

Simulation and Game Design Technology Mississippi Curriculum Framework

Program CIP: 50.0411–Simulation and Animation Design
Program CIP 11.0804 Modeling, Virtual Environments and Simulation (Simulation and Game Design Technology)

September 2019



Published by:

Mississippi Community College Board
Division of Workforce, Career, and Technical Education
3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

FACULTY WRITING TEAM MEMBERS

Kathy Boyte, Hinds Community College – Rankin Campus
Kenneth Boyte, Hinds Community College – Rankin Campus
Monica Washington, Hinds Community College-Rankin Campus

ADMINISTRATOR WRITING TEAM MEMBERS

Sherry Franklin, Dean, Vice President Utica Campus and Administrative Services, District Dean of Career and Technical Education
Dr. Robin Parker, Dean, Career/Technical Education, District Dean of Community and Economic Development, Hinds Community College-Pearl
John Shows, Associate Vice President, Mississippi Gulf Coast Community College

BUSINESS AND INDUSTRY WRITING TEAM MEMBERS

Jeffrey Herzog, Software Engineer, Mississippi Lottery Commission
Josiah Jordan, CTO, Lobaki
Amber Coeur, COO, Lobaki

OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Dr. Scott Kolle, Ph.D., Director, Curriculum, Instruction and Assessment
LaToya Sterling, Ph.D, Curriculum Specialist, Office of Curriculum and Instruction, Mississippi Community College Board
Sheriece Robinson, Ed.D., Curriculum Specialist, Office of Curriculum and Instruction, Mississippi Community College Board

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Copyright© 2019 by Mississippi Community College Board
For information, please contact curriculum@mccb.edu.

CONTENTS

RESEARCH ABSTRACT.....	5
INDUSTRY JOB PROJECTION DATA	6
ARTICULATION	8
TECHNICAL SKILLS ASSESSMENT.....	8
PROGRAM DESCRIPTIONS	9
SUGGESTED COURSE SEQUENCE.....	10
Accelerated Pathway Credential for 50.0411 and 11.0804	10
Career Certificate for 50.0411 and 11.0804	10
Technical Certificate for 50.0411	11
Career Ready Or Technical Certificate For 50.0411 in Extended Reality (XR) Production	11
Technical Certificate for 11.0804	12
Electives for 50.0411 and 11.0804	13
Academic Courses	14
COURSES.....	15
IMT 1114 Introduction to Animation and Simulation Design.....	15
IMT 1123 Vector Illustration	16
IMT 1213 Game Theory and Mechanics	17
IMT 1313 Video Game Programming I.....	18
IMT 1414 Graphic Editing for Games	19
IMT 1513 Introduction to 3D Modeling	20
IMT 1523 Intermediate 3D Modeling.....	21
IMT 1614 Advanced 3-D Modeling	22
IMT 2113 3D Game Engine I	23
IMT 2143 Business and Marketing for Game Design	24
IMT 2153 2D Character Animation Design	25
IMT 2223 Game Engine II	26
IMT 2413 Animation & Simulation Design Capstone	27
IMT 2513 Game Evaluation.....	28
IMT 2613 Audio Design and Production for Animation and Simulation.....	29
IMT 2723 Introduction to Extended Reality (XR) Environment Production	30
IMT 2733 Integrated 3D Production Pipeline.....	32
IMT 2743 Integrated Extended Reality (XR) Experience.....	33
IMT 2763 Introduction to Extended Reality (XR) Content Production	34

IMT 2753	Lighting and Shading	35
IMT 2772	Simulation and game Project	36
IMT 2783	Audio for Simulation and Games	37
Appendix A	Recommended Tools and Equipment	38
Appendix B	Curriculum Definitions and Terms	39
Appendix C:	Recommended Textbook List	41
Appendix D:	Course Crosswalk	42

RESEARCH ABSTRACT

This curriculum was revised in 2019 with the inclusion of Hinds Community College and Pearl River Community College. MS Gulf Coast Community College reviewed and add courses to meet the needs in their community college district too. As of the fall semester of 2014, Hinds Community College is the only college offering the Entertainment Media Technology programs. During the fall of 2019, the Office of Curriculum and Instruction (OCI) met with several business and industry members in Central Mississippi, Northern Mississippi and Southern Mississippi. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Industry members stated the curriculum needed several changes to accommodate the Simulation and Game Design Technology curriculum.

During the curriculum revision IMT 2213 Marketing for Game Design and IMT 2143 Business of Game Development were merged to form once course IMT 2143 Business and Marketing for Gaming.

INDUSTRY JOB PROJECTION DATA

The Simulation and Animation Design (CIP: 50.0411) requires Bachelor's Degree. There is expected to be no change at the state level. Median annual income for this occupation is \$65,312.00 at the state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Multimedia Artist and Animators	Bachelor's Degree

Table 2: Occupational Overview

	Region	State	United States
2016 Occupational Jobs	85	85	35,317
2026 Occupational Jobs	85	85	36,011
Total Change	0	0	694
Total % Change	0.00%	0.00%	1.97%
2016 Median Hourly Earnings	\$31.40	\$31.40	\$31.40
2026 Median Annual Earnings	\$65,312.00	\$65,312.00	\$65,312.00
Annual Openings	0	0	69

Table 3: Occupational Breakdown

Description	2016 Jobs	2026 Jobs	Annual Openings	2016 Hourly Earnings	2016 Annual Earnings 2,080 Work Hours
Multimedia Artist and Animators	85	85	0	\$31.40	\$65,312.00

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
Multimedia Artist and Animators	0	0.00%	0.00%	1.97%

For Simulation and Game Design (CIP: 11.0804), the software developers (applications and software) occupations are projected to grow at 26.46% statewide. Median annual income for this occupation is \$80, 629.12 at a state level. A summary of occupational data from the State Workforce Investment Board Data Center is displayed below:

Table 1: Education Level

Program Occupations	Education Level
Coding/software developers, applications and software	*High school or higher with specialized training related to the subject matter **Bachelor's degree

*Current trend in Mississippi is less than a Bachelor's degree for some entry level jobs within the state and nationally. Jobs outside of the state may allow for the employee to work remotely from the State of Mississippi.

