	Universitas Negeri Surabaya Faculty of Engineering, Electrical Engineering Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Computer Graphics	2020102041	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	6	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Raden Roro Hapsari Peni Agustin Tjahyaningtijas, S.Si., M.T.	Prof. Dr. I Gusti Putu Asto B., M.T.	Dr. Lusia Rakhmawati, 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)

PO - 1	Able to apply knowledge of mathematics and Computer Graphics to gain a thorough understanding of engineering principles.

PLO-PO Matrix

P.O
PO-1

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
PO-1																

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, complex 3D graphic objects.

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.

Supporters:

1. Alan Watt. 3D Computer Graphics. Addison-Wesley.

Supporting lecturer: Prof. Dr. I Gusti Putu Asto Buditjahjanto, S.T., M.T.
Dr. Raden Roro Hapsari Peni Agustin Tjahyaningtijas, S.Si., M.T.

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	**Criteria:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 1 **Reader:** *Edward Angel. 2009. Interactive Computer Graphics: A Top-Down Approach Using OpenGL, Fifth Edition. Pearson International Inc*	5%
2	Students are able to explain the basics of the Graphics Library	1. Identify Computer Graphics applications 2. Explains the basics of the Graphics Library 3. Explains the background of the Graphics Library 4. Identify examples of Graphics Library Programs 5. Identifying 3D in Graphic Systems	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 2 **Reader:** *Edward Angel. 2009. Interactive Computer Graphics: A Top-Down Approach Using OpenGL, Fifth Edition. Pearson International Inc*	5%
3	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:** Evaluation Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 3 **Reader:** *Edward Angel. 2002. OpenGLTM: A Primer, Third Edition . Addison-Wesley*	5%
4	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:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 4 **References:** *Hills, Francis S Jr. 2000. Computer Graphics Using OpenGL, Second Edition. New Jersey: Prentice Hall*	10%
5	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:** Evaluation Rubric **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 5 **Bibliography:** *Donald Hearn and M. Pauline Baker. Computer Graphics with OpenGL, 3rd Edition.*	10%

6	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:** Evaluation Rubric	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	10%
7	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
8	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
9	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%

10	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
11	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
12	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
13	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%

14	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
15	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	5%
16	Students can complete the UAS	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:** Evaluation Rubric **Form of Assessment** : Project Results Assessment / Product Assessment	Approach: Scientific Model: Problem-based learning Method: Discussion, Presentation, Practicum 2 X 50		**Material:** Meeting material 6 **Reader:** *Alan Watt. 3D Computer Graphics. Addison-Wesley.*	10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	20%
2.	Project Results Assessment / Product Assessment	65%
		85%

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.