MODULE HANDBOOK

Course:	**Optical Image Processing**
Module Level:	Undergraduate
Code:	FIO 304
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	7th / Fourth Year
Module Coordinator:	Prof. Dr. Retna Apsari, M.Si.
Lecturer(s):	Prof. Dr. Retna Apsari, M.Si. and Endah Purwanti, S.Si, MT
Language:	Bahasa Indonesia
Classification within the curriculum:	~~Compulsory Course~~ / Elective Course
Teaching format / class hours per week during semester:	3 hours of lectures (50 min / hour)
Workload:	3 hours of lectures, 3 hours of structural activities, 3 hours of individual study, 13 weeks per semester, and total of 117 hours per semester ~ 3,9 ECTS*
Credit Points:	3
Requirement(s):	-
Learning Goals/Competencies:	**General Competence (Knowledge):** After following this course, the students are able to process optical image, explain photonic image processing instruments and its optical phenomenon, and implement the course in physics research for industry and medical applications. **Specific Competences:** 1. Students are able to solve the optical image processing problems Students be able to understand the Introduction of image processing, image formation process, basic of image processing, image histogram, convolution, image tranformation 2. Students are able to understand the basic principle of optical image 3. Students are able to understand the Image analysis 4. Students are able to understand the application of propagation and optical wave difraction 5. Students are able to understand the template imaging and its applications
Contents:	**Introduction of image processing, image formation process, basic of image processing, image histogram, convolution, image tranformation** (descrete fourier transformation, descrete cosinus transformation, descrete wavelet transformation), **basic principle of optical image** (introduction of linear system, optics geometry, light transfer matrix, imaging system application for thin lens), image quality repair (point operation, spatial and frequency filtering,

	smoothing sharpening). **Image analysis** such as (geometric correction, morphology,edge detection, segmentation, fitur extraction (matrix co-occurance, gradient, spectrum fourier, wavelet, color fitur, Gabor filter, fractal, 3D visualization)),**photonics basic principle for optical image processing** (wave equations, Maxwell equations, interference, difraction and coherence, image processing light source, basic principle of radiometri and fotometri), **application of propagation and optical wave difraction** (linear wave propagation, spatial frequency transfer function for propagating, application for fresnel diffraction and fraunhofer diffraction), **photonic instrument for image processing** (holography, diffraction, tonography, microscope imaging, laser spectroscopy, laser speckle imaging), **template imaging an and its applications for eye detection, as well as related others contemporer optical image processing topics for medical and industry.**
Soft Skill Attribute:	Ethic and effort.
Study/Exam Achievements:	Students are considered competent and eligible to pass the course upon obtaining at least 40% of maximum score for midterm test, final exam, quizzes and home work. Final score is calculated as follow: 20% Homework +20% Quizzes + 30% Midterm Test +30% Final Exam 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 Method:	Lecture and tutorial
Literature(s):	1. Ting-Chung Poon, 2002, *Contemporary Optical Image Processing with Mathlab*, Elsevier Tokyo. 2. Crictobal, Schelkens, Thienpont, 2011, *Optical and Digital Image Processing*, Wiley 3. Dougherty Geoff, 2009, *Digital Image Processing For Medical Application*, Cambridge University Press. 4. Goonzales dan Woods. 1998. *Digital Image Processing.* Addison-Wesley Publishing Company, inc. USA. 5. Guenther R., 1999, *Modern Optics*, John Willey and Sons, New York. 6. Yaroslavsky, 2004, Digital Holography and Digital Image Processing (Principles, Methods, Algorithms), Kluwer Academica Publisher (Optics) 7. Kuo dan Tsai, 2002, *Three Dimensional Holographic Imaging*,

	Wiley 8. Relevant international journals.
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.