design Goals:
  - Explain the differences between various file formats (.obj, .fbx, .blend) and their suitability for different design goals, such as animation, texture support, and compatibility with game engines.
  - Understand the importance of choosing appropriate file formats based on factors like file size, compression, and integration capabilities.
- Texture Mapping:
  - Describe the process of texture mapping and its role in enhancing the visual quality of 3D objects.
  - Explain UV mapping techniques and their significance in correctly applying textures to 3D models.
- Lighting Techniques:
  - Discuss different lighting techniques (ambient, directional, point, spot) used to illuminate 3D objects in virtual environments.
  - Understand how lighting properties (intensity, color, shadows) impact the visual presentation and atmosphere of a scene.
- Scene Composition:
  - Analyze principles of scene composition in 3D environments, including spatial relationships, scale, and visual hierarchy.
  - Explain how object placement and scene composition contribute to creating immersive and engaging game environments.
- Animation Basics:
  - Define keyframe animation and its application in animating 3D objects and characters.
  - Understand how animation enhances gameplay by depicting movement, actions, and interactions.
- Optimization Strategies:

        - Discuss optimization techniques for 3D assets, including polygon reduction, texture optimization, and LOD (Level of Detail) management.
        - Explain the impact of asset optimization on game performance, such as frame rates and memory usage.
    - Integration with Game Engines:
        - Explain the process of importing and integrating 3D assets into game engines like Unity or Unreal Engine.
        - Discuss the configuration of materials, shaders, and physics properties within a game engine environment.
    - Industry Standards and Practices:
        - Describe industry standards for creating and managing 3D assets in game development.
        - Discuss best practices for asset organization, naming conventions, and version control to maintain project clarity and efficiency.
    - Collaboration and Teamwork:
        - Understand the importance of collaboration with peers and interdisciplinary teams in 3D asset creation and game development.
        - Explain how effective communication and teamwork contribute to successful project outcomes..

Skills

- Creating Common Items Using Primitive Shapes
    - Modeling Basics:
        - Create and manipulate 3D models using primitive shapes (cubes, spheres, cylinders) in a 3D modeling software or game engine.
        - Apply transformations such as scaling, rotating, and translating to refine and combine primitive shapes into complex objects.
- Comparing and Contrasting Different File Types for Different Design Goals
    - File Formats:
        - Compare and evaluate file formats (e.g., .obj, .fbx, .blend) based on their compatibility, compression, and features for importing into game engines.

        - Choose appropriate file formats considering factors like file size, texture support, and animation capabilities.
- Utilizing Textures on 3D Objects
    - Texture Mapping:
        - Apply textures to 3D models to enhance visual appearance and realism in game environments.
        - Understand UV mapping techniques to efficiently unwrap and apply textures onto 3D surfaces.
- Lighting 3D Objects
    - Lighting Techniques:
        - Implement lighting techniques such as ambient, directional, point, and spot lighting to illuminate 3D objects within a scene.
        - Adjust lighting properties (intensity, color, shadows) to achieve desired visual effects and mood.
- Putting Objects Together to Create a Scene
    - Scene Composition:
        - Arrange and assemble 3D objects within a virtual environment to create cohesive and visually appealing scenes.
        - Consider spatial relationships, scale, and composition principles (rule of thirds, focal points) when placing objects in a scene.
- Additional Relevant Topics:
    - Animation Basics:
        - Understand keyframe animation techniques to animate 3D objects and characters within a game environment.
        - Create and edit animations to depict movement, actions, and interactions in gameplay scenarios.
- Optimization Techniques:
        - Implement optimization strategies to enhance performance by reducing polygon count, optimizing textures, and managing LOD (Level of Detail) models.
        - Understand the impact of asset optimization on frame rates and overall game performance.
- Integration with Game Engines:

- Import 3D assets into game engines (e.g., Unity, Unreal Engine) and configure materials, shaders, and physics properties.
- Test and iterate on assets within the game engine environment to ensure compatibility and functionality

Assessments

- Chair and Tables Project
- Furnished Room Project

Course: 3D Engine Game Development — Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.

- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.
- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.
- 1.2.12adv.Pr5a: Employ mastered artistic, design, technical, and soft skills in managing and producing media artworks.
- 1.2.12adv.Pr5b: Fluently employ mastered creativity and adaptability in formulating inquiry and solutions to address complex challenges within and through media arts productions.
- 1.2.12adv.Pr5c: Independently utilize and adapt tools, styles and systems in standard, innovative and experimental ways in the production of complex media artworks.
- 1.2.12adv.Pr6a: Curate, design and promote the presentation and distribution of media artworks through a variety of contexts.
- 1.2.12adv.Pr6b: Evaluate the benefits and impacts at the global level from presenting media artworks, such as new understandings gained by the artist or audience.
- 1.2.12adv.Re7a: Analyze and synthesize the qualities and relationships of the components and audience impact in a variety of media artworks.

Essential Question(s)

- What are the fundamental differences between 2D and 3D game development?
- What mechanics translate from 2D and what are only possible with a 3D game?
- What genres are popular within the 3D specific gaming space?