** Job data for Tables 1, 2, and 3 are based on Bachelor's degree at a National level.

Table 2: Occupational Overview**

	Region	State	United States
2014 Occupational Jobs	4,581	4,581	1,233,163
2024 Occupational Jobs	5,793	5,793	1,870,980
Total Change	1,212	1,212	637,817
Total % Change	26.46%	26.46%	51.72%
2014 Median Hourly Earnings	\$38.76	\$38.76	\$49.75
2014 Median Annual Earnings	***\$66,580.80 ****\$80,629.12	***\$66,580.80 ****\$80,629.12	***\$79,851.20 ****\$103,480.00
Annual Openings	121	121	63782

** Job data for Tables 1, 2, and 3 are based on Bachelor's degree at a National level.

*** Coding and Software Coding

***Software developers (applications and software)

Table 3: Occupational Breakdown**

Description	2014 Jobs	2024 Jobs	Annual Openings	2016 Hourly Earnings	2016 Annual Earnings 2,080 Work Hours
Software Developers, Applications	3,045	4,155	111	\$40.57	\$84,385.60
Software Developers, Systems Software	1,536	1,638	10	\$36.70	\$76,336.00
Total	4,581	5,793	121	\$38.76	\$80,620.80

** Job data for Tables 1, 2, and 3 are based on Bachelor's degree at a National level.

Table 4: Occupational Change**

Description	Regional Change	Regional % Change	State % Change	National % Change
Software Developers, Applications	1,110	36.45%	36.45%	69.90%
Software Developers, Systems Software	102	6.64%	6.64%	15.86%

** Job data for Tables 1, 2, and 3 are based on Bachelor's degree at a National level.

ARTICULATION

Articulation credit from Secondary Career Pathway programs to Postsecondary Simulation and Design Technology is available. Secondary students who have completed the articulated Secondary Career Pathway Courses listed below may be awarded articulated college credit according to Mississippi Community College Board (MCCB) guidelines (<http://www.mccb.edu/pdfs/ct/StatewideArtManual201213.pdf>).

Articulated Secondary Course	Articulated Postsecondary Course
Simulation and Animation Design (CIP:50.0411)	IMT 1114 History of Gaming
	IMT 1414 Photography for Games
	IMT 1513 Introduction to 3D Modeling
	ETT 1223 Illustration and Artistic Rendering
Simulation and Game Design Technology (CIP:11.0804)	None at this time.

TECHNICAL SKILLS ASSESSMENT

For Simulation and Animation Design
(CIP:50.0411)

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment:

MS-CPAS2:
Simulation & Animation Design Technology

For Simulation and Game Design Technology
(CIP:11.0804)

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment:

Programming for Python
Unity Certified Associate

PROGRAM DESCRIPTIONS

Simulation and Animation Design Technology (CIP:50.0411)

The Simulation and Animation Design Technology program provides individuals with knowledge and skills necessary to create content for video games, simulated environments, Extended Reality (XR), training simulators, advertising media, web content, CGI (Computer Generated Imagery), and architectural visualization. Skills are developed through a combination of theory and hands-on training aligned with professional business outcomes. The program includes in-depth analysis and training in three-dimensional (3D) modeling, rendering, and animation skills for both entertainment and industrial applications. The skills developed through the program offers students a wide application across multiple industries such as healthcare, education, engineering, architecture, gaming, and filmmaking. The Simulation and Animation Design Technology program offers a Career Certificate, Technical Certificate and Associate of Applied Science Degree. Also, a Work Ready and Technical Certificate in Extended Reality (XR) Production.

Simulation and Game Design Technology (CIP:11.0804)

Simulation and Game Design Technology provides students with knowledge and ability to perform programming, graphics development, storylines, and business requirements for developing fully functional games and simulation software applications for PC, Apple, and mobile devices. Simulation and Game Design Technology prepares students to enter employment in computer programming, game development, software engineering, mobile development and graphic design industries. The Simulation and Game Design Technology program offers an Accelerated Pathway Credential, Career Certificate, Technical Certificate and Associate of Applied Science Degree.

SUGGESTED COURSE SEQUENCE

Accelerated Pathway Credential for 50.0411 and 11.0804

			SCH Breakdown				Contact Hour Breakdown		
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship
IMT 1414	Graphic Editing for Games	4	3	2		75			
IMT 1123	Vector Illustration	3	2	2		60			
	Instructor Approved Electives	8							
	Total	15							

Career Certificate for 50.0411 and 11.0804

			SCH Breakdown				Contact Hour Breakdown		
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship
IMT 1114	Introduction to Animation and Simulation	4	3	2		75			
IMT 1213	Game Theory & Mechanics	3	3	0		45			
IMT 1313	Video Game Programming I Or IST Elective for 11.0804	3	3	0		45			
IMT 1414	Graphic Editing for Games Or IST Elective for 11.0804	4	3	2		75			
IMT 1513	Introduction to 3-D Modeling	3	2	2		60			
IMT 1523	Intermediate 3-D Modeling	3	2	2		60			
IMT 2113	3-D Game Engine I	3	2	2		60			
	Instructor Approved Electives	7							
	Total	30							

Technical Certificate for 50.0411

			SCH Breakdown				Contact Hour Breakdown		
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship
IMT 2143	Business and Marketing for Game Design	3	3	0		45			
IMT 2413	Animation and Simulation Design Capstone	3	1	4		75			
IMT 2733	Integrated 3D Production Pipeline	3	2	2		60			
	Instructor Approved Electives	6							
	Total	15							

Career Ready Or Technical Certificate For 50.0411 in Extended Reality (XR) Production

			SCH Breakdown				Contact Hour Breakdown		
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship
IMT 2763	Introduction to Extended Reality (XR) Content Production	3	2	2		60			
IMT 2723	Introduction to Extended Reality (XR) Environment Production	3	2	2		60			
IMT 2743	Integrated Extended Reality (XR) Experience	3	1	4		75			
	Instructor Approved Electives	6							
	Total	15							

Technical Certificate for 11.0804

			SCH Breakdown				Contact Hour Breakdown		
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Clinical/ Internship	Total Contact Hours	Lecture	Lab	Clinical/ Internship
IMT 2763	Introduction to Extended Reality (XR) Content Production	3	3	0		45	3	3	
IMT 2413	Animation and Simulation Design Capstone	3	1	4		75	1	6	
IST	Instructor Approved Electives	9							
	Total	15	2	2		1	3	6	

Electives for 50.0411 and 11.0804

Course Number	Course Name	Semester Credit Hours
IMT 1614	Advanced 3D Modeling	4
IMT 2613	Audio Design & Production for Simulation and Animation	3
IMT 2513	Game Evaluation	3
IMT 2153	2D Character Animation Design	3
IMT 2733	Integrated 3D Production Pipeline	3
IMT 2113	3D Game Engine II	3
IMT 2783	Audio for Simulation and Games	3
IMT 2753	Lighting and Shading	3
IMT 2772	Simulation and Game Project	3
	Other approved elective courses per local community college	

General Education Core Courses

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACSCOC).

