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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Computer Vision	2010102029		T=2	P=0	ECTS=4.48	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Lilik Anifah, Hapsari Peni	Unit Three Kartini, S.T., M.T., Ph.D.	Unit Three Kartini, S.T., M.T., Ph.D.

Learning model	**Case Studies**

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	Able to understand the basic concepts of Computer Vision and its implementation in various applications
PO - 2	Students are able to understand the basic concepts of pattern recognition and its implementation in various applications
PO - 3	Students are able to understand the basic techniques/algorithms used in computer vision and pattern recognition
PO - 4	Students are able to apply these techniques/algorithms into simple applications of computer vision and pattern recognition

PLO-PO Matrix

P.O
PO-1
PO-2
PO-3
PO-4

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																
PO-2																
PO-3																
PO-4																

Short Course Description

This course provides a foundation for the concept of building a recognition system that tries to imitate the way humans work in recognizing an object. The emphasis on process complexity is conveyed through statistical, syntactic and semantic recognition methods. Students are guided to be able to see the essence and depth of determining object descriptors/properties using feature extraction techniques. After understanding descriptor/property objects, students are introduced to classification techniques for previously determined descriptor/property object data. Students are introduced to technology for processing data in building recognition systems and are required to design, implement and measure the performance of a recognition system.

References

Main :

1. Computer and Machine Vision: theory, Algorithms, Practicalities, E. R. Davies, Academic Press, 4th edition, 2012
2. Computer Vision: Algorithms and Applications, Richard Szeliski, Springer, 2010
3. An Introduction to 3D Computer Vision Techniques and Algorithms, Boguslaw Cyganek, J. Paul siebert, John Wiley & Sons, 2009

Supporters:

Supporting lecturer

Dr. Raden Roro Hapsari Peni Agustin Tjahyaningtijas, S.Si., M.T.
Dr. Lilik Anifah, S.T., M.T.

Week-	Final abilities of each learning	Evaluation	Help Learning, Learning methods, Student Assignments, [Estimated time]	Learning materials [References]	Assessment Weight (%)

	stage (Sub-PO)	Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students are able to explain the basic concepts of Computer Vision and its implementation in various applications	Accuracy in explaining the basic principles of computer vision and implementation	**Criteria:** Questions and Answers, Written (Assignment/Quiz) **Form of Assessment** : Participatory Activities	Lectures & Presentations	Lectures & Presentations	**Material:** Computer vision **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	2%
2	Students understand and are able to carry out basic image processing techniques that can be used in computer vision	Accuracy in calculating Image Formation, Filtering, and Enhancement and simulating them	**Criteria:** The assessment score is on a scale of 0-100 according to the assessment indicators **Form of Assessment** : Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Image processing **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	5%
3	Students understand and are able to carry out basic image processing techniques that can be used in computer vision	Accuracy in calculating Image Formation, Filtering, and Enhancement and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Image processing **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
4	Students understand and are able to carry out basic image processing techniques that can be used in computer vision	Accuracy in calculating Image Formation, Filtering, and Enhancement and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Edge detection **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
5	Students understand the basic principles and schemes of pattern recognition systems and know the methods that can be used at each stage of pattern recognition	Accuracy in explaining the basic principles and schemes of pattern recognition systems □ Accuracy in explaining the use of decision trees and Bayesians as classifiers □ Accuracy in explaining the difference between detection and recognition	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Pattern Recognition **Library:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
6	Students understand the basic principles and schemes of pattern recognition systems and know the methods that can be used at each stage of pattern recognition	Accuracy in explaining the basic principles and schemes of pattern recognition systems □ Accuracy in explaining the use of decision trees and Bayesians as classifiers □ Accuracy in explaining the difference between detection and recognition	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Pattern Recognition **Library:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%

7	Students understand the basic principles and schemes of pattern recognition systems and know the methods that can be used at each stage of pattern recognition	Accuracy in explaining the basic principles and schemes of pattern recognition systems Accuracy in explaining the use of decision trees and Bayesians as classifiers Accuracy in explaining the difference between detection and recognition	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Pattern Recognition **Library:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
8	Students understand the basic principles and schemes of pattern recognition systems and know the methods that can be used at each stage of pattern recognition	Accuracy in explaining the basic principles and schemes of pattern recognition systems Accuracy in explaining the use of decision trees and Bayesians as classifiers Accuracy in explaining the difference between detection and recognition	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Pattern Recognition **Library:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
9	Students understand and are able to perform basic stereopsis techniques that can be used in computer vision	Accuracy in explaining the basic principles of stereopsis and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Stereopsis **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
10	Students understand and are able to perform basic stereopsis techniques that can be used in computer vision	Accuracy in explaining the basic principles of stereopsis and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Stereopsis **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
11	Students understand the basic principles of motion in images and videos and know motion detection algorithms in video data	Accuracy in explaining the basic principles of motion in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Motion in images and videos **References:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	7%
12	Students understand the basic principles of motion in images and videos and know motion detection algorithms in video data	Accuracy in explaining tracking objects in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Motion in images and videos **References:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012* **Material:** Object Tracking **Library:** *Computer Vision: Algorithms and Applications, Richard Szeliski, Springer, 2010*	6%

13	Students understand the basic principles of motion in images and videos and know motion detection algorithms in video data	Accuracy in explaining tracking objects in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Object Tracking **Library:** *Computer Vision: Algorithms and Applications, Richard Szeliski, Springer, 2010*	6%
14	Students are able to apply the techniques they have learned to various computer vision applications/systems	Accuracy in explaining tracking objects in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Computer vision applications/systems **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	6%
15	Students are able to apply the techniques they have learned to various computer vision applications/systems	Accuracy in explaining tracking objects in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Computer vision applications/systems **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	6%
16	Students are able to apply the techniques they have learned to various computer vision applications/systems	Accuracy in explaining tracking objects in images and videos and simulating them	**Criteria:** Question and answer, Simulation (Assignment/Quiz) **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	Type: Lecture Method: 1. Direct instruction 2. Problem based learning (PBL) Time: 2 x 50 minutes 2 x 50 minutes	**Material:** Computer vision applications/systems **Bibliography:** *Computer and Machine Vision: theory, Algorithms, Practicalities, ER Davies, Academic Press, 4th edition, 2012*	6%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	48.5%
2.	Project Results Assessment / Product Assessment	51.5%
		100%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.