	UNIVERSITAS PEMBANGUNAN NASIONAL "VETERAN" YOGYAKARTA **FACULTY OF SOCIAL AND POLITICAL SCIENCE** **BACHELOR PROGRAMME OF COMMUNICATION SCIENCE**	**DOCUMENT CODE** **CUD/COMMUNICATION SCIENCE/S1/1530233/2023**

COURSE UNIT DESCRIPTION (CUD)

COURSE UNIT (CU) & CODE: **Graphic Computer**	**COURSE UNIT CLUSTER (CUC):** Communication Science	**ECTS CREDITS ALLOCATED:** T = 3.2 P = -	**SEMESTER:** 3ft
LANGUAGE OF INSTRUCTION: Bahasa Indonesia	**COURSE UNIT TYPE:** Compulsory	**DATE CREATED:** January, 5th 2023	**Level of course unit (according to EQF):** Level 6 First Cycle Bachelor

AUTHORIZED	**LECTURER OF CUD CREATOR:** Anton Rimanang, M.Sn	**CUC COORDINATOR:** -	**COORDINATOR STUDY PROGRAM:**  ARIF WIBAWA

Learning Outcome (LO) CPL	**Program Learning Outcome in Course Unit (PLO-CU)**	
	A2	Play a role as a citizen with social sensitivity, nationalism, and responsibility towards the country, nation, and profession, while respecting cultural and religious diversity to enhance the quality of life based on Pancasila (LO2).
	K3	Explain the social, cultural, ecological, political, economic, legal, and technological influences to address communication issues (LO9).
	GS1	Create creative and ethical works to foster innovation in the field of Communication (LO3).

	SS3	Apply marketing communication, journalism, and broadcasting strategies to communication practices (LO13).

Course Description

This course provides an introduction to computer graphics, covering the fundamental principles and techniques used in the creation and manipulation of digital images. Students will learn the basics of graphics programming, 2D and 3D transformations, rendering algorithms, and image processing. Through hands-on assignments and projects, students will develop practical skills in computer graphics and gain a deeper understanding of the visual representation of data.

Learning Objectives

By the end of this course, students will be able to:

1. Understand the basic concepts and principles of computer graphics.
2. Implement and manipulate 2D and 3D transformations.
3. Apply rendering algorithms to generate realistic images.
4. Perform image processing operations on digital images.
5. Develop graphics applications using programming languages and libraries.

Expectations

- Attend all lectures and actively participate in class discussions.
- Complete assigned readings and prepare questions for discussion.
- Submit assignments on time and actively seek feedback for improvement.
- Collaborate with classmates on group projects and contribute to a positive learning environment.

Course Schedule

Week 1: Students Are Able to Explain Introduction to Computer Graphics

- Introduction to computer graphics: history, applications, and challenges.
- Graphics pipeline: stages and transformations.
- Introduction to OpenGL and graphics libraries.

Readings:

- Chapter 1: Introduction to Computer Graphics, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 2: Students Are Able to Explain 2D Transformations

- 2D coordinate systems and transformations.
- Translation, scaling, rotation, and shearing.
- Matrix representation of transformations.

Readings:

- Chapter 2: Geometric Transformations, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 3: Students Are Able to Explain 3D Transformations

- 3D coordinate systems and transformations.
- Translation, scaling, rotation, and shearing in 3D.
- Perspective and orthographic projections.

Readings:

- Chapter 5: 3D Geometry, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 4: Students Are Able to Explain Illumination Models and Shading

- Introduction to illumination models.
- Ambient, diffuse, and specular reflections.
- Flat shading and Gouraud shading.

Readings:

- Chapter 7: Illumination Models and Surface-Rendering Methods, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 5: Students Are Able to Explain Ray Tracing

- Introduction to ray tracing.
- Ray-object intersection.
- Recursive ray tracing and reflection.

Readings:

- Chapter 14: Ray Tracing, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 6: Students Are Able to Explain Rasterization and Texturing

- Introduction to rasterization.
- Scan conversion algorithms.
- Texture mapping and filtering.

Readings:

- Chapter 8: Rasterization: Concepts and Algorithms, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 7: Students Are Able to Explain Hidden Surface Removal

- Depth buffering and z-buffer algorithm.
- Painter's algorithm.
- Binary space partitioning (BSP) trees.

Readings:

- Chapter 10: Hidden-Surface Removal, in "Computer Graphics: Principles and Practice" by Foley et al.

Week 8: Midterm Exam

Week 9: Students Are Able to Explain Image Processing Fundamentals

- Introduction to digital image processing.
- Image acquisition and representation.
- Point processing operations.

Readings:

- Chapter 2: Digital Image Fundamentals, in "Digital Image Processing" by Gonzalez and Woods.

Week 10: Students Are Able to Explain Image Filtering and Enhancement

- Spatial and frequency domain filtering.
- Image enhancement techniques.
- Histogram equalization and contrast stretching.

Readings:

- Chapter 3: Intensity Transformations and Spatial Filtering, in "Digital Image Processing" by Gonzalez and Woods.

Week 11: Students Are Able to Explain Image Segmentation

- Image segmentation techniques.
- Thresholding and region-based segmentation.
- Edge detection and contour extraction.

Readings:

- Chapter 10: Image Segmentation, in "Digital Image Processing" by Gonzalez and Woods.

Week 12: Students Are Able to Explain Texture Analysis and Synthesis

- Texture analysis techniques.
- Texture synthesis algorithms.
- Applications of texture analysis.

Readings:

- Chapter 11: Texture Analysis and Synthesis, in "Digital Image Processing" by Gonzalez and Woods.

Week 13: Students Are Able to Explain Advanced Topics in Computer Graphics

- GPU programming and parallel computing.
- Advanced rendering techniques.
- Virtual reality and augmented reality.

Readings:

- Selected research papers and articles on advanced topics in computer graphics.

Week 14-15: Students Are Able to Explain Project Development

- Working on a group project to apply the concepts learned in the course.
- Implementing a graphics application with real-world applications.

Week 16: Final Exam

Assessment

- Participation and Class Engagement: 10%
- Assignments and Programming Exercises: 30%
- Midterm Exam: 20%
- Final Exam: 30%
- Group Project: 10%

Required Readings

- "Computer Graphics: Principles and Practice" by Foley et al.
- "Digital Image Processing" by Gonzalez and Woods.
- Selected research papers and articles on advanced topics in computer graphics.