Section 9 Standard 3

3. The institution requires the successful completion of a general education component at the undergraduate level that
 - a) is based on a coherent rationale.
 - b) is a substantial component of each undergraduate degree program. For degree completion in association programs, the component constitutes a minimum of 15 semester hours of the equivalent for baccalaureate programs, a minimum of 30 semester hours or the equivalent.
 - c) Ensures breadth of knowledge. The credit hours include at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. These courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

Academic Courses

			SCH Breakdown			Contact Hour Breakdown		Certification Information
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Credit Hours	Lecture	Lab	Certification Name
	Humanities/Fine Arts	3						
	Natural Science/Mathematics	3						
	Social/Behavioral Sciences	3						
	Other academic courses per local community college requirements for AAS degree.	6						
TOTAL		15						

Southern Association of Colleges and Schools Commission on Colleges. (2017). The Principles of Accreditation: Foundations for Quality Enhancement. Retrieved from <http://www.sacscoc.org/2017ProposedPrinc/Proposed%20Principles%20Adopted%20by%20BOT.pdf>

COURSES

Course Number and Name:

IMT 1114 Introduction to Animation and Simulation Design

Description:

This course identifies the foundation skills necessary in the game design industry. Content such as safety, ethical issues, video game history, career opportunities, and the social impact of gaming will be covered within the scope of the course. Students will get an overview of the principles of animation and demonstrate usage of animation software through completion of an animation portfolio of original content.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite:

Instructor Approved

Student Learning Outcomes:

1. Demonstrate knowledge of the history of the video game industry.
 - a. Demonstrate knowledge of the evolution of the industry.
 - b. Demonstrate knowledge of gaming platforms.
 - c. Demonstrate knowledge of different games genres.
2. Demonstrate knowledge of ethics in the game design industry.
 - a. Demonstrate knowledge of copyright and how it applies to game design.
 - b. Demonstrate knowledge of the industry code of ethics.
 - c. Demonstrate knowledge of safety in the workplace.
3. Demonstrate knowledge of how games impact society.
 - a. Demonstrate knowledge of player motivations.
 - b. Demonstrate knowledge of the effects of games on society.
 - c. Demonstrate the use of psychology in player experiences.
4. Demonstrate knowledge of career opportunities within the video game industry.
 - a. Identify careers and roles within the video game industry.
5. Demonstrate knowledge of twelve principles of animation.
 - a. Describe and identify the twelve principles of animation.
 - b. Produce digital animations using twelve principles of animation.
 - c. Produce an animation portfolio of original content proving proficiency of animation skills.

Course Number and Name: IMT 1123 Vector Illustration

Description: In this course, students will understand and apply the elements of visual design and demonstrate the use of illustration software.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate a working knowledge of illustration and artistic rendering.
 - a. Apply the elements of visual design.
 - b. Apply the basic principles and methods of drawing used in digital and graphic design.
 - c. Apply the basic principles, techniques, and media used in digital and traditional illustration styles.
 - d. Use illustration software for illustration and artistic rendering.
 - e. Demonstrate vector drawing and painting tools and apply their use appropriately.
 - f. Apply the design/creative process to a “real world” project.
 - g. Create original illustrations with comprehensive layer control, gradients, blends, and illustration tools.
 - h. Understand file formats and export pipelines.

Course Number and Name: IMT 1213 Game Theory and Mechanics

Description: Students will learn the theory related to game design and development, the applications associated with game design and the elements and trends in game design. Students will understand the “rules of play” and apply design principles and techniques in the creation of user interfaces and 2D game assets.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Analyze software and hardware used in game design.
 - a. Examine digital animation tools, capabilities, and interface elements.
 - b. Examine graphic editing software for gaming content creation.
 - c. Evaluate 2D game engines to determine suitability.
2. Demonstrate knowledge of design principles and techniques.
 - a. Discuss current trends and genres in game design.
 - b. Explain the core concepts of “rules of play” and apply design techniques.
 - c. Apply design principles and techniques in the creation of user interfaces.
3. Demonstrate game design concepts by creating 2D games.
 - a. Working individually, apply game design mechanics to produce a simple prototype using a 2D game engine.
 - b. Implement a sprite sheet animation within a 2D game engine.
 - c. Working in teams, design and implement a functional 2D game.
 - d. Compile a game project for multiple target platforms (mobile, desktop, web, XR, etc.).

Course Number and Name: IMT 1313 Video Game Programming I

Description: In this course, students will develop a basic understanding of a programming language and how it relates to the game development process.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Analyze the structure of a programming language.
 - a. Define common programming language terminology.
 - b. Explain the programming development cycle to include input/output, processing and storage.
 - c. Demonstrate compiling, executing, and debugging programs.
 - d. Construct an algorithm for compute programming technology.
 - e. Demonstrate screen output using a programming language.
 - f. Classify variable and constraints.
 - g. Create programs that perform calculations using arithmetic operations to include addition, subtraction, multiplication, division, and exponentiation.
 - h. Create programs that include decision, selection, and iteration statements to include IF/THEN statements, Case statements, Do loops, and For/Next loops.
 - i. Create programs that use array/table structures.
 - j. Create, run, and debug an original program to input data, process data, and print a report.
 - k. Create a small game implementing programming objectives.
 - l. Demonstrate string manipulation.
 - m. Incorporate Boolean logic and logical operators.
 - n. Demonstrate creation and use of functions as sub-routines.

