	Universitas Negeri Surabaya Vocational Faculty, D4 Informatics Management Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Computer Graphics	5730102178	Graphics, Interaction and Games	T=2	P=0	ECTS=3.18	4	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dodik Arwin Dermawana	Dodik Arwin Dermawan	Dodik Arwin Dermawan, S.ST., S.T., M.T.

Learning model: Project Based Learning

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description: This course teaches basic principles and methods in computer graphics and is able to design, implement and analyze correct and good graphics application systems. The material studied in this course is an introduction to computer graphics, primitive drawing, 2D graphic objects, 2D affine transformations, 3D graphic objects, 3D affine transformations, creating complex 3D graphic objects. In line with industrial needs, the Computer Graphics course also studies the implementation of Virtual Reality, which is currently more needed for simulation and virtual laboratory development.

References

Main :

1. Edward Angel. 2009. Interactive Computer Graphics: A Top-Down Approach Using OpenGL , Fifth Edition. Pearson International Inc.
2. Edward Angel. 2002. OpenGLTM: A Primer, Third Edition. Addison-Wesley.
3. Hills, Francis S Jr. 2000. Computer Graphics Using OpenGL, Second Edition . New Jersey: Prentice Hall.
4. Donald Hearn and M. Pauline Baker. Computer Graphics with OpenGL , 3rd Edition.
5. Alan Watt. 3D Computer Graphics. Addison-Wesley.

Supporters:

Supporting lecturer: Dodik Arwin Dermawan, S.ST., S.T., M.T.
Andi Iwan Nurhidayat, S.Kom., M.T.
I Gde Agung Sri Sidhimantra, S.Kom., M.Kom.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Students are able to explain the basics of graphics systems and graphics pipelines in the graphics library	1. Explaining Graphic Systems 2. Explain the meaning of Computer Graphics 3. Identify the formation of graphs/images 4. Identify models and Graphic System Architecture 5. Identify Computer Graphics applications 6. Explains the basics of the Graphics Library 7. Explains the background of the Graphics Library 8. Identify examples of Graphics Library Programs 9. Identifying 3D in Graphic Systems	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
2	Students are able to create and demonstrate simple graphics programs	1. Explaining Sierpinski Gaskets (2D/3D) 2. Identifying Input and Interaction 3. Explaining Graphics Library Callbacks 4. Applying the Graphic Library to the program code	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
3	Students are able to create interactive graphic applications	1. Identify input, display, menu, and picking devices 2. Apply how to design and build interactive programs with the Graphic Library	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
4	Students are able to implement World Windows and Viewport	1. Identify and implement World Windows and Viewport 2. Identify and apply clipping lines 3. Identify and apply regular polygons, circles and arcs	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%

5	Students can implement vector tools	1. Explain vectors 2. Explain dot product 3. Explain the cross product of two vectors 4. Explain the representation of key geometric objects 5. Applying vectors to the Graphic Library program	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
6	Students can explain geometry, representation and transformation of objects	Explains geometry, representation, and transformation of objects	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
7	Students can demonstrate object transformations in interactive graphics programs	1. Identify and apply transformations to the Graphics Library 2. Implement model building in the Graphic Library program 3. Implementing an isometric cube in the Graphic Library program	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
8	Subsummative Exam / Midterm Exam	Subsummative Exam / Midterm Exam	**Criteria:** Subsummative Exam / Midterm Exam	Subsummative Exam / Midterm Exam 3 X 50			0%
9	Students can model shapes with Polygonal Meshes	1. Identifying Polyhedra 2. Identifying Extruded Shapes 3. Identifying Particle Systems 4. Implement Polygonal Meshes modeling in the Graphic Library program	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
10	Students can implement 3D viewing	1. Identify and apply cameras 2. Identify and apply perspective projections of 3D objects 3. Identify and apply stereo view 4. Identify and apply a projection taxonomy	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%

11	Students are able to render faces in visual realism	1. Identify and apply shading models 2. Identify and apply flat shading and smooth shading 3. Identify and apply Adding hidden surface removal 4. Identify and apply texture to faces 5. Identify and apply shadows of objects	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
12	Students are able to render faces in visual realism	1. Identify and apply shading models 2. Identify and apply flat shading and smooth shading 3. Identify and apply Adding hidden surface removal 4. Identify and apply texture to faces 5. Identify and apply shadows of objects	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
13	Students can use tools for raster displays	1. Identify and implement pixmaps manipulation processes 2. Identify and apply combinations of pixmaps 3. Identify and apply Bresenham‘s algorithm 4. Identify and apply define and fill regions of pixels 5. Identify and apply polygon filling 6. Identify and apply aliasing and anti-aliasing techniques	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%

14	Students can use tools for raster displays	1. Identify and implement pixmaps manipulation processes 2. Identify and apply combinations of pixmaps 3. Identify and apply Bresenham's algorithm 4. Identify and apply define and fill regions of pixels 5. Identify and apply polygon filling 6. Identify and apply aliasing and anti-aliasing techniques	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
15	Students can implement curve and surface designs	1. Identify and apply interactive curve design 2. Identify and apply Beziercurve for curve design 3. Identify and apply the properties of Bezier curve 4. Identify and implement finding better blending function 5. Identify and apply B-spline basis functions 6. Identify and apply rationalsplines and NURPS curves	**Criteria:** Holistic Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50			0%
16	Summative Exam / Final Semester Exam	Summative Exam / Final Semester Exam	**Criteria:** Summative Exam / Final Semester Exam	Summative Exam / Final Exam Semester 2 X 50			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.

8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.