	Universitas Negeri Surabaya Faculty of Postgraduate School, Master of Technology and Vocational Education Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Image Processing	8310103019	Compulsory Study Program Subjects	T=3 P=0 ECTS=6.72	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Dr. Nurhayati., ST.,MT	.....	Dr. Ir. Achmad Imam Agung, M.Pd.

Learning model	**Project Based Learning**

Program Learning Outcomes (PLO)

PLO study program which is charged to the course

PLO-7	Have extensive knowledge in the fields of general knowledge, social and humanities
PLO-11	Able to apply applied research to innovate vocational learning methods, optimize industry-relevant technology

Program Objectives (PO)

PLO-PO Matrix

P.O	PLO-7	PLO-11

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 discusses the basic concepts and techniques of image processing, image conversion from analog to digital, presentation of digital images with resolution and gray level, image quality improvement techniques using various approaches and image restoration, basics and techniques of image segmentation, image analysis using techniques side detection to improve the appearance of lines in the image, image compression and coding techniques, image coloring and processing concepts, and getting to know tools in image processing and being able to implement image processing algorithms in software and applications

References

Main :

1. Gonzales, Rafael C. . 2002. Digital Image Processing , Second Edition. New Jersey: Prentice-Hall, Inc
2. John G Proakis, Dimitris G. Manolakis. 1996. Digital Signal Processing: Principles, Algorithms, and Apllication, 3rd ed. Prentice-Hall
3. Anil K. Jain. 1989. Fundamentals of Digital Image Processing.New Jersey: Prentice-Hall, Inc
4. Alasdair Mc Andrew. 2004.An Introduction to Digital Image Processing with Matlab. Victoria University of technology
5. William K. Pratt.2001. Digital Image Processing, Third Edition, California.John wiley&Son, Inc

Supporters:

Supporting lecturer	Dr. Nurhayati, 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	Students are able to explain the meaning of digital images and their processing	1. Explain the basic concepts of digital images 2. Explain various digital image processing methods 3. Know the equipment used to process images 4. Know image processing applications	**Criteria:** Oral Test Performance Test **Form of Assessment** : Participatory Activities		Presentation, discussion and reflection 3x50‘	**Material:** Understanding digital images and their processing **References:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	5%
2	Students are able to explain the meaning of digital images and their processing	1. Explain the basic concepts of digital images 2. Explain various digital image processing methods 3. Know the equipment used to process images 4. Know image processing applications	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment		Presentation, discussion and reflection 3 X 50	**Material:** 1. Basic concepts of digital images 2. Digital image processing methods 3. Equipment used to process images 4. Image processing applications **References:** *John G Proakis, Dimitris G. Manolakis. 1996. Digital Signal Processing: Principles, Algorithms, and Applications, 3rd ed. Prentice-Hall*	5%
3	Students are able to explain image conversion from analog to digital, presenting digital images with resolution and gray level	1. Understand the presentation of digital images 2. Compare how close the digital image is to the original image 3. Know about the gray level and color of the image 4. Understand the presentation of binary images	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Tests		Presentation, project discussion and reflection 3 X 50	**Material:** Presentation of digital images, Comparing how close a digital image is to the original image, Gray level and color of the image and Presentation of binary images **References:** *John G Proakis, Dimitris G. Manolakis. 1996. Digital Signal Processing: Principles, Algorithms, and Applications, 3rd ed. Prentice-Hall*	5%

4	Students are able to explain convolution and Fourier transformation in image processing	1. Understand the basic theory of convolution 2. Understand convolution in 2-dimensional functions 3. Understand the fourier transform 4. Understand the discrete fourier transform	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Tests		Discussions, assignments, exercises, searching for library sources and other references 3 X 50	**Material:** basic theory of image convolution **Reference:** *Anil K. Jain. 1989. Fundamentals of Digital Image Processing. New Jersey: Prentice-Hall, Inc*	5%
5	Students are able to explain convolution and Fourier transformation in image processing	1. Understand the basic theory of convolution 2. Understand convolution in 2-dimensional functions 3. Understand the fourier transform 4. Understand the discrete fourier transform	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance		Discussions, assignments, exercises, searching for library sources and other references 3 X 50	**Material:** convolution and fourier transformation **Reader:** *Alasdair Mc Andrew. 2004. An Introduction to Digital Image Processing with Matlab. Victoria University of technology*	5%
6	Explains image quality improvement techniques using various approaches and image restoration	- produce analysis and synthesis of creative work to improve image performance	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance		Discussions, assignments, exercises, searching for library sources and other references 3 X 50	**Material:** improving image quality with various approaches and image restoration **References:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	5%
7	Explains image quality improvement techniques using various approaches and image restoration	1. Understand the histogram concept and its application 2. Understand the concept of filtering to improve image quality 3. Understand the concept of contrast switching in improving image quality 4. Use geometric transformation and correction techniques 5. Understand the concept of image restoration	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Project Results Assessment / Product Assessment, Practical Assessment, Practice / Performance, Test		Discussions, assignments, exercises, searching for library sources and other references 3 X 50	**Material:** Image restoration concept **Reference:** *William K. Pratt.2001. Digital Image Processing, Third Edition, California. John wiley&Son, Inc*	5%
8	U.S.S	- produce work that is creative, original, tested and useful for scientific development	**Form of Assessment** : Project Results Assessment / Product Assessment, Test	Written Test Oral Test Description Performance Test	3 X 50		15%

