	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
Machine Vision	2020102075	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	5	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Lilik Anifah, S.T., M.T. ; Parama Diptya Widyaka, S.ST., M.T.	Prof. Dr. I Gusti Putu Asto B., M.T.	Dr. Lusia Rakhmawati, S.T., M.T.

Learning model	**Case Studies**

Program Learning Outcomes (PLO)

PLO study program which is charged to the course

Program Objectives (PO)

PO - 1	Able to apply basic knowledge of machine vision to gain a thorough understanding of engineering principles.
PO - 2	Able to communicate effectively both verbally and in writing regarding machine vision topics
PO - 3	Able to apply basic machine vision methods and skills needed to solve problems in the engineering field
PO - 4	Able to work in cross-disciplinary and cultural arts teams
PO - 5	Able to understand the need for lifelong learning in the field of machine vision related to relevant current issues

PLO-PO Matrix

P.O
PO-1
PO-2
PO-3
PO-4
PO-5

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																
PO-5																

Short Course Description	Students can understand the theory of machine vision, explain methods for recognizing colors, patterns, binaries, etc., discuss basic algorithms in machine vision, combine methods in machine vision to solve simple problems in the surrounding environment using the case method learning model in lectures.

References

Main :

1. Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc

Supporters:

1. Ramesh Jain. 1995. Machine Vision. McGraw-Hill, Inc.

Supporting lecturer	Dr. Lilik Anifah, S.T., M.T. Parama Diptya Widyaka, S.ST., 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	Understanding of the hardware used in machine visioncamera basicswebcamCCDLightingControlled experiments	1.Can explain the hardware used in machine vision, the basics of cameras 2.webcam 3.CCD 4.Lighting 5.Controlled experiment	**Criteria:** Evaluation Rubric	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 1 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
2	Understanding of the hardware used in machine visioncamera basicswebcamCCDLightingControlled experiments	1.Can explain the hardware used in machine vision, the basics of cameras 2.webcam 3.CCD 4.Lighting 5.Controlled experiment	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 2 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
3	Understand the basic theory of Image Processing Techniques, Basic Image Processing, Grayscale, Binary image processing, RGB normalization	1.Can explain the basic theory of basic image processing techniques 2.Grayscale 3.Binary image processing 4.RGB 5.normalization	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50			5%
4	Understand the basic theory of Image Processing Techniques, Basic Image Processing, Grayscale, Binary image processing, RGB normalization	1.Can explain the basic theory of basic image processing techniques 2.Grayscale 3.Binary image processing 4.RGB 5.normalization	**Criteria:** Evaluation Rubric	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 4 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
5	Understand segmentation techniques in image processing. Conturing techniques. Clustering techniques. Sneak techniques. Masking techniques	1.Can explain segmentation techniques in image processing. Conturing techniques 2.Clustering Technique 3.Sneak Technique 4.Masking Technique	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 5 **Reader:** *Ramesh Jain. 1995. Machine Vision. McGraw-Hill, Inc.*	5%

6	Understand segmentation techniques in image processing. Conturing techniques. Clustering techniques. Sneak techniques. Masking techniques	1. Can explain segmentation techniques in image processing. Conturing techniques 2. Clustering Technique 3. Sneak Technique 4. Masking Technique	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 6 **Bibliography:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
7	Understanding Image Recognition Techniques Pattern Recognition from Images Pattern recognition algorithm: Principle Component analysis Pattern recognition algorithm: Gabor Pattern recognition algorithm: Wavelet	1. Can explain Image Recognition Techniques, Pattern Recognition from Images 2. Pattern recognition algorithm: Principle Component analysis 3. Pattern recognition algorithm: Gabor 4. Pattern recognition algorithm: Wavelet	**Criteria:** Evaluation Rubric	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 7 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
8	Understanding Image Recognition Techniques Pattern Recognition from Images Pattern recognition algorithm: Principle Component analysis Pattern recognition algorithm: Gabor Pattern recognition algorithm: Wavelet	1. Can explain Image Recognition Techniques, Pattern Recognition from Images 2. Pattern recognition algorithm: Principle Component analysis 3. Pattern recognition algorithm: Gabor 4. Pattern recognition algorithm: Wavelet	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 1-7 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	10%
9	Midterm exam	Midterm exam	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 9 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%

10	Understand the Image Understanding techniqueLocal Binary PatternNeural NetworkLocalizing	1.Can explain the technique of Understanding Local Binary Pattern Images 2.Neural Networks 3.Localizing	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 10 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
11	Understand the Image Understanding techniqueLocal Binary PatternNeural NetworkLocalizing	1.Can explain the technique of Understanding Local Binary Pattern Images 2.Neural Networks 3.Localizing	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 11 **Reader:** *Ramesh Jain. 1995. Machine Vision. McGraw-Hill, Inc.*	5%
12	Understanding Stereo Image Techniques Modeling Image processing results Depth Image Stereo Visio Image enhancing and repairing	1.Can explain Stereo Image Techniques, Modeling Image Processing Results 2.Depth Image 3.Stereo Visio 4.Image enhancing and repairing	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 12 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
13	Able to design machine vision systems in industry, use of image processing, use of image segmentation and recognition methods, data extraction from images, data processing and data display	1.Can design machine vision systems in the image processing industry 2.use of image segmentation and recognition methods 3.extracting data from images 4.data processing and data display	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 13 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
14	Able to design machine vision systems in industry, use of image processing, use of image segmentation and recognition methods, data extraction from images, data processing and data display	1.Can design machine vision systems in the image processing industry 2.use of image segmentation and recognition methods 3.extracting data from images 4.data processing and data display	**Criteria:** Evaluation Rubric **Form of Assessment** : Participatory Activities	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 14 **Reader:** *Ramesh Jain. 1995. Machine Vision. McGraw-Hill, Inc.*	5%

15	Able to design machine vision systems in industry, use of image processing, use of image segmentation and recognition methods, data extraction from images, data processing and data display	1.Can design machine vision systems in the image processing industry 2.use of image segmentation and recognition methods 3.extracting data from images 4.data processing and data display	**Criteria:** Evaluation Rubric	Model: Cooperative learningMethod: Discussion Scientific Approach:-ObservingListening to the lecturer's explanation regarding the theory of light waves-AskingDiscussing solutions to problems-ExploringMaking observation reports regarding the theory of light waves-Associating Analyzing the results of observations-CommunicatingDiscussing the results of observations. 2 X 50		**Material:** Meeting material 15 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	5%
16	Complete the Final Semester Exam	Evaluation Rubric	**Criteria:** Evaluation Rubric	Written Test 2 x 50		**Material:** Meeting material 1-15 **Reader:** *Linda G. Shapiro. 2001. Computer Vision. Prentice-Hall, Inc*	10%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	60%
		60%

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.