Content

- Comparison of 2D and 3D Development:
  - Understand the fundamental differences between developing games in 2D and 3D, including graphical representation, gameplay mechanics, and complexity.
- Understanding Professional Game Engines:
  - Explain the architecture and components of professional-level game engines such as Unity or Unreal Engine.
  - Describe the workflow and toolset provided by game engines for developing, testing, and deploying 3D games.
- Importing Assets:
  - Demonstrate the process of importing various types of assets (models, textures, animations) into a 3D game engine.
  - Understand file formats, optimization techniques, and asset management practices within the context of game development.
- Designing 3D Game Mechanics:
  - Analyze and design gameplay mechanics that utilize 3D objects, including movement, physics interactions, collision detection, and spatial navigation.
  - Discuss strategies for integrating complex 3D mechanics into cohesive gameplay experiences.
- Advanced Drag and Drop Languages:
  - Explore and understand advanced drag-and-drop scripting languages or visual programming tools available in game engines.
  - Develop proficiency in using these tools to implement game logic, control flow, and interactions with 3D objects.

- Integration of Art and Code:
  - Understand the integration of art assets and code within a 3D game development environment.
  - Describe how art assets (models, textures) and programming components (scripts, shaders) work together to create immersive game experiences.
- Physics and Simulation in 3D Games:
  - Explain the principles of physics simulation in 3D game engines, including rigid body dynamics, collision detection, and real-time interactions.
  - Apply physics concepts to design and implement realistic behaviors for 3D game objects and environments.
- Optimization and Performance:
  - Discuss optimization techniques specific to 3D game development, such as level of detail (LOD), batching, and shader optimization.
  - Understand the importance of optimizing assets and code to achieve smooth performance in 3D games across different hardware platforms.
- User Interface (UI) and User Experience (UX):
  - Define principles of UI/UX design in the context of 3D games, including HUD elements, menus, and interactive interfaces.
  - Implement effective UI/UX solutions to enhance player engagement and usability in 3D game environments.
- Testing and Iteration:
  - Describe methodologies for testing and iterating on 3D game mechanics, assets, and overall gameplay experience.
  - Apply debugging techniques and playtesting feedback to refine and improve 3D games throughout the development cycle.
- Industry Standards and Practices:
  - Discuss industry standards, trends, and best practices in 3D game development.
  - Explore case studies of successful 3D games and analyze their development processes and strategies.

Skills

- Utilizing a 3D Game Engine:
    - Navigate and utilize a 3D game engine interface (e.g., Unity, Unreal Engine) proficiently.
    - Create and manipulate game objects, scenes, and environments using built-in tools and editors.
- Creating Simple Mechanics:
    - Design and implement basic game mechanics in a 3D environment, such as player movement, interactions, and object behaviors.
    - Utilize scripting or visual programming tools within the game engine to develop and refine gameplay mechanics.
- Importing 3D Art Assets:
    - Import and integrate 3D art assets (models, textures, animations) from external sources (e.g., Blender, Maya) into the game engine.
    - Understand file formats, optimization techniques, and asset management practices for efficient game development.
- Proper Lighting Techniques:
    - Apply lighting principles and techniques to enhance visual aesthetics and gameplay experience in a 3D environment.
    - Configure lighting settings, adjust light sources, and create atmospheres that complement the game's theme and mood.
- Character Movement Setup:
    - Implement character movement mechanics suitable for parkour-style gameplay.
    - Configure character controllers, animations, and physics interactions to simulate fluid and dynamic movements in a 3D space.
- Scripting Events and Gameplay:
    - Utilize a programming language (e.g., C#, JavaScript) or visual scripting tool to script events, interactions, and gameplay logic.
    - Write scripts to control game mechanics, AI behavior, user interfaces, and other aspects of interactive gameplay.
- Level Design and Environment Setup:

        - Design and create 3D game levels and environments that support gameplay mechanics and player engagement.
        - Incorporate terrain, props, obstacles, and interactive elements to build immersive and challenging game scenarios.
    - User Interface (UI) Implementation:
        - Design and implement UI elements and menus using the game engine's UI tools.
        - Create user-friendly interfaces that enhance navigation, feedback, and interaction within the game environment.
    - Testing and Debugging:
        - Conduct thorough testing of game mechanics, assets, and interactions to ensure functionality, balance, and playability.
        - Use debugging tools and techniques to identify and resolve errors, glitches, and performance issues in the game.
    - Project Collaboration and Management:
        - Collaborate effectively with peers on game development projects, including task delegation, communication, and version control.
        - Manage project timelines, milestones, and deliverables to ensure timely completion and quality of game development tasks.
    - Documentation and Presentation:
        - Document project progress, design decisions, and technical details using appropriate documentation tools.
        - Present and showcase developed games and prototypes to peers, instructors, or potential stakeholders, demonstrating understanding and proficiency in 3D game development.

Assessments

- Parkour Game
- First Person Shooter
- Flying Game

Course: 3D Game Engine Development II	Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a)
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.

- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.
- 1.2.12adv.Pr5a: Employ mastered artistic, design, technical, and soft skills in managing and producing media artworks.
- 1.2.12adv.Pr5b: Fluently employ mastered creativity and adaptability in formulating inquiry and solutions to address complex challenges within and through media arts productions.
- 1.2.12adv.Pr5c: Independently utilize and adapt tools, styles and systems in standard, innovative and experimental ways in the production of complex media artworks.
- 1.2.12adv.Pr6a: Curate, design and promote the presentation and distribution of media artworks through a variety of contexts.