Course Number and Name: **IMT 1414** Graphic Editing for Games

Description: This course will explore image composition and elements of visual design games, including the use of photo editing software for manipulation and enhancement of images for use in visual design software.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate knowledge of image composition and elements of visual design.
 - a. Apply art elements and principles, such as composition, color, value, and symmetry to photographic works of art in both traditional and digital photographic media.
 - b. Use photo editing software to manipulate and enhance images for use in visual design software and meet hardware specifications.
 - c. Explore and learn about design principles to arrange graphic elements, white space, and balancing objects while considering copyright laws and ethical implications.
 - d. Create and use layer options in media to convert, add, delete, group, and organize layers.
 - e. Work with color to transform, blend, filter, apply gradients, apply grayscales, and match colors for an image.
 - f. Create text on a path.
 - g. Modify type with Bevel, Emboss, and Extrude to 3D.
 - h. Paint and patch an image to create airbrush effects.
 - i. Use layer masks with a selection. Work with multiple layers at one time.
 - j. Create and utilize clipping mask.
 - k. Use perspective warp, distort, noise filters, lighting, and vanishing point special features to add perspectives to an image.
 - l. Utilize the video image and animation features of photo editing software to fix common photography problems.
 - m. Prepare textures for use with 3D objects using photographs and graphic editing software.
2. Design and create 3D textures for UV-mapped game objects using visual design software.
 - a. Apply surface properties and colors to an object to simulate various materials.
 - b. Create raster image files to wrap around various 3D objects.
 - c. Use preset brushes.
 - d. Create custom brushes.
 - e. Paint 2D and 3D.
 - f. Edit paint effects.
 - g. Utilize layers to organize textures and maps.

Course Number and Name: IMT 1513 Introduction to 3D Modeling

Description: In this course, students will learn to utilize 3D modeling software to create polygon-based models suitable for use in game design and extended reality (XR) projects.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate basic knowledge of design visualization software.
 - a. Discuss software visualization terminology, dimensions, and perspectives.
 - b. Identify types of software visualization.
2. Interact with the design visualization software effectively and productively.
 - a. Apply and manage correct file input and output.
 - b. Develop efficient work flow between design software and production software.
 - c. Develop non-destructive methods for editing and asset creation.
3. Demonstrate ability to set an environment for working with design visualization software and create objects using primitive geometry.
 - a. Analyze menus, tools, and other user interface elements used in creation and editing of geometric objects.
 - b. Identify how to adjust scale unit and axis orientation options of modeling software to match game engine options.
 - c. Utilize Perspective and Orthographic views for modeling and modifying objects.
 - d. Demonstrate understanding of topology and polygon-count when modeling game and extended reality (XR) assets.
4. Design, create, and analyze geometric visual components of games.
 - a. Apply selection, translation, rotation and scaling to modify geometry and sub-components to create 3D objects.
 - b. Apply usage of Nurbs surfaces, polygons, deformers, and sub-components to create and manipulate models.
 - c. Create objects modeled from reference images.
 - d. Utilize editing tools such as Extrude, Bevel, etc. to manipulate mesh objects.
 - e. Re-create commonly-used game components for analysis of methods.
5. Produce a themed-scene to include a minimum of five original modeled 3D objects.
 - a. Suggested/Example Projects:
 - i. Street scene with signs, trash cans, buildings, etc.
 - ii. Room scene with furnishings.
 - iii. Laboratory with apparatus.
 - iv. Park area.
 - v. City block with buildings, streets, etc.

Course Number and Name: IMT 1523 Intermediate 3D Modeling

Description: In this course, students will learn about materials, textures, lighting, and rendering as it relates to developing assets for use in gaming and extended reality (XR) projects.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate basic theoretical knowledge related to materials, textures, lighting, and shader networks.
 - a. Identify properties of basic materials such as Lambert, Blinn, and Phong and how they relate to objects.
 - b. Identify how procedural materials are utilized to create extra details.
 - c. Identify how light reflection and refraction are used to simulate certain materials.
 - d. Investigate various methods of texturing models (graphic editing vs. texture painting)
 - e. Investigate how physically-based rendering (PBR) materials are utilized by current game engines.
 - f. Identify how textures maps are used (Normal, Diffuse, Bump, Specular, etc).
 - g. Demonstrate understanding of typical light sources (ambient, point, directional spot, etc.) and where they are utilized both in rendering and game engines.
 - h. Investigate methods and tools for UV mapping of polygon objects.
2. Create and manipulate node-based materials for shader-based texturing and lighting effects.
 - a. Demonstrate UV mapping operations for polygons models.
 - b. Prepare textures for use with 3D objects using photographs and graphic editing software.
 - c. Create various materials using shader combinations and attributes.
 - d. Utilize pre-made textures and materials for online resources.
 - e. Utilize textures painting software to apply textures directly to objects.
3. Utilize rendering engines to produce still-images suitable for documentation, concept art, or marketing materials.
 - a. Demonstrate basic still-image rendering techniques.
 - b. Create rendered scenes utilizing default light types.
 - c. Create rendered scenes using HDRI environment/sky maps.

Course Number and Name: IMT 1614 Advanced 3-D Modeling

Description: In this course, students will gain an understanding of design principles and techniques for use in planning, designing, and producing a game character with animation.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
4	3	2	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop an understanding of the principles and history of character development and animation.
 - a. Analyze and discuss the history of animation from its beginning to the modern era.
 - b. Analyze the application of the Principals of Animation and identify their effects.
 - c. Differentiate among different animation principles such as squash, stretch, anticipation, and follow-through techniques.
 - d. Set keyframe animation to establish the movement scheme for an object.
 - e. Import objects into a scene.
 - f. Create the feeling of weight and mass for an animated object using scale animation.
 - g. Read animation curves in the Graph Editor.
 - h. Create motion trails and animate objects along a path.
 - i. Animate objects in time with each other.
2. Examine the process of Character Development.
 - a. Discuss common character mechanics in games.
 - b. Utilize pre-visualization, model creation, rigging methods, and skin binding to create game-ready characters.
 - c. Demonstrate creation of high-details characters using sculpting/re-topology/baking workflow.
 - d. Create animations using constraints, keyframes, timelines, graph editor, dope sheet, and layers for game production.
 - e. Investigate various methods of motion-capture and how they are utilized in game and extended reality (XR) projects.