9	Students are able to explain the basics and techniques of image segmentation	1. Understand image segmentation 2. Understand image segmentation techniques based on histograms 3. Understand binary image segmentation	**Form of Assessment** : Project Results Assessment / Product Assessment		Discussion, exercises and assignments 3 X 50	**Material:** Mind segmentation **Reference:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	5%
10	Students are able to explain the basics and techniques of image segmentation	- produce creative, original, tested work regarding image segmentation techniques and is useful for scientific development	**Criteria:** Oral Test Performance Test **Form of Assessment** : Project Results Assessment / Product Assessment		Discussion, exercises and assignments 3 X 50	**Material:** Application of image segmentation **References:** *John G Proakis, Dimitris G. Manolakis. 1996. Digital Signal Processing: Principles, Algorithms, and Applications, 3rd ed. Prentice-Hall*	4%
11	Students are able to explain image analysis using edge detection techniques to improve the appearance of lines in the image	Students can understand various image analysis techniques using system detection	**Criteria:** Oral Test Performance Test **Form of Assessment** : Project Results Assessment / Product Assessment, Practice / Performance, Test		Discussion, exercises and assignments 3 X 50	**Material:** edge detection techniques **References:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	5%
12	Students are able to explain image compression and coding techniques	- produce creative, original, tested and useful work regarding image compression techniques to overcome data repetition, image compression techniques and the Huffman method for image coding	**Criteria:** Oral Test Performance Test		Discussion, exercises and project assignments 3 X 50	**Material:** Image compression and coding **Reader:** *Alasdair Mc Andrew. 2004. An Introduction to Digital Image Processing with Matlab. Victoria University of technology*	5%
13	Students are able to explain image compression and coding techniques	1. Understand image compression techniques to overcome data repetition 2. Understand image compression systems 3. Use the Huffman method for image coding	**Criteria:** Oral Test Performance Test **Form of Assessment** : Project Results Assessment / Product Assessment, Test		Discussion, exercises and project assignments 3 X 50	**Material:** Compression and coding applications **References:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	5%

14	Students are able to explain the concept of image coloring and its processing	Produce work that is creative, original, tested, and useful for scientific development regarding the basics of coloring images and their attributes, color specifications, synthesizing several color models, color processing based on gray levels 5. Get to know the concepts of steganography and watermarking	**Criteria:** Oral Test Performance Test **Form of Assessment** : Project Results Assessment / Product Assessment	Discussion, exercises and assignments 3 X 50		**Material:** image coloring and processing **References:** *Gonzales, Rafael C. . 2002. Digital Image Processing, Second Edition. New Jersey: Prentice-Hall, Inc*	3%
15	Students are able to explain the concept of image coloring and its processing	1. Understand the basics of image coloring and its attributes 2. Determine color specifications 3. Convert several color models 4. Understand color processing based on gray levels 5. Get to know the concepts of steganography and watermarking	**Criteria:** Oral Test Performance Test **Forms of Assessment** : Project Results Assessment / Product Assessment, Practical Assessment, Practice / Performance	Discussion, exercises and project assignments 3 X 50		**Material:** image coloring and processing **Reference:** *William K. Pratt.2001. Digital Image Processing, Third Edition, California. John wiley&Son, Inc*	2%
16	UAS		**Form of Assessment** : Project Results Assessment / Product Assessment, Practice / Performance, Test	3 X 50			20%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	12.92%
2.	Project Results Assessment / Product Assessment	40.18%
3.	Portfolio Assessment	2.5%
4.	Practical Assessment	3.17%
5.	Practice / Performance	13.18%
6.	Test	22.09%
		94.04%

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.