Essential Question(s)

- What is the difference between VR, AR, and Mixed Reality?
- What settings are necessary to create a game that utilizes mixed reality?
- What is mixed reality and how does it relate to gaming?
- What art assets are necessary for a game that utilizes mixed reality?

Content

- Creating a Game for VR:

        - Understand the principles and considerations for designing and developing games specifically for Virtual Reality (VR) platforms.
        - Know the hardware and software requirements for VR development, including VR headset compatibility and optimization.
    - Understanding the Camera and Perspective:
        - Grasp how VR systems handle camera control and perspective to create immersive experiences.
        - Understand the differences in perspective and player interaction between traditional 3D games and VR environments.
    - Game Mechanics for VR:
        - Identify and implement game mechanics that are effective and suitable for VR environments.
        - Consider VR-specific interactions such as motion controls, spatial awareness, and immersive gameplay mechanics.
    - Augmented Reality (AR) Fundamentals:
        - Define augmented reality (AR) and distinguish it from virtual reality (VR).
        - Understand the technologies and devices used in AR applications, such as smartphones and AR glasses.
    - Designing an AR Feature:
        - Develop conceptual and practical skills for integrating augmented reality features into game design.
        - Plan and prototype AR elements that enhance gameplay, user interaction, or storytelling within a game context.
    - Using AR Elements in Game Development:
        - Utilize AR elements and technologies to create interactive and engaging game experiences.
        - Implement AR features such as marker-based or markerless AR interactions, object recognition, and overlaying digital content on real-world environments.
    - User Experience (UX) in VR and AR:
        - Understand the principles of UX design specific to VR and AR applications.
        - Design user interfaces, navigation systems, and interaction methods that optimize usability and immersion in VR and AR environments.
    - Hardware and Software Integration:

        - Integrate VR and AR hardware components and SDKs (Software Development Kits) into game projects.
        - Configure and optimize VR and AR settings, including performance considerations and device compatibility.
    - Testing and Iteration:
        - Conduct thorough testing and user feedback sessions for VR and AR experiences to refine gameplay mechanics and user interaction.
        - Iterate on design choices based on usability testing and performance analysis in VR and AR environments.
    - Ethical and Social Implications:
        - Discuss ethical considerations and social implications of VR and AR technologies in gaming and beyond.
        - Explore potential applications, challenges, and impacts of immersive technologies on society and culture.
    - Emerging Trends and Future Directions:
        - Stay informed about current trends and innovations in VR and AR game development.
        - Discuss future advancements in hardware, software, and design methodologies that may influence the evolution of VR and AR gaming.

Skills

- Utilize a 3D Game Engine to Create Simple Mechanics:
    - Develop and implement basic gameplay mechanics using a 3D game engine, tailored for VR and AR environments.
    - Prototype and refine interactive elements such as player movement, object interactions, and environmental triggers.
- Import 3D Art Assets from Other Sources:
    - Integrate 3D models, textures, and animations from external sources into a game project using the chosen game engine.

        - Optimize and adjust imported assets for performance and aesthetic coherence within the game environment.
    - Learn How to Properly Light an Area:
        - Apply lighting techniques in a 3D environment to enhance visual quality, mood, and gameplay atmosphere.
        - Understand the principles of dynamic and static lighting setups suitable for VR and AR experiences.
    - Set Up Character Movement for Parkour Style Games:
        - Implement advanced character movement mechanics, such as parkour-style navigation, climbing, and traversal.
        - Integrate animations and physics-based interactions to simulate realistic movement in virtual spaces.
    - Utilize a Programming Language to Script Events:
        - Write scripts or use visual scripting tools within the game engine to create interactive events and gameplay logic.
        - Debug, test, and iterate on scripted events to ensure functionality and coherence with game mechanics.
    - Create a VR Environment:
        - Design and develop a virtual reality environment using the game engine's VR capabilities.
        - Optimize VR performance and user experience, considering factors like frame rate, comfort, and immersion.
    - Set Up Basic AR Elements:
        - Integrate augmented reality elements into a game environment, leveraging AR frameworks and technologies.
        - Implement simple AR interactions, such as object recognition, overlaying digital content, and marker-based interactions.
    - Optimize Performance for VR and AR:
        - Apply optimization techniques to enhance performance and maintain frame rates suitable for VR and AR platforms.
        - Implement level-of-detail (LOD) systems, texture streaming, and other optimization strategies to maximize hardware resources.

- Test and Iterate on VR and AR Experiences:
    - Conduct thorough testing and iteration cycles to refine VR and AR gameplay mechanics and user interfaces.
    - Gather user feedback and adjust design choices based on usability testing and performance analysis.
- Integrate Sound and User Interface for Immersion:
    - Integrate audio assets and create spatial audio effects to enhance immersion in VR environments.
    - Design and implement user interfaces (UI) that are intuitive and responsive, considering VR and AR interaction paradigms.
- Document and Present VR and AR Projects:
    - Create documentation detailing the development process, design decisions, and technical implementations of VR and AR projects.
    - Present VR and AR projects effectively, articulating design concepts, gameplay mechanics, and user experiences to an audience.

Assessments

- VR Game
- AR Enhanced Environment

Course: Game Development Capstone | Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.

- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.
- 1.2.12adv.Pr5a: Employ mastered artistic, design, technical, and soft skills in managing and producing media artworks.
- 1.2.12adv.Pr5b: Fluently employ mastered creativity and adaptability in formulating inquiry and solutions to address complex challenges within and through media arts productions.
- 1.2.12adv.Pr5c: Independently utilize and adapt tools, styles and systems in standard, innovative and experimental ways in the production of complex media artworks.
- 1.2.12adv.Pr6a: Curate, design and promote the presentation and distribution of media artworks through a variety of contexts.
- 1.2.12adv.Pr6b: Evaluate the benefits and impacts at the global level from presenting media artworks, such as new understandings gained by the artist or audience.
- 1.2.12adv.Re7a: Analyze and synthesize the qualities and relationships of the components and audience impact in a variety of media artworks.
- 1.2.12adv.Re7b: Survey an exemplary range of media artworks, analyzing methods for managing audience experience, creating intention and persuasion through multimodal perception and systemic communications when addressing global issues including climate change.
- 1.2.12adv.Re8a: Analyze the intent, meanings and impacts of diverse media artworks, considering complex factors of context and bias.

- 1.2.12adv.Re9a: Independently develop rigorous evaluations of work, strategically seek feedback for media artworks and production processes and considering complex goals and factors.
- 1.2.12adv.Cn10a: Independently and proactively access relevant and qualitative resources to inform the creation of impactful media artworks.
- 1.2.12adv.Cn10b: Interpret the use of media artworks in order to demonstrate a high degree of skill to create new meaning, knowledge, and impactful cultural experiences.
- 1.2.12adv.Cn11a: Through relevant and impactful media artworks, demonstrate the relationships of media arts ideas to personal and global contexts, purposes and values.
- 1.2.12adv.Cn11b: Critically investigate and strategically interact with legal, technological, systemic, and vocational contexts of media arts.

Essential Question(s)

- What type of games are colleges and universities looking for?
- What are some examples of project management skills that a person can develop to help stay on track when creating a large video game?
- What competitions and events exist that a person can participate in to help stand out when applying for game design programs?

Content

- Project Management Techniques:
  - Understand and apply project management methodologies specific to game development, including Agile, Scrum, and Kanban.
  - Develop and execute project plans, schedules, and milestones to effectively manage game development projects.
- Asset Management Strategies:
  - Implement effective strategies for organizing, storing, and versioning game assets such as art, sound, and code.

        - Utilize asset management tools and workflows to streamline collaboration and maintain project continuity.
    - Overview of Available Popular Marketplaces:
        - Identify and evaluate popular online marketplaces for publishing and distributing games, such as Steam, Epic Games Store, and Itch.io.
        - Understand the submission processes, revenue models, and community engagement strategies for each marketplace.
    - Exploration of Game Jam Events, Competitions, and Scholarships:
        - Participate in game jam events to rapidly prototype and develop game concepts under time constraints.
        - Research and apply for game development competitions and scholarships to gain recognition and funding opportunities.
    - Presentation and Documentation:
        - Create comprehensive documentation including design documents, technical specifications, and marketing materials for the game project.
        - Prepare and deliver professional presentations showcasing the game project to stakeholders, peers, and potential collaborators.
    - Testing and Quality Assurance:
        - Implement testing strategies to identify and resolve bugs, glitches, and gameplay issues throughout the development lifecycle.
        - Conduct user testing and gather feedback to iteratively improve gameplay mechanics, user experience, and overall game quality.
    - Marketing and Promotion:
        - Develop marketing strategies and promotional materials to build awareness and interest in the game project.
        - Utilize social media, press releases, and community engagement to effectively market the game to target audiences.
    - Legal and Ethical Considerations:

        - Understand legal aspects of game development including intellectual property rights, licensing agreements, and copyright protection.
        - Adhere to ethical standards and industry guidelines in game design, content creation, and distribution.
    - Collaboration and Team Dynamics:
        - Collaborate effectively with team members, artists, programmers, and designers to achieve project goals and deadlines.
        - Manage interpersonal dynamics, resolve conflicts, and foster a collaborative and creative team environment.
    - Post-launch Support and Maintenance:
        - Plan for post-launch support including updates, patches, and community management to sustain and grow the game's player base.
        - Monitor player feedback and analytics to make data-driven decisions for ongoing game improvements and updates.

Skills

- Project Management:
    - Plan and Execute Projects: Develop comprehensive project plans including timelines, milestones, and resource allocation for game development projects.
    - Use Project Management Tools: Utilize software tools such as Jira, Trello, or Asana to manage tasks, track progress, and facilitate team communication.
    - Adapt Agile Methodologies: Implement Agile practices like Scrum or Kanban to respond to changes, prioritize tasks, and optimize development cycles.
- Game Development:
    - Game Design and Prototyping: Design and prototype original game concepts that demonstrate innovative gameplay mechanics, engaging narratives, and unique visual styles.
    - Implement Game Mechanics: Translate design concepts into functional gameplay mechanics using programming languages (e.g., C#, JavaScript) and game engines (e.g., Unity, Unreal Engine).
    - Iterative Development: Iterate on game features based on playtesting feedback to refine gameplay balance, user experience, and overall game quality.

