SM4128: DIGITAL LIGHTING AND TEXTURING

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Digital Lighting and Texturing

Subject Code
SM - School of Creative Media
Course Number
4128

Academic Unit
School of Creative Media (SM)

College/School
School of Creative Media (SM)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This course aims to

- Develop a sound knowledge of modern CGI rendering techniques and the essential technical factors of high quality renderings;

- Equip students with robust digital lighting and texturing skills necessary for quality production works and various artistic undertakings with an emphasis of creative applications of the tools;

- Equip students with the ability to create and apply lighting and texturing together as an expressive device for both still image and motion pictures making;

- Introduce the basic of theory of light interaction with materials so that the student can develop their own rendering shaders later;

- Introduce the basic of computer graphics theory to facilitate the students to use different commercial rendering package currently exist or any rendering package exist in the future.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	- Configure and setup CGI renderers for production renderings in an efficient and productive manner - Diagnose problematic renderings		x	x	x
2	Create quality renderings by taking full advantage of basic ‘direct illumination’ lights, shadows and basic textures		x	x	
3	Create photorealistic renderings by using advanced Global Illumination (GI) lighting instruments		x	x	
4	Design and prepare professional quality texture maps for shading and illumination maps for image-based lighting by using hand-painted drawings, HDRI imaging, found photographs and procedural materials		x		x
5	Use lighting and texturing as an expressive device for communicating atmospheric and emotional qualities		x	x	x
6	- Associate, combine and integrate knowledge from different disciplines (e.g. mathematics, sciences, literature etc.) into course assignments. - Integrate the knowledge of physics (theory of light interaction with materials and theory of color) and mathematics (basic of signal theory) into computer generated image (CGI) technique.		x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Explain key concepts on digital lighting and texturing (DLX) principles relevant to procedural animation. Discuss the related DLX technologies and their use.	1, 2, 3, 4, 5, 6	3hrs/wk
2	Lectures, case studies and workshops	Requires students to create DLX art works related to the materials taught in the class. Requires students to create an individual DLX art works, assignments, that using the principles taught in the classes.	1, 2, 3, 4, 5, 6	1hr/wk
3	Individual Final Project	Requires each student to create a substantial individual animation work using taught DLX principles and technologies. Requires each student to present his/her final project art work. Requires students to attend the final project presentation and make critique to other student art works.	1, 2, 3, 4, 5, 6	3hrs/wk for 2 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	In-class exercise: Diagnosis of problematic digital renderings.	1	25	
2	Assignment, presentation and critique: With a given theme and specific technical requirements, individual shall produce monochrome rendering which uses only basic Direct Illumination lights and shadowing.	2, 5	25	

3	Assignment, presentation and critique: With a given theme and specific technical requirements, individual shall create necessary textures and apply GI lighting tools to produce a photorealistic rendering which matches a photograph shot from a real setup prepared by the individual.	3, 5, 6	25	
4	Assignment, presentation and critique: With a given theme and specific technical requirements, a group of individuals shall shoot and develop HDRI images and then apply them as image lighting maps to produce photorealistic renderings.	4, 5, 6	25	

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task

1. In-Class Exercise/ Assignment

Criterion

This assessment will grade on rationality, clarity and fluency of argument and comment. The threshold of 'discovery' lies in a student's ability to negotiate a position that is informed, defendable, and standing on personal insight.

Students need to demonstrate basic understanding of modern CGI theory and technology. They include CGI lights, shaders/ materials system, image format/color space, rendering.

With good grasp of the teaching materials, the students are asked to produce good rendered images output based on exercises and assignments requirements.

Excellent (A+, A, A-)

- Excellent grasp of research material, able to explain key concepts, assumptions and debates
- Rigorous organization, coherent structure, distinct thesis, properly argued with strong narrative
- Insightful interpretation of the subject matter with distinct themes and thesis
- Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize
- Ability to approach a text or a theme using a variety of theories and analytical tools
- Strong bibliography suggesting breadth and depth of coverage and informed insights

Good (B+, B, B-)

- Firm grasp of materials, able to explain key concepts and assumptions

- Reasonable organization, balanced structure, adequate content, sufficient ability to integrate various resources based on demand
- Clear ideas which keep to the point, clear-cut subject, ability to interpret opinions independently
- Organized bibliography which can be utilized in accordance with the topic

Fair (C+, C, C-)

- Comprehensive grasp of materials, able to explain key concepts
- Fair organization, weak structure, adequate content, fair ability to integrate various resources based on demand
- Relevant points to the subject matter, fair ability to interpret opinions
- Unorganized bibliography which can be utilized in accordance with the topic

