



**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																																																																																																															
Image Processing	2010102027	Study Program Elective Courses	T=2 P=0 ECTS=4.48	2	April 27, 2023																																																																																																															
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator																																																																																																																
	Hapsari Peni, Lilik Anifah		Unit Three Kartini, S.T., M.T., Ph.D	Unit Three Kartini, S.T., M.T., Ph.D.																																																																																																																
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	PO - 1	CLO1-CPL-S3 3. Able to show a responsible attitude towards Image Processing-based solutions to problems in the field of Electrical Engineering.																																																																																																																		
	PO - 2	CLO2-CPL-KU3 3. Able to manage simple research and development in the field of electrical engineering that is beneficial to society and image processing-based science.																																																																																																																		
	PO - 3	CLO3-CPL-KK6 6. Able to specify and model artificial intelligence-based image processing algorithms in utilizing electricity industry technology																																																																																																																		
	PO - 4	CLO4-CPL-P3 3. Able to master theoretical concepts and image processing methods in the field of electrical engineering																																																																																																																		
	PLO-PO Matrix																																																																																																																			
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Short Course Description	Digital Image Processing is the study of what digital images are and how to manipulate them to obtain certain desired results, which can help visual perception, processing and advanced pattern recognition and advanced image classification																																																																																																																			
References	Main :																																																																																																																			
	1. Gonzalez, Rafael C and Woods, Richard,1992, Digital Image Processing, Third Edition Pearson																																																																																																																			
	Supporters:																																																																																																																			
1. Munir,Rinaldi, 2004, Pengolahan Citra Digital dengan Pendekatan Algoritmik, Penerbit Informatika, Bandung																																																																																																																				
2. Artiker jurnal penelitian image processing yang relevan																																																																																																																				

Supporting lecturer		Dr. Raden Roro Hapsari Peni Agustini Tjahyaningtjas, S.Si., M.T. Dr. Lilik Anifah, S.T., 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	SubCLO1-CLO1-CPL-S3 3. Able to show a responsible attitude towards Image Processing based problems.	<p>1.1. Students understand how to present image representations in the spatial domain using matrices</p> <p>2.2. Students understand the meaning of color space and examples</p> <p>3.3. Students understand sampling and quantization methods from analog images to digital images</p> <p>4.4. Students understand the meaning of halftoning and examples</p>	<p>Criteria: Criteria: Holistic Rubric Form: Non Test</p> <p>Form of Assessment : Participatory Activities</p>	Lectures and discussions 2 x 50 minutes	Lectures and discussions -	<p>Material: 1. Definition of digital image. 2. Color space. 3. Sampling and quantization. 4. Storing the image in a file. 5. Halftoning Bibliography: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
2	SubCLO2-CLO4-CPL-P3 3. Able to master the concept of Image Processing	Students understand: 1. the types of attributes used in digital images; 2. characteristics used in digital images.	<p>Criteria: Criteria: Analytical Rubric Form: Non Test</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, PjBL 2 x 50 minutes	PjBL	<p>Material: 1. Attributes of digital images. 2. Image characteristics, digital. 3. Color space. References: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
3	SubCLO2-CLO4-CPL-P3 3. Able to master the concept of Image Processing	Students understand: 1. the types of attributes used in digital images; 2. characteristics used in digital images.	<p>Criteria: Criteria: Analytical Rubric Form: Non Test</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, PjBL 2 x 50 minutes	PjBL	<p>Material: 1. Attributes of digital images. 2. Image characteristics, digital. 3. Color space. References: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%

4	SubCLO3-CLO2-CPL-KU3 3. Able to manage simple research using Process Morphology in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to manage simple research using Process Morphology in the field of Electrical Engineering 2.Able to use Process Morphology when given an image processing problem 3.Able to analyze the morphology of the process that has been produced 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes		<p>Material: 4. Process Morphology Library: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
5	SubCLO3-CLO2-CPL-KU3 3. Able to manage simple research using Process Morphology in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to manage simple research using Process Morphology in the field of Electrical Engineering 2.Able to use Process Morphology when given an image processing problem 3.Able to analyze the morphology of the process that has been produced 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes		<p>Material: 4. Process Morphology Library: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
6	SubCLO3-CLO2-CPL-KU3 3. Able to manage simple research using Process Morphology in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to manage simple research using Process Morphology in the field of Electrical Engineering 2.Able to use Process Morphology when given an image processing problem 3.Able to analyze the morphology of the process that has been produced 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes		<p>Material: 4. Process Morphology Library: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
7	SubCLO4-CLO2-CPL-KU3 3. Able to manage simple Image Enhancement research in the field of Electrical Engineering	<ol style="list-style-type: none"> 1.Able to manage simple Image Enhancement research in the field of Electrical Engineering 2.Able to analyze the results of the Image Enhancement process 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes		<p>Material: Image Enhancement Bibliography: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p> <p>Material: Image Enhancement Bibliography: <i>Relevant image processing research journal articles</i></p>	6%