- Asset Management:
  - Organize and Version Assets: Implement effective strategies for organizing, storing, and versioning game assets (artwork, sound, code) using version control systems like Git.
  - Integrate Third-party Assets: Source, evaluate, and integrate third-party assets (e.g., textures, models, sound effects) into the game project while adhering to licensing agreements.
- Collaboration with Peers:
  - Team Dynamics: Collaborate effectively with interdisciplinary teams including artists, programmers, designers, and sound engineers to achieve project goals and deadlines.
  - Communication Skills: Communicate project vision, progress updates, and technical requirements clearly and professionally to team members and stakeholders.
  - Resolve Conflicts: Manage interpersonal dynamics, resolve conflicts constructively, and maintain a positive and productive team environment.
- Game Deployment and Launch:
  - Prepare for Release: Prepare game projects for release by optimizing performance, debugging issues, and ensuring compatibility across platforms (PC, console, mobile).
  - Marketing and Promotion: Develop marketing strategies, promotional materials, and digital assets (trailers, screenshots) to effectively promote the game and build anticipation among target audiences.
  - Launch Strategy: Plan and execute a launch strategy including release timing, distribution channels (Steam, App Store), and community engagement to maximize visibility and player engagement.
- Post-launch Support and Maintenance:
  - Player Feedback: Monitor player feedback, reviews, and analytics post-launch to identify areas for improvement and prioritize post-launch updates and patches.
  - Community Management: Engage with the player community through forums, social media, and live events to foster a supportive and active player base.
  - Continuous Improvement: Implement ongoing updates, content expansions, and feature enhancements based on player preferences and market trends to sustain and grow the game's success.
- Legal and Ethical Considerations:

- Intellectual Property: Understand legal aspects related to game development including copyright, licensing, and intellectual property rights to protect original game content.
- Ethical Design Practices: Adhere to ethical standards in game design, content creation, and marketing to ensure inclusivity, diversity, and responsible engagement with players.

- Professional Development:
  - Portfolio Development: Compile a comprehensive portfolio showcasing game projects, design documents, technical achievements, and contributions to team projects.
  - Career Readiness: Prepare for career opportunities in the game industry by networking, attending industry events, and pursuing internships or entry-level positions aligned with career goals.

Assessments

- Finished portfolio projects

Course: The Business of eSports and Gaming | Length: Full Semester

Standards

- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).

- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
- 9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations (e.g., NJSLSA.R6, 7.1.AL.IPRET.6)
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.
- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.

Essential Question(s)

- How do streaming platforms and technologies influence the growth and popularity of eSports and gaming content?
- What strategies are effective in leveraging social media and community engagement to promote and grow a streaming channel or eSports team?
- How do analytics and data-driven insights impact decision-making in game development, eSports team management, and streaming content creation?
- What are the key challenges and opportunities in monetizing eSports events, streaming channels, and gaming content in today's market?
- How do trends in game marketplaces and distribution platforms shape game development strategies and business models within the gaming industry?

Content

- Overview of eSports Industry:
  - Understand the growth and scope of the eSports industry, including key marketplaces and platforms.
- Streaming Platforms and Tools:
  - Explore options for streaming, including open-source software (e.g., OBS Studio, Streamlabs OBS) and their features for broadcasting gameplay.
- Viewer Analytics:
  - Explain how viewer analytics work in the context of streaming, including metrics such as viewer demographics, engagement metrics, and viewer retention.
- Social Media Management:
  - Develop skills in managing social media profiles for stream promotion, including content planning, audience engagement strategies, and leveraging platforms like Twitter, Instagram, and Discord.
- Monetization Strategies:
  - Analyze various monetization strategies used in eSports and gaming, including advertising, sponsorships, subscriptions, donations, and merchandise sales.
- Legal and Regulatory Considerations:

        - Understand legal and regulatory issues relevant to eSports and streaming, such as copyright law, licensing agreements, and compliance with platform policies.
    - Brand Building and Personal Branding:
        - Explore techniques for building a personal brand as a streamer or eSports professional, including brand identity development, content consistency, and building a loyal fanbase.
    - Event Management:
        - Learn about organizing and managing eSports events, tournaments, and competitions, including logistics, sponsorship acquisition, and event promotion.
    - Business Models in eSports:
        - Study different business models prevalent in eSports, such as team organizations, eSports leagues, content creation studios, and gaming communities.
    - Industry Trends and Future Outlook:
        - Stay updated on current trends, emerging technologies, and future projections in the eSports and gaming industry to anticipate and adapt to market shifts.
    - Case Studies and Analysis:
        - Analyze successful eSports and gaming business models, case studies of top streamers, eSports organizations, and companies leading innovation in the industry.
    - Networking and Career Development:
        - Develop networking skills within the eSports industry, connect with professionals, and explore career paths in eSports management, streaming, event coordination, and related fields.

Skills

- Streaming Applications:
    - Familiarize with various streaming applications like OBS Studio, Streamlabs OBS, and their functionalities for broadcasting gameplay and content creation.
- Hardware Settings for Streaming:
    - Learn to optimize hardware settings, including video capture devices, microphones, and network configurations for smooth streaming experiences.
- Utilizing 2D Assets for Streaming:

        - Understand how to create and integrate 2D assets such as overlays, alerts, and graphics into streaming setups to enhance viewer engagement.
    - Basics of Audio Production:
        - Gain foundational knowledge in audio production techniques relevant to streaming, including microphone setup, noise reduction, and audio mixing.
    - Exploration of Jobs in the eSports Industry:
        - Explore career opportunities within the eSports industry, such as streamers, eSports event organizers, content creators, community managers, and marketing specialists.
    - Game Marketplaces:
        - Study major game marketplaces and platforms where games are distributed and sold, understanding their impact on game development and distribution strategies.
    - Game Analytics:
        - Analyze game analytics tools and metrics used to measure player engagement, retention, monetization, and game performance.