Course Number and Name: IMT 2113 3D Game Engine I

Description: In this course, students will develop a basic understanding of a game engine and analyze the purpose, importance, and structure of game engines. Students will explore the associated programming language, create user interfaces (UI), and create game levels for video games. The suggested engines are Unreal and/or Unity.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore and understand the basic structure of 3D game engines.
 - a. Identify the core components of game engines relative to game development.
 - b. Discuss the importance of game engines in the game development process.
 - c. Develop an understanding of the elements of the game design engine.
 - d. Create game code using a game engine.
 - e. Develop an understanding of how coding is implemented in the game engine.
 - f. Identify how the game engine utilizes prefabs/blueprints to create more complex components.
 - g. Identify which materials and textures the game engine can utilize.
 - h. Identify which types of lighting are available in the game engine.
 - i. Investigate how 2D and 3D audio are implemented in the game engine.
 - j. Research the different controller types available in the game engine.
 - k. Evaluate which target platforms the game engine is capable of delivering for, as well as licensing for those platforms.
2. Create and publish interactive 3D game environments utilizing typical workflow techniques.
 - a. Plan the environment using sketches, storyboards, inspiration art, and notes.
 - b. Create prototype environment geometry using the “blocking-in” technique.
 - c. Implement a character controller into the environment for early testing.
 - d. Revise prototype designs by creating and importing meshes and textures into the game engine.
 - e. Demonstrate integration of pre-made assets into the environment.
 - f. Integrate appropriate light sources and effects into the environment.
 - g. Create and utilize prefab/blueprints in the environment.
 - h. Create basic game logic using script/code/blueprints.
 - i. Implement 2D and 3D audio into the environment.
 - j. Implement environmental and/or particle effects.
 - k. Demonstrate creating deployment packages for various platforms.
 - l. Demonstrate usage of source control and asset management.

Course Number and Name: IMT 2143 Business and Marketing for Game Design

Description: In this course, students will identify the company roles, team roles, and responsibilities related to the game development process and apply time and project-management skills. Students will also explore the importance of audience knowledge and target marketing in game design technology. Students will research consumer behavior, publisher relations, and functions of marketing such as: advertising, public relations, sales, and promotions. Additionally, students will research and analyze the economics of the video game industry.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the company roles and team roles and responsibilities related to the game development process.
 - a. Describe the elements of leadership and the qualities necessary to become a successful leader.
 - b. Identify the company roles related to the game development process.
 - c. Identify game development team roles involved in the game development process.
 - d. Explain the phases associated with developing a game from concept to completion.
 - e. Explain the Five-Stage Team Management Model and how it can be used in the game development process.
 - f. Explain and demonstrate how to conduct meetings.
 - g. Identify the various stages of quality assurance (QA) for game development.
2. Apply time and project management skills.
 - a. Explain the components of each stage in the game development process.
 - b. Describe the milestones in project management and how they are accomplished.
 - c. Create a one-page high concept game design document to showcase an original game idea.
 - d. Using the one-page high concept game design document, create a ten-page original game design proposal document that contains a title page, game outline, targeted audience, genre specification, character summary, gameplay synopsis, game world description, game experience, game mechanics, enemies, multi-player capabilities, bonus materials, and monetization.
3. Produce job-application documents for employment in the gaming industry.
 - a. Create a professional cover letter, professional resume, and participate in a mock interview.
4. Explain the importance of audience knowledge and target marketing in game design technology.
 - a. Discuss how game companies and publishers work together to bring a game to market.
 - b. Discuss target markets and how to get a video game sold.
 - c. Explain demographic segregation and how it is used in the marketing campaign.
 - d. Describe the marketing tools and how each can be used to attract buyers to a product.
 - e. Compare and contrast the areas of the distribution process.
 - f. Understand the relevance of company mission, objectives, and goals for the process of marketing strategies.
 - g. Discuss contracts between game companies and publishers.
 - h. Describe the connect between game product life cycles and marketing strategies.
 - i. Research and analyze the economics of the video game industry.
 - j. Investigate cost versus profit for video games.
 - k. Understand how game analytics are used to inform the design process.

Course Number and Name: IMT 2153 2D Character Animation Design

Description: In this course, students will explore in-depth advanced techniques for creating quality 2D animation. This course is designed to teach advanced application of 2D techniques that build upon the basics learned in IMT 1114 Introduction to Animation and Simulation. Students will create their own characters, storyboards, and final animation of a short piece utilizing digital animation software. (Suggested Software: Moho Pro, Adobe Animate)

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisites: Instructor Approved

Student Learning Outcomes:

1. Students will demonstrate the ability to conceptualize the way meaning is structured and perceived in animation.
2. Students will demonstrate an understanding of the techniques and practices of animation production including conceptualization, modeling, construction, texturing, animation, digital cinematography, and post-production while using relevant tools for each of these stages.
3. Students will demonstrate proficiency in the principles and production of animation.
4. Students will demonstrate proficiency in digital animation software and the 2D animation process to create advanced animations mixed with sound.
5. Pace a production schedule in order to effectively complete aspects of sound recording, animation, and editing on time.
6. Produce a final animation of a short piece utilizing digital animation software.

Course Number and Name: IMT 2223 Game Engine II

Description:

In this course, students will develop a basic understanding of a game engine and analyze the purpose, importance, and structure of game engines. Students will explore the associated programming language, create user interfaces (UI), and create game levels for video games.

This course is an elective class that allows students to gain proficiency with a game engine different from the engine used in IMT 2113 Game Engine 1. Suggested engine is Unity3D.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisites:

Instructor Approved

Student Learning Outcomes:

1. Explore and understand the basic structure of 3D game engines.
 - a. Identify the core components of game engines relative to game development.
 - b. Discuss the importance of game engines in the game development process.
 - c. Develop an understanding of the elements of the game design engine.
 - d. Create game code using a game engine.
 - e. Develop an understanding of how coding is implemented in the game engine.
 - f. Identify how the game engine utilizes prefabs/blueprints to create more complex components.
 - g. Identify which materials and textures the game engine can utilize.
 - h. Identify which type of lighting are available within the game engine.
 - i. Investigate how 2D and 3D audio are implemented in the game engine.
 - j. Research the different controller types available in the game engine.
 - k. Evaluate which target platforms the game engine is capable of delivering for, as well as licensing costs for those platforms.
2. Create and publish interactive 3D game environments utilizing typical workflow techniques.
 - a. Plan the environment using sketches, storyboards, inspiration art, and notes.
 - b. Create prototype environment geometry using the "blocking-in" technique.
 - c. Implement a character controller into the environment for early testing.
 - d. Revise prototype designs by creating and importing meshes and textures into the game engine.
 - e. Demonstrate integration of pre-made assets into the environment.
 - f. Integrate appropriate light sources and effects into the environment.
 - g. Create and utilize prefab/blueprints in the environment.
 - h. Create basic game logic using script/code/blueprints.
 - i. Implement 2D and 3D audio into the environment.
 - j. Implement environmental and/or particle effects.
 - k. Demonstrate creating deployment packages for various platforms.

