Course Code	TKIT162205
Course Name	Graphical Visualization Engineering
Course Instructors	Rudy Hartanto; Paulus Insap Santoso
Course Type	Required
Course Classification	Basic Science & Math
Credit / Contact Hour per Week	2 /100 minutes per Week
Course Description	Learn the basic concepts of graphical math and its relation in designing realistic graphical objects by considering lighting and shadow models.
Prerequisites Courses	Fundamental of Programming
Covered Student Outcome	**Fundamental Engineering Knowledge (a)** **Development of Engineering Solution (b)** **Engineering Design (c)** **Modern Tools Utilization (e)**

Learning Outcome

No	Learning Outcome	Study Program Student Outcome
1.	Students are able to design and visualize 2-D graphical objects	Fundamental Engineering Knowledge
2.	Students are able to design and visualize 3-D graphical objects	Engineering Design
3.	Students are able to use OpenGL as one of the tools for designing 2-D and 3-D graphical objects	Development of Engineering Solution
4.	Students are able to use tools for designing the lighting process of an object in creating a realistic visualization of 3-D objects	Modern Tools Utilization

Topic	1. Basic mathematical graphics 2. 2-Dimensional graphics transformation 3. 3-Dimensional graphical transformation 4. Graphics Programming with OpenGL 5. Viewing and 3-Dimensional Projection 6. Lighting and Shading 7. Ray-Tracing Concept
Direct Asessment	

Direct Asessment Plan	**Measured Learning Outcome**
Mid Exam	LO1, LO2
Final Exam	LO3, LO4
Assignment	LO3, L04

Indirect Assesment	Questionnaire and direct communication
References	1. Govil-Pai, Shalini, Principles of Computer Graphics: Theory and Practice Using OpenGL and Maya, Springer Science+Business Media, Inc., 2004. 2. Edward Angel, David Shreiner, Interactive Computer Graphics: A Top-down Approach With Shader-Based OpenGL, Pearson Education, Inc., publishing as Addison-Wesley, 2012 3. Hill, F.S, Jr., Stephen M. Kelley Jr, Coputer Graphics Using OpenGLPearson Education Inc., 2007. 4. Shreiner Dave , OpenGL Programming Guide, Addison-Wesley, Pearson Education Inc., 2010.

	5. Wright, Richard S. Jr., Nicholas Haemel, Graham Sellers, Benjamin Lipchak, OpenGL Superbible: Coprehensive Tutorial and Reference, Addison-Wesley, Pearson Education Inc., 2011.