Assessments

- Recorded Stream Project

Course: Interactive Media Design | Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.DC.4: Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users (e.g., 8.1.12.NI.3).
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.
- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.
- 1.2.12acc.Pr5b: Demonstrate effective creativity and adaptability, such as resisting closure and responsive use of failure, to address sophisticated challenges within and through media arts productions.
- 1.2.12acc.Pr5c: Demonstrate the skillful adaptation and combination of tools, styles and techniques to achieve specific expressive goals in the production of a variety of media artworks.
- 1.2.12adv.Pr5a: Employ mastered artistic, design, technical, and soft skills in managing and producing media artworks.
- 1.2.12adv.Pr5b: Fluently employ mastered creativity and adaptability in formulating inquiry and solutions to address complex challenges within and through media arts productions.
- 1.2.12adv.Pr5c: Independently utilize and adapt tools, styles and systems in standard, innovative and experimental ways in the production of complex media artworks.

- 1.2.12adv.Pr6a: Curate, design and promote the presentation and distribution of media artworks through a variety of contexts.
- 1.2.12adv.Pr6b: Evaluate the benefits and impacts at the global level from presenting media artworks, such as new understandings gained by the artist or audience.
- 1.2.12adv.Re7a: Analyze and synthesize the qualities and relationships of the components and audience impact in a variety of media artworks.
- 1.2.12adv.Re7b: Survey an exemplary range of media artworks, analyzing methods for managing audience experience, creating intention and persuasion through multimodal perception and systemic communications when addressing global issues including climate change.
- 1.2.12adv.Re8a: Analyze the intent, meanings and impacts of diverse media artworks, considering complex factors of context and bias.
- 1.2.12adv.Re9a: Independently develop rigorous evaluations of work, strategically seek feedback for media artworks and production processes and considering complex goals and factors.

Essential Question(s)

- How does web programming work?
- What languages are involved in programming for the web?
- What function does each web language serve?
- How are these languages used in unison to create a standard web experience?
- What tools are needed to program for the web?
- What settings are needed for 2D assets created for use online?
- How does one store data for a user?
- What concerns come up when storing user data?
- What type of game mechanics are possible using web programming languages?
- What game engines exist that utilize web programming languages?

Content

- Programming Fundamentals:
  - Proficiency in HTML, CSS, and JavaScript, including modern frameworks and libraries.
  - Ability to create interactive and responsive web interfaces using these technologies.
- Creating Interactive Fiction:
  - Techniques for designing and developing interactive narratives and storytelling experiences.
  - Understanding of branching narratives, player choices, and narrative design principles.
- Data Management:
  - Methods for storing and retrieving data locally on web browsers or applications.
  - Utilization of databases or local storage mechanisms for managing user data and preferences.
- Programming Environments:
  - Familiarity with integrated development environments (IDEs) or code editors used in web development.
  - Understanding how to set up and configure development environments for efficient coding.
- Asset Management:
  - Strategies for organizing and managing digital assets (images, videos, audio files) used in interactive media projects.
  - Knowledge of file formats, optimization techniques, and version control systems for collaborative projects.
- User Interface (UI) and User Experience (UX) Design:
  - Principles of UI/UX design as applied to interactive media, emphasizing usability and accessibility.
  - Prototyping and testing interactive designs to enhance user engagement and experience.
- Responsive Design and Accessibility:
  - Techniques for creating responsive layouts that adapt to various screen sizes and devices.
  - Understanding accessibility standards and best practices for ensuring inclusivity in interactive media.
- Project Management:
  - Skills in planning, organizing, and executing interactive media projects, including timelines, milestones, and task delegation.
  - Collaboration with team members and stakeholders to achieve project goals effectively.
- Ethical and Legal Considerations:

- Awareness of ethical issues related to interactive media design, such as user privacy, data security, and content integrity.
- Understanding of copyright, intellectual property rights, and legal obligations in creating and distributing interactive content.

- Emerging Trends and Technologies:
  - Knowledge of current trends and innovations in interactive media, including augmented reality (AR), virtual reality (VR), and immersive experiences.
  - Exploration of new technologies and their potential impact on interactive media design and development.

Skills

- HTML Skills:
  - Create well-structured web pages using HTML5.
  - Use semantic HTML elements for improved accessibility and SEO.
  - Embed multimedia elements (images, videos, audio) and forms in HTML documents.
  - Implement HTML5 APIs for interactive web functionalities.
- CSS Skills:
  - Apply CSS for styling and layout of web pages.
  - Utilize CSS preprocessors (e.g., Sass, Less) for efficient styling workflows.
  - Implement responsive design techniques using CSS media queries.
  - Use CSS frameworks (e.g., Bootstrap, Foundation) to streamline design and development.
- JavaScript Skills:
  - Write JavaScript code to create interactive and dynamic web content.
  - Manipulate the DOM (Document Object Model) using JavaScript for interactivity.
  - Implement event handling and callbacks to respond to user actions.
  - Use JavaScript libraries and frameworks (e.g., jQuery, React) to enhance functionality.
- Notepad++ Skills:
  - Effectively use Notepad++ as a code editor for HTML, CSS, and JavaScript.
  - Customize and extend Notepad++ functionalities using plugins.

