COURSE LEARNING OUTCOMES:

COURSE NUMBER & NAME: GDP 215 3D Game Graphics Programming

LECTURE/LAB HOURS: 3 lecture hours per week

CREDITS: 3

PREREQUISITES: GDP 112

COURSE DESCRIPTION: This course provides students with the fundamentals of 3D graphics programming for games and interactive media using a modern professional game engine. Students will explore various topics of shader programming, post-processing effects, lighting models, physically based rendering, and grab passes.

Upon successful completion of this course, students will be able to:

1. Understand how to write shaders using a shader scripting language and a modern professional game engine
2. Discuss how post-processing effects work in games and digital media
3. Explain and use surface shaders, fragment shaders, texture mapping, vertex functions, and grab passes
4. Understand what lighting models and physically based rendering are
5. Explain how to optimize shader code using profiling techniques
6. Discuss the use of screen effects in games and how to implement them
7. Locate, discern, and effectively use information to solve issues and/or problems in game design and development

COURSE MATERIALS:

No textbook is required for this course

ADDITIONAL COURSE MATERIALS:

**Textbook** – Unity 2018 Shaders and Effects Cookbook, 3rd edition, John Doran, Packt Publishing, 2018

COURSE REQUIREMENTS:

* The successful completion of quizzes and final exam.
* The completion of in-class assignments and projects.
* The completion of assigned readings and homework.
* Attendance and class participation. Students are expected to attend all classes.

**Experiential Learning:**

Students must complete an experiential learning activity that connects course content to career applications. This activity may be a content specific assignment or practical skill that is applied within a course assignment. This assignment supports the general education learning outcomes of scientific/critical thinking and quantitative reasoning; oral and written communication; and information literacy/technological competency.

**ADA Statement:**

Union County College offers reasonable accommodations and/or services to persons with disabilities. Any student who has a documented disability and wishes to self-identify should contact the Coordinator of Services for Students with Disabilities at (908) 709-7164, or email [disabilitysvc@ucc.edu](mailto:disabilitysvc@ucc.edu). Accommodations are ***individualized*** and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. In order to receive accommodations, students must be registered with the Disability Services Office. Students should register with the office as soon as possible. Accommodations are not official until the Faculty Accommodations Alert Form(s) are issued from the student to his/her instructor(s).

**FERPA Statement:**

The Family Educational Rights and Privacy Act of 1974 (FERPA) guarantees that the academic records for students over 18 years old cannot be discussed with anyone except the student or authorized College personnel. However, certain information classified as "Directory Information" is available for public consumption unless the student specifically directs that it be withheld. Public Directory Information as defined by the act includes: Student's name, addresses (campus, home, e-mail), telephone listings, photograph, date and place of birth, major field of study, class year, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, enrollment status (e.g., undergraduate or graduate; full-time, half-time, part-time), degrees, honors, and awards received, and the most recent previous educational institution attended.

EVALUATION METHODS:

Quizzes 30%

Final Exam 20%

Assignments 50%

Grading System

A 90 or above C 70 - 76

B+ 87 – 89 D+ 67 - 69

B 80 – 86 D 60 - 66

C+ 77 – 79 F below 60

CLASS SCHEDULE**:**

|  |  |  |
| --- | --- | --- |
| Week | Unit/Content | Learning Activities |
| 1 | Chapter 1: Post-Processing Stack | Lecture  Class discussion  Homework |
| 2 | Chapter 2: Creating Your First Shader | Lecture  Class discussion  Homework |
| 3 | Chapter 3: Surface Shaders and Texture Mapping | Lecture  Class discussion  Homework |
| 4 | Chapter 3: Surface Shaders and Texture Mapping (continued) | Lecture  Class discussion  Homework |
| 5 | Chapter 4: Understanding Lighting Models | Lecture  Class discussion  Homework |
| 6 | Chapter 5: Physically-Based Rendering | Lecture  Class discussion  Homework |
| 7 | Chapter 6: Vertex Functions | Lecture  Class discussion  Homework |
| 8 | Chapter 7: Fragment Shaders and Grab Passes | Lecture  Class discussion  Homework |
| 9 | Chapter 8: Mobile Shader Adjustment | Lecture  Class discussion  Homework |
| 10 | Chapter 9: Screen Effects with Unity Render Textures | Lecture  Class discussion  Homework |
| 11 | Chapter 10: Gameplay and Screen Effects | Lecture  Class discussion  Homework |
| 12 | Chapter 11: Advanced Shading Techniques | Lecture  Class discussion  Homework |
| 13 | Chapter 12: Shader Graph | Lecture  Class discussion  Homework |
| 14 | Exam Review | Lecture  Class discussion  Homework |
| 15 | Final Exam |  |

SUGGESTED TEACHING METHODOLOGIES:

* Lecture, group discussion, presentations, multimedia/technology, projects, demonstrations, etc.

**CORRELATION OF PROGRAM and GENERAL EDUCATION OUTCOMES, STUDENT OUTCOMES, AND ASSESSMENT METHODS**

|  |  |  |
| --- | --- | --- |
| **Program and General Education Outcomes** | **Course Learning Outcomes** | **Assessment Methods** |
| Use a modern professional game engine to develop game prototypes | * Understand how to write shaders using a shader scripting language and a modern professional game engine | Written: Assignments.  Verbal: Class discussion and responses, group discussion and responses. |
| Apply software methods and algorithms to design technological solutions in game development | * Explain how to optimize shader code using profiling techniques |  |
| Combine graphical and technical methods to produce aesthetic solutions for interactive games | * Understand how to write shaders using a shader scripting language and a modern professional game engine * Discuss how post-processing effects work in games and digital media * Explain and use surface shaders, fragment shaders, texture mapping, vertex functions, and grab passes * Understand what lighting models and physically based rendering are * Explain how to optimize shader code using profiling techniques * Discuss the use of screen effects in games and how to implement them | Written: Assignments.  Verbal: Class discussion and responses, group discussion and responses. |
| Communicate effectively in writing, verbal and electronic formats. | * Locate, discern, and effectively use information to solve issues and/or problems in game design and development | Written: Exams, assignments.  Verbal: Class discussion and responses, group discussion and responses. |

REVISED: 5/14/2019