MODULE HANDBOOK

Course:	**Digital Image Processing**
Module Level:	Undergraduate
Code:	FIK311
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	7^{th} / Fourth Year
Module Coordinator:	Dr. Riries Rulaningtyas, S.T, M.T.
Lecturer(s):	Dr. Riries Rulaningtyas, S.T, M.T. and Drs. Soegianto Soelistiono, M.Si.
Language:	Bahasa Indonesia
Classification within the Curriculum:	~~Compulsory Course~~ / Elective Course
Teaching format / class hours per week during semester:	2 hours of lectures (50 min / hour)
Workload:	2 hours of lectures, 2 hours of structural activities, 2 hours of individual study, 13 weeks per semester, and total of 78 hours per semester ~ 2.6 ECTS*
Credit Points:	2
Requirement(s):	(FIK 303) Computational Physics Programming and (FIK 305) Computational Physics
Learning Goals/Competencies:	**General Competence (Knowledge):** After following this course, students are able to apply the concept of digital image processing of image resulting from the application of medical and industrial equipments. **Specific Competence:** 1. The students are able to explain the process of digital image acquisition and all the operations of the digital image. 2. The students are able to solve the problem of digital image quality improvement in the spatial domain. 3. The students are able to explain the concept of image enhancement with wavelet multiresolution method. 4. The students are able to explain the concept of digital image processing in color images. 5. The students are able to apply the concept of morphology on digital image processing 6. The students are able to apply the concept of segmentation in digital images to extract certain image 7. The students are able to apply the concept of image restoration for image identification

Contents:	**Digital Image fundamentals** : Image Sensing and Acquisition, Image sampling and Quantization, pixels operation, neighbors operation; **Image Enhancement in Spatial Domain** : Histogram processing, Spatial Filtering; **Image Enhancement in the Frequency Domain** : Fourier Transform application, Smoothing Frequency-domain Filter, Sharpening Frequency Domain Filter; **Wavelet and Multi resolution Processing** : Multiresolution Expansions, Wavelet Transforms in One Dimension, **Image Restoration**: The process of degradation of the image, the model image noise, noise in the degraded image restoration spatial filter, noise reduction filter periodically with the frequency domain, inverse filter, filter wiener, geometric transformations; **Color Image Processing**: Color models, color conversion, image processing base color, color transformation, the spatial filter color image, color image smoothing, color image enhancement **Morphology Image Processing**: Dilation and erosion, opening and closing, boundary extraction, region filling, extraction connected component, thinning, thickening, skeletonization; **Image Segmentation**: Discontinuity detection, thresholding, region-based segmentation, watershed-based segmentation algorithm, Hough transform; **Image Representation** : Chain code, a segment boundary, skeleton, boundary descriptors, Fourier descriptors, statistical moments, texture, invariant moments; **Object Recognition** : Pattern classes, structural methods.
Soft Skill Attribute:	Effort and ethic
Study/Exam Achievements:	Students are considered competent and eligible to pass the course upon obtaining at least 40 of maximum score for the exams (midterm test and final exam) structured activity (group discussion). Final score is calculated as follow: ▪ 20% assignment with : ▪ essay ▪ make papers ▪ 10% soft skill : ▪ from presentation : communication, leadership, team work ▪ discipline ▪ 35% (midterm test) ▪ essay ▪ 35% (final exam) ▪ essay Final grade is defined as follow: A : 75 - 100 AB : 70 - 74.99 B : 65 - 69.99 BC : 60 - 64.99 C : 55 - 59.99 D : 40 - 54.99 E : 0 - 39.99

Forms of Media:	Powerpoint slides, LCD projectors and whiteboards
Learning Methods:	Concept based learning with lecture , assessments , and group discussion
Literature(s):	1. Jain, K. Anil, 1989, *Fundamental of Digital Image Processing*, Prentice Hall 2. Rafael C. Gonzalez dan Richard E. Woods., 2002, *Digital Image Processing,* second edition. Prentice Hall. New Jersey. 3. Prasetyo, E., Pengolahan Citra Digital dan Apllikasinya menggunakan Matlab, Penerbit Andi, 2011.
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.