        - Employ syntax highlighting, code folding, and auto-completion features.
        - Manage multiple files and projects within Notepad++ for efficient coding workflows.
    - Version Control:
        - Utilize version control systems (e.g., Git) for managing and tracking changes in code.
        - Understand basic Git commands for committing, branching, merging, and pushing code changes.
        - Collaborate with team members using Git repositories (e.g., GitHub, Bitbucket).
    - Debugging and Optimization:
        - Debug HTML, CSS, and JavaScript code to identify and fix errors.
        - Optimize web pages for performance, including load times and rendering efficiency.
        - Use browser developer tools to inspect and debug web applications.
    - Responsive Design:
        - Design and implement responsive web layouts that adapt to different screen sizes and devices.
        - Test and debug responsive designs across various browsers and devices.
        - Implement mobile-first and progressive enhancement strategies for responsive web development.
    - Accessibility Principles:
        - Apply accessibility standards (e.g., WCAG) to ensure web content is accessible to users with disabilities.
        - Implement accessible design practices for navigation, forms, and multimedia content.
        - Use assistive technologies and browser tools to test and verify accessibility features.
    - User Interface (UI) Design:
        - Design intuitive and user-friendly interfaces for web applications.
        - Create wireframes and prototypes to visualize and iterate on UI designs.
        - Incorporate UI design principles (e.g., hierarchy, consistency, feedback) into web projects.
    - Project Management:
        - Plan and organize interactive media projects, including defining goals, timelines, and milestones.
        - Manage project resources, tasks, and deadlines effectively.
        - Communicate and collaborate with team members, clients, and stakeholders throughout project lifecycles.
    - Ethical and Legal Awareness:
        - Understand ethical considerations in interactive media design, such as user privacy and data security.

        - Comply with legal requirements and regulations related to intellectual property rights and content distribution.
        - Apply ethical principles in decision-making and content creation for digital environments.
    - Continuous Learning and Adaptability:
        - Stay updated with industry trends and emerging technologies in interactive media design.
        - Adapt to evolving tools, techniques, and platforms in web development and design.
        - Pursue ongoing learning through self-study, courses, and professional development opportunities.

Assessments

- Basic Website Project
- Advanced Website Project
- Interactive Fiction Project

Course: Python Programming — Length: Semester

Standards

- 9.3.12.AR-VIS.3 Analyze and create two and three-dimensional visual art forms using various media.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.

- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.3.IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors
- 1.2.12acc.Cr1a: Strategically use generative methods to create multiple ideas and refine artistic goals that increase aesthetic depth.
- 1.2.12acc.Cr1b: Organize and design artistic ideas for media arts productions.
- 1.2.12acc.Cr1c: Critique plans, prototypes, constraint of resources, and production processes considering purposeful and expressive artistic intention and personal aesthetic.
- 1.2.12acc.Cr1d: Apply aesthetic criteria in developing and refining media arts artwork. Advanced
- 1.2.12adv.Cr1a: Fluently integrate generative methods, aesthetic principles and innovative thinking to form original ideas and solutions.
- 1.2.12adv.Cr1b: Fluently integrate a sophisticated personal aesthetic for media arts productions.
- 1.2.12adv.Cr1c: Knowledge of systems, prototypes and production processes with consideration of complex constraints of goals, time, resources, and personal limitations.
- 1.2.12adv.Cr3a: Synthesize ideas with content, processes and components to express compelling purpose, demonstrating mastery of media arts principles such as hybridization.
- 1.2.12adv.Cr3b: Intentionally and consistently refine and elaborate elements and components to form impactful expressions in media artworks, directed at specific purposes, audiences and contexts.
- 1.2.12acc.Pr4a: Integrate various arts, media arts forms and academic content into unified media arts productions that retain thematic integrity and stylistic continuity, such as transmedia productions.
- 1.2.12adv.Pr4a: Synthesize various arts, media arts forms and academic content into unified media arts.
- 1.2.12acc.Pr5a: Demonstrate effective command of artistic, design, technical and soft skills in managing and producing media artworks.

Essential Question(s)

- What is Python?
- What is the difference between an interpreted language and a compiled language?
- What is a library in relation to programming?

- What does the PyGame library add to Python in order to make it easier for game programmers?

Content

- Introduction to Python:
  - Overview of Python programming language.
  - History and significance of Python in the programming landscape.
  - Installing Python and setting up the development environment (IDEs like PyCharm, VS Code, or Jupyter Notebooks).
- Basic Programming Concepts:
  - Variables, data types, and type conversion in Python.
  - Operators and expressions (arithmetic, relational, logical).
  - Control flow statements: if-elif-else, loops (for and while), and exceptions.
- Functions and Modules:
  - Defining functions, parameters, and return values.
  - Organizing code into modules and packages.
  - Importing and using standard and third-party libraries/modules.
- Data Structures:
  - Lists, tuples, dictionaries, sets, and their methods.
  - Working with sequences and collections in Python.
  - Understanding mutability and immutability of data structures.
- Object-Oriented Programming (OOP):
  - Classes, objects, attributes, and methods.
  - Encapsulation, inheritance, and polymorphism in Python.
  - Implementing OOP concepts in practical programming tasks.
- File Handling:
  - Reading from and writing to files (text and binary files).
  - Managing file objects, file modes, and file operations in Python.
- Exception Handling:
  - Handling exceptions with try-except blocks.