8	SubCLO4-CLO2-CPL-KU3 3. Able to manage simple Image Enhancement research in the field of Electrical Engineering	<ol style="list-style-type: none"> 1. Able to manage simple Image Enhancement research in the field of Electrical Engineering 2. Able to analyze the results of the Image Enhancement process 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes		<p>Material: Image Enhancement Bibliography: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p> <hr/> <p>Material: Image Enhancement Bibliography: <i>Relevant image processing research journal articles</i></p>	6%
9	SubCLO5-CLO3-CPL-KK6 6. Able to specify and model Image Segmentation algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1. Able to specify and model Image Segmentation algorithms 2. Able to apply the Image Segmentation algorithm 3. Able to analyze the results of applying the Image Segmentation algorithm 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	- -	<p>Material: Image Segmentation Bibliography: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
10	SubCLO5-CLO3-CPL-KK6 6. Able to specify and model Image Segmentation algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1. Able to specify and model Image Segmentation algorithms 2. Able to apply the Image Segmentation algorithm 3. Able to analyze the results of applying the Image Segmentation algorithm 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	- -	<p>Material: Image Segmentation Bibliography: <i>Gonzalez, Rafael C and Woods, Richard, 1992, Digital Image Processing, Third Edition Pearson</i></p>	6%
11	SubCLO6-CLO3-CPL-KK6 6. Able to specify and model Image Identification algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1. Able to apply a simple image identification algorithm 2. Able to apply a simple hybrid image identification algorithm/using AI 3. Able to apply analyzing algorithms that have been created 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	- -	<p>Material: Image Identification Bibliography: <i>Relevant image processing research journal articles</i></p>	7%
12	SubCLO6-CLO3-CPL-KK6 6. Able to specify and model Image Identification algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1. Able to apply a simple image identification algorithm 2. Able to apply a simple hybrid image identification algorithm/using AI 3. Able to apply analyzing algorithms that have been created 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	- -	<p>Material: Image Identification Bibliography: <i>Relevant image processing research journal articles</i></p>	7%

13	SubCLO7-CLO3-CPL-KK6 6. Able to specify and model Image Classification algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to apply Image Classification algorithms and artificial intelligence in the field of Electrical Engineering. 2.Able to analyze the implementation of the Image Classification algorithm that has been created 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	-	<p>Material: 13. Image Classification Bibliography: Gonzalez, Rafael C and Woods, Richard, 1992, <i>Digital Image Processing, Third Edition</i> Pearson</p> <hr/> <p>Material: 13. Image Classification Bibliography: Relevant image processing research journal articles</p>	7%
14	SubCLO7-CLO3-CPL-KK6 6. Able to specify and model Image Classification algorithms and artificial intelligence in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to apply Image Classification algorithms and artificial intelligence in the field of Electrical Engineering. 2.Able to analyze the implementation of the Image Classification algorithm that has been created 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	-	<p>Material: 13. Image Classification Bibliography: Gonzalez, Rafael C and Woods, Richard, 1992, <i>Digital Image Processing, Third Edition</i> Pearson</p> <hr/> <p>Material: 13. Image Classification Bibliography: Relevant image processing research journal articles</p>	7%
15	SubCLO8-CLO1-CPL-S3 3. Able to demonstrate a responsible attitude towards Image Processing-based solutions through the process of evaluating and calculating system performance in problems in the field of Electrical Engineering.	<ol style="list-style-type: none"> 1.Able to model Image Classification algorithms and artificial intelligence in the field of Electrical Engineering. 2.Able to implement simple Image Classification algorithm modeling and artificial intelligence in the field of Electrical Engineering. 3.Able to analyze the results of implementing the algorithms that have been created 	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	-	<p>Material: Performance Evaluation Bibliography: Relevant image processing research journal articles</p>	6%

16	SubCLO8-CLO1-CPL-S3 3. Able to demonstrate a responsible attitude towards Image Processing-based solutions through the process of evaluating and calculating system performance in problems in the field of Electrical Engineering.	<p>1. Able to model Image Classification algorithms and artificial intelligence in the field of Electrical Engineering.</p> <p>2. Able to implement simple Image Classification algorithm modeling and artificial intelligence in the field of Electrical Engineering.</p> <p>3. Able to analyze the results of implementing the algorithms that have been created</p>	<p>Criteria: The assessment score is on a scale of 0-100 according to the assessment indicators</p> <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Lectures, discussions, PjBL 2 x 50 minutes	- -	<p>Material: Performance Evaluation</p> <p>Bibliography: <i>Relevant image processing research journal articles</i></p>	6%
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Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	18%
2.	Project Results Assessment / Product Assessment	82%
		100%

Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.