Course Number and Name: IMT 2413 Animation & Simulation Design Capstone

Description:

This capstone class is the culmination of lessons learned in previous and present courses leading to the creation of final projects for a professional digital portfolio. The student will originate and/or revise a minimum of two projects and create a “sizzle reel” video utilizing the standard process of pre-production planning, production, revision, and final publication.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite:

Instructor Approved

Student Learning Outcomes:

1. Conceptualize a portfolio for online presentation.
 - a. Evaluate online portfolio hosting sites to determine the best option for the individual’s media portfolio.
 - b. Evaluate existing portfolios to determine styles, structures, and substance for the media portfolio.
 - c. Create a rough-draft concept (storyboard, mock-up, etc.) for the media portfolio.
 - d. Determine projects to include in the media portfolio (new content or revision of existing projects).
2. Produce projects for the media portfolio that showcase student’s areas of strength and skills.
 - a. Develop a schedule for completion of portfolio content projects.
 - b. Demonstrate effective time-management skills through the completion of projects.
3. Plan and produce a “sizzle reel” video of 45-90 seconds for inclusion in the portfolio.
 - a. Create a storyboard to be used for video creation.
 - b. Determine the scope of the video (which projects, how many projects, types of projects to be included).
 - c. Locate or create suitable background music for the video.
 - d. Utilize video-editing software to produce the video, with title and credit screens.
4. Revise, edit, and complete the media portfolio.
 - a. Perform revision based on instructor feedback to projects, video, and media portfolio.
 - b. Finalize and upload all content to the online portfolio hosting site.
 - c. Test the presentation of the portfolio utilizing different computing devices and web browsers.
 - d. Revise online media portfolio to provide appropriate experience based on results of testing.

Course Number and Name: IMT 2513 Game Evaluation

Description: In this course, students will explore and understand video game architecture through testing, defect tracking, technical reviews, inspections and will also critically evaluate game design, character development, character animation, sound design, playability, and compatibility.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore and understand video game architecture through testing, defect tracking, technical reviews, and inspections.
 - a. Identify the elements of game architecture and the evaluation process.
 - b. Explain the process of bug testing.
 - c. Explain bug fixing.
 - d. Identify major bug categories.
 - e. Explain the common elements of a bug report.
2. Critically evaluate game design, character development, character animation, sound design, playability, and compatibility.
 - a. Classify the testing priority of elements of game design, character development and animation, sound design, playability, and compatibility.
 - b. Design and develop a video game evaluation plan.
 - c. Demonstrate the process of correcting game problem areas and satisfying quality assurance requirements.
 - d. Evaluate existing games and write professional-quality bug reports suitable for identification and correction of problems.

Course Number and Name:

IMT 2613 Audio Design and Production for Animation and Simulation

Description:

This course covers the functions of audio design fundamentals, interactive audio, and the fundamentals of 3-D audio in order to blend video game audio elements.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite:

Instructor Approved

Student Learning Outcomes:

1. Research audio history and theory.
 - a. Discuss the components of audio and game design.
 - b. Discuss the history of audio components and their importance in game design.
 - c. Discuss how parameters such as bit rate, resolution, sample rate, and format relate to game audio.
 - d. Discuss how 2D and 3D audio are used in game and extended reality (XR) projects.
 - e. Investigate how adaptive audio is used in games.
 - f. Investigate and analyze different audio middleware solutions for game engines.
2. Understand the functions of audio design fundamentals (creating the atmosphere) and interactive audio for game design.
 - a. Describe how sound can set the mood for a game.
 - b. Create audio asset lists and digital sound effects.
 - c. Use music composition software tools to create simple game and music sequences.
 - d. Record, edit, and mix audio using Digital Audio Workstation (DAW) software.
 - e. Utilize Digital Audio Workstation (DAW) software to export audio with appropriate specification for game engine use.
 - f. Use Foley techniques to create sound effects.
 - g. Utilize Digital Audio Workstation (DAW) software to record, edit, mix, and export vocal narration tracks.
 - h. Use middleware to create a sound bank suitable for use in a video game or extended reality (XR) project.
 - i. Demonstrate implementation of 2D and 3D audio in a game engine.

Course Number and Name: IMT 2723 Introduction to Extended Reality (XR) Environment Production

Description: In this course, students will develop a basic understanding of an extended reality (XR) development environment and analyze the purpose, importance, and structure of the development environment. Students will explore the associated programming language, create user interfaces (UI), and create environments for extended reality (XR) projects. Suggested development environment is Unreal Engine.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify the core components of a development environment relative to Extended Reality (XR) design.
 - a. Analyze the importance of game engines in the Extended Reality (XR) development process.
 - b. Identify the elements of the environment development engine.
 - c. Create logic using the development environment.
 - d. Distinguish the different methods of implementing code in the development environment.
 - e. Analyze how the development environment utilizes prefabs/blueprints to create more complex components.
 - f. Define which materials and textures the environment engine can utilize.
 - g. Identify which type of lighting are available within the development environment.
 - h. Discuss how 2D and 3D audio are implemented in the development environment.
 - i. Assess the different control schemes available in the development environment.
 - j. Investigate which target platforms the development environment is capable of delivering for, as well as licensing costs, for those platforms.
 - k. Implement extended reality (XR) control systems in the development environment.
 - l. Create deployment packages for extended reality (XR) target platforms.
 - m. Identify the complexity restrictions for target extended reality (XR) hardware platforms.
 - n. Investigate workflow for importing assets into the extended reality (XR) development environment.
2. Develop and publish interactive 3D extended reality (XR) environments utilizing industry-standard workflow.
 - a. Formulate the environment using sketches, storyboards, inspiration art, and notes.
 - b. Use the “blocking-in” technique to create prototype environment geometry.
 - c. Establish a control system into the environment for early interactive testing.
 - d. Refine prototype designs by replacing placeholders with pre-made content.
 - e. Employ appropriate lighting and effects into the environment.

- f. Construct and incorporate prefabs/blueprints into the environment.
- g. Create simple control logic using script/code/blueprints.
- h. Implement 2D and spatial audio into the environment.
- i. Incorporate environmental and/or particle effects.
- j. Build deployment packages for various platforms.
- k. Utilize performance optimization for extended reality (XR) projects.