        - Using else and finally clauses with exceptions.
        - Raising custom exceptions and error handling strategies.
    - Python Standard Library:
        - Overview of commonly used modules in the Python standard library.
        - Utilizing modules for string manipulation, regular expressions, datetime operations, etc.
    - Advanced Python Concepts:
        - Functional programming features: lambda functions, map, filter, reduce.
        - Generators and iterators in Python.
        - Decorators and context managers for managing resources.
    - Web Development with Python:
        - Introduction to web frameworks (e.g., Flask, Django).
        - Creating web applications using Python and frameworks.
        - Handling HTTP requests, routing, and rendering templates.
    - Data Analysis and Visualization:
        - Introduction to data manipulation with pandas.
        - Data visualization with matplotlib and seaborn libraries.
        - Performing statistical analysis and generating plots/graphs.
    - Game Development and Graphics:
        - Overview of game development frameworks (e.g., Pygame).
        - Creating simple games with Python.
        - Introduction to 2D and 3D graphics programming with Python libraries.
    - Interactive Fiction and Procedural Generation:
        - Creating text-based interactive fiction games using Python.
        - Implementing procedural generation algorithms for game content.
        - Generating random maps, levels, or narratives programmatically.
    - Python for Automation and Scripting:
        - Writing scripts for automating repetitive tasks (file operations, data processing, etc.).
        - Interacting with the operating system (OS) using subprocess and os modules.
        - Building command-line interfaces (CLI) with argparse or click libraries.

- Software Development Best Practices:
  - Code organization, documentation, and commenting.
  - Testing and debugging techniques in Python.
  - Version control with Git and collaboration using GitHub or GitLab.
- Managing Assets and Resources:
  - Handling assets such as images, sounds, and other media in Python applications.
  - Integrating asset management into game development and interactive applications.
  - Optimizing asset loading and resource management for performance.
- Python for Data Science and Machine Learning:
  - Introduction to data analysis and machine learning libraries (e.g., NumPy, scikit-learn).
  - Implementing basic machine learning algorithms in Python.
  - Working with datasets, preprocessing data, and evaluating model performance.
- Ethical and Legal Considerations:
  - Understanding ethical implications of data usage and AI applications.
  - Compliance with data protection laws and regulations (e.g., GDPR, HIPAA).
  - Ethical responsibilities in software development and data handling.

Skills

- Python Programming:
  - Apply Python coding principles to solve computational problems.
  - Implement algorithms and data structures in Python.
- Organizing and Refactoring Code:
  - Create structured code using functions, classes, and modules.
  - Refactor code to improve readability, efficiency, and maintainability.
- Utilizing a Development Environment:
  - Set up and configure integrated development environments (IDEs) such as PyCharm, VS Code, or Jupyter Notebooks.
  - Use debugging tools and integrated terminals within the IDE.
- Importing Assets and Files:

    - Read from and write to files in various formats (text files, CSV, JSON, etc.).
    - Import external libraries and modules into Python projects.
- Utilizing Programming Libraries to Extend Functionality:
    - Explore and integrate third-party libraries and frameworks (e.g., NumPy, Pandas, Flask) to enhance Python applications.
    - Utilize libraries for specific functionalities such as data analysis, web development, or game programming.
- Version Control and Collaboration:
    - Apply version control systems (e.g., Git) to manage code repositories and track changes.
    - Collaborate on code projects using platforms like GitHub or GitLab.
- Testing and Debugging:
    - Write and execute unit tests to validate code functionality.
    - Debug Python code to identify and resolve errors and exceptions.
- Documentation and Code Comments:
    - Write clear and concise documentation for code functionality and usage.
    - Add inline comments and docstrings to explain code logic and enhance readability.
- Scripting and Automation:
    - Develop scripts to automate repetitive tasks or system administration tasks.
    - Create command-line interfaces (CLI) for Python scripts using argparse or click libraries.
- Web Development with Python:
    - Build web applications using Python frameworks like Django or Flask.
    - Implement server-side logic, handle HTTP requests, and render dynamic web content.
- Data Handling and Analysis:
    - Manipulate and analyze data using Python libraries such as Pandas and NumPy.
    - Visualize data with libraries like Matplotlib and Seaborn.
- Game Development and Graphics Programming:
    - Create games using Python and frameworks like Pygame or Unity with Python scripting.
    - Implement graphics and animation in 2D or 3D environments using libraries like PyOpenGL.
- Security and Error Handling:

        - Implement security measures in Python applications to prevent vulnerabilities.
        - Handle errors gracefully and ensure robust error handling practices.
    - Ethical and Legal Considerations:
        - Understand ethical implications of software development and data usage.
        - Comply with legal requirements and regulations related to data privacy and intellectual property rights.
    - Problem Solving and Algorithm Design:
        - Apply problem-solving strategies and algorithms to solve real-world problems.
        - Analyze algorithm efficiency and optimize code performance.

Assessments

- Text Adventure
- Random Character Generator
- Alien Invasion Game

Resources

➔ Course Resources
- Scratch.mit.edu
- Unreal Engine
- EpicGames
- Roblox

- Godot
- W3Schools.com
- FreeCodeCamp.org
- Steam
- Photoshop
- GIMP
- Blender
- Photopea
- Oculus
- HSEL
- EGF
- PlayVs
- Twitch.tv
- YouTube
- Open Broadcasting Software
- Python
- CPUBenchmark.net
- NewEgg.com