Marginal (D)

- Loose grasp of materials, cannot explain key concepts
- Poor organization and structure, weak content, limited use of resources
- Relevant points to the subject matter, marginal ability to interpret opinions
- Insufficient and/or unorganized bibliography

Failure (F)

- Poor grasp of materials
- No organization and structure, inadequate content, no/ irrelevant use of resources
- Irrelevant points to the subject matter, minimal ability to interpret opinions
- Irrelevant bibliography

Assessment Task

2. Presentation

Criterion

This assessment will grade on content and fluency of presentation. Students should show their co-operation to conduct a well-organized presentation with their own argument and evidence from readings and notes. The threshold of ‘discovery’ lied in a student’ s self initiatives to conduct additional research and to personalize theories for her/his personal daily experience.

During the presentation, students need to discuss the inspiration of the CGI work, their workflow, the problem they encountered during the CGI production process and their solutions.

Excellent (A+, A, A-)

- Rich, informative content, excellent grasp of the material with in-depth and extensive knowledge of the subject matter
- Rigorous organization, coherent structure, and systematic exposition with a strong sense of narrative
- Superior presentation skills: distinct pronunciation, fluent expression and appropriate diction, exact time-management
- Critical analysis with insightful comments opening up new issues, or suggesting the ability to theorize

Good (B+, B, B-)

- Adequate content with firm grasp of the material that informs the audience on a subject matter
- Reasonable organization, balanced structure and composition
- Good verbal communication: comprehensible pronunciation, fluent expression and diction, fair time-management

Fair (C+, C, C-)

- Adequate content with comprehensive grasp of the material demonstrating basic knowledge of the subject matter
- Fair organization, weak structure and composition
- Fair presentation skills: acceptable pronunciation, expression and diction, fair time-management

Marginal (D)

- Weak content, loose grasp of the general ideas with some knowledge of the subject matter
- Poor organization, structure and composition

- Poor presentation skills: marginal pronunciation, expression and diction, poor time-management

Failure (F)

- Inadequate content, fail to identify the general ideas with knowledge of the subject matter
- No organization, structure or/and composition
- Poor presentation skills: marginal pronunciation, expression and diction, minimal time-management

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Assessment Task

3. Class Participation

Criterion

This assessment task reviews students' participation and performance in discussions, debates and peer critique during the tutorial sessions. The evidence of 'negotiation', the sign of discovery, lies in students' pre-class preparation and interpersonal sensitivity to his/her peer members.

In each class, exercises are prepared for the students to complete them. After the completion, they will share their works with classmate and listen feedback/comment for their rendered works.

Excellent (A+, A, A-)

- Active in-class participation, positive listening, strong ability to stimulate class discussion and comment on other points
- In-depth pre-class preparation and familiarity with peer reports and other materials
- Interpret others' views with an open mind and ready to negotiate
- Readiness to share personal insight via analysis and synthesis with informed views
- Constructively critical, thus facilitating the discovery of new issues

Good (B+, B, B-)

- Active in-class participation, positive listening, ability to initiate class discussion and comment on other points
- Adequate pre-class preparation and familiarity with peer reports and other materials
- Interpret opinions effectively

Fair (C+, C, C-)

- Attentive in in-class participation, listening with comprehension, but only infrequently contributing
- Adequate pre-class preparation but little familiarity with peer reports and other materials
- Fair ability in interpreting opinions

Marginal (D)

- Unmotivated to participate in class discussion or comment on other people's views
- Little pre-class preparation and familiarity with peer reports and other materials
- Poor ability in interpreting opinions

Failure (F)

- Unwilling to participate in class discussion and comment on other points, even when requested by the teacher
- No pre-class preparation and familiarity with peer reports and other materials
- Minimal ability in interpreting opinions

Additional Information for AR

All A+/A/A- grade assignment should comply with the highest performance of Discovery-oriented learning.

Part III Other Information

Keyword Syllabus

CGI renderers, digital rendering techniques, digital lighting by direct illumination, texture maps, ray-tracing, digital lighting by global illumination, High Dynamic Range Imaging (HDRI), image-based lighting, caustics rendering, radiosity, mental ray, Photorealistic RenderMan, shader networks, procedural shading, Non-Photorealistic Rendering (NPR).

Reading List

Compulsory Readings

	Title
1	Lee Lanier, “Advanced Maya Texturing and Lighting”, SYBEX, 2008.

Additional Readings

	Title
1	Virginia Wissler, “Illuminated Pixels”, Cengage Learning PTR, 2012.