Module Description

Module name	Computer Vision
Module level, if applicable	Bachelor of Informatics
Code, if applicable	21D12131304
Subtitle, if applicable	-
Course, if applicable	-
Semester(s) in which the module is taught	6th
Person responsible for the module	Dr. Ir. Ingrid Nurtanio, MT.
Lecturer	1. Dr. Ir. Ingrid Nurtanio, MT. 2. Dr. Eng. Intan Sari Areni., ST., MT
Language	Indonesian Language [Bahasa Indonesia]
Relation to Curriculum	This course is a compulsory course for the Artificial Intelligence and Robotics research group and is offered in the 6th semester.
Type of teaching, contact hours	Teaching methods: [group discussion], [problem-based learning]. Teaching forms: [lecture], [tutorial], [practicum]. CH : 08.00 - 16.00
Workload	For this course, students are required to meet a minimum of 181.33 hours in one semester, which consist of: - 53.33 hours for lecture, - 64.00 hours for structured assignments, - 64.00 hours for private study
Credit points	4 credit points (equivalent with 6.8 ECTS)
Requirements according to the	Students have participated in at least 80% of the learning activities (Academic Regulations, Chapter VII)

examination regulations	
Recommended prerequisites	Linear Algebra
Module objectives/intended learning outcomes	After completing the course, Students are able:

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Intended Learning Outcomes (ILO):

ILO 3 : Apply the knowledge of computing and other related disciplines to analyze and identify solutions for any computing-based problem. [ILO 3] - S

ILO 7 : Perform a logical systematic procedure to solve problems, then communicate their ideas in a convincing and effective manner, either in written or orally, to propose solutions. [ILO 7] - S

Course Learning Objective (CLO):

After completing this course, students are expected to be able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology with the spirit of independence and responsibility. In addition, students are expected to be able to solve problems related to the field of Informatics with expertise in artificial intelligence, robotics, games and multimedia, data processing, Big Data, and Cloud Computing.

Sub CLO :

ILO 3 ⇒ CLO 1 : Students are able to explain the meaning of image and image processing; representation of image, image processing element, image acquisition; able to explain the relationship of image processing with computer graphics and pattern recognition and computer vision; and able to explain the application of computer vision.

ILO 3 ⇒ CLO 2 : Students are able to understand convolution theory on 2-dimensional functions and their application, Fourier Transformation, statistical operations and their application.

ILO 3 ⇒ CLO 3 : Students are able to explain spatial transformations and operations as well as various image processing operations, both in improving the quality of image and restoration of image.

ILO 7 ⇒ CLO 4 : Students are able to explain edge detection techniques to improve the appearance of lines in the image which is the core of the segmentation

	ILO 3 ⇒ CLO 5 : Students are able to understand and to implement image processing based on frequency domain. ILO 7 ⇒ CLO 6 : Students are able to explain and implement image morphology operation. ILO 7⇒ CLO 7 : Students are able to understand contour representation techniques which are a continuation of edge detection. ILO 7 ⇒ CLO 8 : Students are able to explain about image compression.
Content	Students will learn about : 1. Introduction to image processing and computer vision 2. Model of image and image digitization, digital image elements, digital image processing systems, Image Acquisition 3. Image representation and convolution theory 4. Fourier transform, Statistical operations, basic image processing operations 5. Spatial transformation and operations, image enhancement and image restoration. 6. Edge detection 7. Contour Representation, Hough transformation 8. Image compression 9. Image morphology and processing
Forms of Assessment	Assessment techniques: [observation], [participation], [written test]. Assessment forms: [quiz], [midterm exam], [final term exam], [assignment], [presentation]. Quiz = 10%, Mid term exam = 13% Final term exam = 25%, Assignment = 17.5%, Presentation = 19.5%, Practicum = 15% CLO 1 => ILO 3: 5% (Assignment: participation) CLO 2 => ILO 3: 13% (Mid term exam: written test) CLO 3 => ILO 3: 12.5% (Assignment: participation) CLO 4 => ILO 7: 19.5% (Presentation: observation) CLO 5 => ILO 3: 5% (Practicum: observation) CLO 6 => ILO 7: 5% (Practicum: observation) CLO 7 => ILO 7: 25% (Final term exam: written test) CLO 8 => ILO 7: 15% (Practicum : observation and Quiz: written test)
Study and	**Study and examination requirements:**

examination requirements and forms of examination	- Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Students must attend the exam to get a final grade. **Form of examination:** Written exam: Essay
Media employed	Text book, Image Processing Toolbox, Zoom, Gmeet, Learning Management System, Video and Slide Presentation
Reading list	**Main :** ● Fadlisyah SSi, 2007, *Visi Komputer dan Pengolahan Citra*, Edisi Pertama, Penerbit Andi, Yogyakarta. ● Aniati Murni Arymurthy, Suryana Setiawan, 1992, *Pengantar Pengolahan Citra*, Edisi pertama, Elex Media Komputindo ● Gonzales, Rafael C., 1992, *Digital Image Processing*, Second Edition, Addison-Wesley publishing. ● Jain, Anil K., 1995, *Fundamentals of Digital Image Processing*, Second Edition, Prentice Hall of India. ● Marvin Ch. Wijaya, Agus Prijono, 2007, *Pengolahan Citra Digital menggunakan Matlab*, Penerbit Informatika Bandung. ● Michael C. Fairhurst, 1994, *Visi Komputer untuk Sistem Robotik, sebuah pengantar*, Penerbit Universitas Indonesia, Yogyakarta. ● Rinaldi Munir, 2004, *Pengolahan Citra Digital dengan Pendekatan Algoritmik*, Edisi Pertama, Penerbit Informatika Bandung. ● Tati Mengko, Richard Mengko, 1988, *Diktat Kuliah Pengolahan Citra*, Jurusan Teknik Elektro ITB ● T. Suyoto, Edy Mulyanto, Vincent Suhartono, Oky Dwi Nurhayati, Wijanarto, 2009, *Teori Pengolahan Citra Digital*, Edisi pertama, Penerbit Andi Offset, Yogyakarta

	● Usman Ahmad, 2005, *Pengolahan Citra Digital & Teknik Pemrogramannya, Penerbit Graha Ilmu.* **Support :** ● Computer Vision Teaching Module