Course Number and Name: IMT 2733 Integrated 3D Production Pipeline

Description: In this course, students will work in teams to plan and produce a comprehensive project that integrates knowledge and skills from across the curriculum. Project will be student-originated; dependent upon instructor approval.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop project ideas *could be*:
 - a. One-level concept demo 3D game (desktop, web, or mobile)
 - b. Extended Reality (XR) experience; one main focus and/or time limited
 - c. Training simulation
 - d. Combination of above
 - e. Other student-devised project
2. Utilize time and project-management skills while working as a team to produce a project.
 - a. Conduct brainstorm sessions.
 - b. Document results of creative planning sessions.
 - c. Elect a project manager and determine team roles.
 - d. Conduct regular “scrum” or status meetings to assess progress.
 - e. Produce typical planning and production documentation, dependent on project.
 - f. Utilize communication technologies to coordinate and track progress.
 - g. Utilize online storage solution (cloud) for organization and storage of documentation and assets.
3. Produce an entertainment-based application that is at least “pitch demo” completeness and quality.
 - a. Utilize 3D game engine for production of application.
 - b. Utilize graphics editing and/or illustration software for creation of art assets.
 - c. Create 3D assets using modeling software.
 - d. Create textures utilizing appropriate software methods.
 - e. Produce audio assets appropriate for the application experience.
 - f. Program functionality using the game engine supported programming structure.
 - g. Implement a user interface (UI) and control system/player-controller.
 - h. Compile a stand-alone application for the target platform.

Course Number and Name: IMT 2743 Integrated Extended Reality (XR) Experience

Description: In this course, students will work in teams to plan and produce a comprehensive project that integrates knowledge and skills from across the curriculum. Project will be student-originated; dependent upon instructor approval.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisites: Instructor Approval

Student Learning Outcomes:

1. Students will work as a team to design an extended reality (XR) experience project proposal.
 - a. Demonstrate project-management skills.
 - b. Utilize professional communication skills to collaborate among team members.
 - c. Produce planning documents and materials.
2. Produce a working XR experience that meets the proposed scope of work.
 - a. Utilize XR development environment for production.
 - b. Create required content and assets for the project.
 - c. Utilize instructor-approved pre-made content.
 - d. Implement basic logic for XR experience and user interaction.
 - e. Produce compiled application for a target platform.

Course Number and Name: IMT 2763 Introduction to Extended Reality (XR) Content Production

Description: This course is designed to introduce students to extended reality (XR) using AR/VR/MR experience and creation tools, while researching the benefits and roles within the industry.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Document the history of extended reality (XR).
 - a. Demonstrate knowledge of the history of the extended reality (XR) industry.
 - b. Demonstrate knowledge of extended reality (XR) hardware platforms.
2. Demonstrate understanding of different aspects of extended reality (XR).
 - a. Identify uses of virtual reality (VR) as a medium.
 - b. Identify uses of augmented reality (AR) as a medium.
 - c. Identify uses of mixed reality (MR) as a medium.
3. Understand development roles in the extended reality (XR) industry.
 - a. Explain key roles and specialization within the extended reality (XR) development industry.
 - b. Investigate organization make up of existing extended reality (XR) development companies.
 - c. Identify the tools needed for each role in extended reality (XR) development.
4. Create and present an idea for an extended reality (XR) production project.
 - a. Explore current extended reality (XR) applications.
 - b. Utilize and set up extended reality (XR) equipment including hardware and software.
 - c. Create initial planning extended reality (XR) documentation to include high concept document, storyboard, and concept art along with other supporting material as needed.

Course Number and Name: IMT 2753 Lighting and Shading

Description: This course is designed to introduce students to lighting and shading algorithms used in simulation and game development, Students will utilize various tools to create light and shadows.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate lighting and shading principles.
 - a. Demonstrate the ability to use digital tools to create light and shadows.
 - b. Apply various lighting and shading algorithm concepts to the creation of simulation and/or games.

Course Number and Name: IMT 2772 Simulation and game Project

Description: This course is designed to aid students in creating a functional simulation or game with minimal aid from the instructor. Students will also be instructed on the creation and presentation of a simulation and game development portfolio.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
2	1	2	45

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Demonstrate verbal and written communication skills, skill documentation and professional presentation.
2. Create and professionally present a fully functional simulation or game with minimal instructor support.

Course Number and Name: IMT 2783 Audio for Simulation and Games

Description: This course provides an introduction to the various aspects of audio and its application in simulations and game development. Students will learn how to produce and edit audio for simulations and games.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Identify techniques for producing and editing audio for multiple digital mediums.
2. Produce and edit audio clips for simulations and games.

Appendix A Recommended Tools and Equipment

Capitalized Items

1. Desktop CPU (Student Workstations plus one instructor unit)(Windows, Android or Apple or other CPU that meets or exceed industry demands)
 - Windows, 64-Bit Operating System
 - Gaming/VR Capable Unit
 - CPU: Intel I7 or Xeon Processor
 - RAM: 16 GB or larger
 - HDD: 500 GB (Minimum), SSD (Preferred)
 - Optical Drive: CD/DVD-R/W
 - Video Card: RayTracing Capability, DX12 Compatible, VR capable, NVidia RTX 2060 or higher
2. Interactive Presentation Panel with Integrated CPU (4' X 5') or greater
3. 3D Printer
4. Color Laser Printer
5. Gaming Laptop (Laptop should meet same general specifications as the desktop units) (Windows, Android or Apple)
6. Television - 50" or larger, LCD or LED, with wall mount system and HDMI/VGA/Composite/Coax

Non-Capitalized Items

1. Computer Monitor: 27" minimum, HDMI/DVI/VGA Inputs, LCD or LED
2. Webcams (1 Per Student Workstation) – SVGA Resolution or greater
3. Virtual Reality Hardware: HTC Vive and/or Oculus (current generation consumer-grade) with sensor tripod and/or other industry requested hardware (2 Per Lab)
4. Mobile self-contained unit (Example: Oculus Quest)
5. Graphics Tablets – 7" minimum, pressure sensitive with stylus
6. Microphones plus cable (One per station), condenser, boom-type
7. Headphones (One per station), padded over ear
8. MIDI Keyboard
9. Two-Input USB Audio Interface
10. Condenser Microphone (Shure SM57 or Equivalent – Minimum 2)
11. Mixer (Optional)
12. Digital Camera (Minimum 2 – 8GB SD Card and Video Capability)
13. 360 Degree Camera (Minimum 1 – 4K or Better Still-Frame with Video Capture)
14. Tri-pod (2 Units – 3' – 6' Adjustment Height)
15. Lights (One Spot and One Backfill with Mounts)
16. Laser Printer (Student Lab Use)
17. Gaming Console – XBOX, PlayStation, and Nintendo Switch (Current Generation with Additional Controllers for each.

