MODULE HANDBOOK DESCRIPTION

Module designation	Computer Graphics
Code	FBD0008
Semester(s) in which the module is taught	3/ thirdth year
Person responsible for the module	Giri Wahyu Wiriasto, S.T., M.T.
Language	Indonesian
Relation to curriculum	Free elective for computer engineering
Teaching methods	Project Base Method
Workload (incl. contact hours, self-study hours)	Contact Hours every week, each week of the 16 weeks/semester : (per week includes) • 2 x 50 minutes : Lecture • 2 x 60 minutes : Exercise and Assignment • 2 x 60 minutes : Self-learning Total Study hours = 5 hours and 40 minutes/week
Credit points	2 SKS (~ 3.2 ECTS)
Required and recommended prerequisites for joining the module	-

Module objectives/Program Learning Outcomes (PLO)	1. Student are able to explain and analyse the fundamental computer graphics concepts: Students should be able to explain basic concepts in computer graphics such as 2D and 3D coordinate systems, transformations, color models, and rasterization. 2. Student are able to explain and analyse Proficiency in graphics programming: Students should be able to use a graphics API (e.g., OpenGL or DirectX) to create basic 2D and 3D graphics applications, including simple shapes, texturing, and lighting. 3. Student are able to explain and analyse graphics hardware: Students should be able to explain the role of graphics hardware in modern computer systems and be able to identify key components of graphics hardware such as GPUs and video memory. 4. Student are able to explain and analyse the real-time rendering: Students should be able to explain the concepts behind real-time rendering, including rendering pipelines, shading models, and optimization techniques.	PLO-3
	1. Ability to design and implement graphics algorithms: Students should be able to design and implement algorithms for tasks such as rendering complex scenes, simulating physics-based animation, or creating special effects. 2. Ability to apply computer graphics to other domains: Students should be able to apply computer graphics techniques to other areas such as virtual reality, computer animation, or computer-aided design (CAD).	PLO-4
	1. Students are able to continuously learn about computer graphics development object with the continuously aspect like game development, etc	PLO9

Content	1. Introduction to computer graphics: Overview of the history of computer graphics, graphics hardware and software, and applications of computer graphics. 2. Graphics programming: Introduction to graphics APIs (e.g., OpenGL, DirectX), basic primitives (e.g., points, lines, triangles), transformations (e.g., translation, rotation, scaling), and rendering (e.g., rasterization). 3. Color models and lighting: Color models (e.g., RGB, CMYK, HSL), lighting models (e.g., ambient, diffuse, specular), and shaders (e.g., vertex shaders, fragment shaders). 4. 3D graphics: Three-dimensional graphics concepts (e.g., projection, perspective), modeling techniques (e.g., polygonal modeling, spline modeling), and texturing (e.g., mapping textures onto 3D models). 5. Real-time rendering: Overview of rendering pipelines, culling techniques, and optimization strategies for real-time rendering. 6. Graphics algorithms: Overview of different algorithms used in computer graphics, including ray tracing, rasterization, and image processing. 7. Animation and simulation: Introduction to computer animation and simulation techniques, including keyframing, skeletal animation, particle systems, and physics-based animation. 8. Virtual reality and augmented reality: Overview of virtual reality and augmented reality technologies, including hardware and software, applications, and challenges. 9. Computer-aided design: Introduction to computer-aided design (CAD) software, including 2D and 3D modeling techniques and applications in engineering and architecture.
Examination forms	Presentation design project, quiz Project simulation
Study and examination requirements	The final grade in the module is composed of: 1. Per-meeting score 16 meeting = 50% 2. Project = 50% Students must have a final grade of 65% or higher to pass.
Reading list	1. Computer Graphics: Principles and Practice (3rd Edition) by John F. Hughes, Andries van Dam, James D. Foley, Steven K. Feiner, and Kurt Akeley. 2. OpenGL Programming Guide (8th Edition) by Dave Shreiner, Graham Sellers, John Kessenich, and Bill Licea-Kane. 3. SIGGRAPH and ACM Transactions on Graphics.