RECOMMENDED SOFTWARE

- Adobe Creative Cloud Suite
- 3D Game Development Environment (Ex. Unity 3D, Unreal Engine)
- 3D Modeling and Animation Software (Ex. Maya, 3ds Max, Blender)
- Audio/Recording/Mixing Software (Ex. Audacity, Audition, Tracktion)
- Music Composition Software (Ex. LMMS, FLStudio)
- Texture Painting Software (Ex. Substance Painter, Quixel, 3D Coat, MudBox)
- 2D Animation Software (Ex. Moho Professional Studio, Adobe Animate, Character Animator, Toon Boom)
- 2D Game Development Environment (Ex. Game Maker, Game Salad, Click Team Fusion)
- Integrated Development Environment for Programming (IDE) (Ex. MS Visual Studio, Dev C++, NetBeans, MonoDevelop, etc.)
- Lab Management Software (Ex. SmartSync Software, Net Control, etc.)
- Graphics Software (Ex. Photoshop, Illustrator, GIMP, Piskel, Marmoset Hexels, etc.)

*Equipment, hardware, software and accessories choices should be adjusted to modern advances and budgetary constraints.

Appendix B Curriculum Definitions and Terms

- Course Name – A common name that will be used by all community colleges in reporting students
- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students
- Classification – Courses may be classified as the following:
 - Career Certificate Required Course – A required course for all students completing a career certificate.
 - Technical Certificate Required Course – A required course for all students completing a technical certificate.
 - Technical Elective – Elective courses that are available for colleges to offer to students.
- Description – A short narrative that includes the major purpose(s) of the course
- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course
- Corequisites – A listing of courses that may be taken while enrolled in the course
- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
 - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
 - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
 - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
 - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas
- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each

community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:
 - Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework.
 - Revising or extending the student learning outcomes
 - Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

Appendix C: Recommended Textbook List

RECOMMENDED SIMULATION AND ANIMATION DESIGN TECHNOLOGY TEXTBOOK LIST CIP: 50.0411- SIMULATION AND ANIMATION DESIGN (CIP:11.0804) SIMULATION AND GAME DESIGN TECHNOLOGY NOTE: THIS IS NOT AN INCLUSIVE LIST. BECAUSE THIS FIELD IS CHANGING SO RAPIDLY, COMMUNITY COLLEGES ARE ENCOURAGED TO USE THE LATEST TEXTBOOKS THAT MEET OR EXCEED INDUSTRY REQUIREMENTS.		
Fundamentals of Game Design 3rd Edition, 2014	Earnest Adams	978-0-321-92967-9
A First Book of C++ Programming, 4 th Edition	Gary Bronson	978-1-111-53100-3
Adobe Photoshop Revealed (Creative Cloud)	Elizabeth Eisner Reding	978-1-305-26053-5
Autodesk Maya 2017 Basics Guide	Kelly L. Murdock	978-1-63057-035-4
Introducing Auto Desk Maya 2016	Dariusz Derakhshani	978-1-11-05969-9
Adobe Illustrator Creative Cloud Revealed, 1 st Edition, 2015	Chris Botello	978-1-305-26261-4
An Introduction to Unreal Engine 4	Andrew Sanders	978-1-498-76509-1
Video Game Marketing-A Student Textbook 2017	Perter Zackariasson and Mikolaj Dymek	978-1-138-81227-7
Level Up, The Guide to Great Video Game Design, 2 nd Edition, 2014	Scott Rogers	978-1-1118-87716-6
The Essential Guide to Game Audio: Theory and Practice of Sound for Games	Steve Horowitz, Scott R. Looney	979-0-415-7060-4
Game Testing All in One, 3 rd Edition	Charles Schultz & Robert Bryant	978-1-942270-76-8

Appendix D: Course Crosswalk

Course Crosswalk CIP 50.0411-Simulation and Animation Design (CIP:11.0804) Simulation and Game Design Technology					
<i>Note: Courses that have been added or changed in the 2019 curriculum are highlighted.</i>					
Existing			Revised		
2015 MS Curriculum Framework			2019 MS Curriculum Framework		
Course Number	Course Title	Hours	Course Number	Course Title	Hours
EET 1223	Illustration and Artistic Rendering	3			
RST 1312	Freshman Orientation	2			
IMT 1114	Introduction to Animation and Simulation Design	4	IMT 1114	Introduction to Animation and Simulation	4
			IMT 1123	Vector Illustration	3
IMT 1214	Game Theory and Mechanics	4	IMT 1213	Game Theory and Mechanics	3
IMT 1313	Video Game Programming I	3	IMT 1313	Video Game Programming I	3
IMT 1414	Photography for Games	4	IMT 1414	Graphic Editing for Games	4
IMT 1513	Introduction to 3D Modeling	3	IMT 1513	Introduction to 3D Modeling	3
IMT 1524	Intermediate 3D Modeling	4	IMT 1523	Intermediate 3D Modeling	3
IMT 1613	Advanced 3D Modeling	3	IMT 1614	Advanced 3D Modeling	4
IMT 2113	Video Game Programming II	3	IMT 2113	3D Game Engine	3
			IMT 2143	Business and Marketing for Gaming	3
			IMT 2153	2D Character Animation and Design	3
IMT 2213	Marketing for Game Design	3			
			IMT 2223	Game Engine 2	3
IMT 2312	Business of Game Development	2			
IMT 2512	Game Evaluation	2	IMT 2513	Game Evaluation	3
IMT 2612	Audio Design and Production for Animation and Simulation	2	IMT 2613	Audio Design and Production for Animation and Simulation	3

			IMT 2763	Introduction to Extended Reality (XR) Content Production	3
			IMT 2723	Introduction to Extended Reality (XR) Environment Production	3
			IMT 2733	Integrated 3D Production Pipeline	3
			IMT 2743	Introduction to Extended Reality (XR) Experience	3