



**UNIVERSITAS GADJAH MADA**  
**Faculty of Mathematics and Natural Sciences**  
**Department of Computer Science and Electronics**  
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## Doctoral Programme of Computer Science

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Website	: <a href="http://dcse.fmipa.ugm.ac.id/site/en/computer-science-doctoral-program/">http://dcse.fmipa.ugm.ac.id/site/en/computer-science-doctoral-program/</a>
Module name:	<b>PATTERN RECOGNITION</b>
Module level, if applicable:	<b>DOCTORAL</b>
Code, if applicable:	MII7845
Semester(s) in which the module is taught:	1 (Odd)
Person responsible for the module:	Agus Harjoko, M.Sc., Ph.D
Lecturer(s):	Agus Harjoko, M.Sc., Ph.D
Language:	Indonesia
Relation to curriculum:	Elective course for students majoring in classification and the like
Credit points:	3
Type of teaching, contact hours:	A mixed of Classical delivery, literature study, mini project, and presentation
Workload:	6-9 hours/week (meeting, literature study, and project)
Requirements according to the examination regulations:	Mini project presentation and report. The report may be in the paper format.
Recommended prerequisite	Good in mathematics and programming
Module objectives/ intended learning outcomes:	CO1: Able to explain the concepts and techniques of pattern recognition which include detection, grouping, classification, identification and verification. CO2: Able to design and or implement solutions to pattern recognition problems with data in the form of text. CO3: Able to design and or implement solutions to pattern recognition problems with data in the form of 1-dimensional signals. CO4: Able to design and or implement solutions to pattern recognition problems using image data. CO5: Able to design and or implement solutions to pattern recognition problems using video data. CO6: Able to design and or validate methods to solve pattern recognition problems.
Content:	1. Pattern recognition concept

	<ol style="list-style-type: none"> <li>2. Text features and basic processing</li> <li>3. One dimensional signal features and basic processing</li> <li>4. Image features and basic processing</li> <li>5. Video features and basic processing</li> <li>6. Clustering methods</li> <li>7. Detection and Classification methods</li> <li>8. Performance evaluation</li> </ol>
Study and examination requirements and forms of examination:	Students are evaluated based on mini project presentation and report
Media employed:	Face to face meeting, online meeting, power point presentation
Reading List:	<ol style="list-style-type: none"> <li>1. <u>Pattern Recognition and Machine Learning</u> by C. Bishop, Springer 2006.</li> <li>2. <u>Pattern Classification (2nd. Edition)</u> by R. O. Duda, P. E. Hart and D. Stork, Wiley 2002.</li> <li>3. 2D Object Detection and Recognition, Y. Amit, MIT Press, 2002.</li> <li>4. <u>Statistical Pattern Recogniton</u>, by A.R. Webb, John Wiley &amp; Sons, 2002.</li> <li>5. Computer Vision: Algorithms and Applications, 2<sup>nd</sup> Edition, R. Szeliski, Springer 2021.</li> <li>6. An Introduction to Statistical Learning with Application in R, by G. James, D. Witten, T. Hastie, and R. Tibshirani, Springer 2021.</li> <li>7. Informasi dan sumber data di <a href="http://kdd.ics.uci.edu/">http://kdd.ics.uci.edu/</a>.</li> <li>8. Relevant papers</li> </ol>

#### The Mapping of COs to PLOs

COs	PLOs							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CO1								
CO2								
CO3								
CO4								
CO5								
CO6								

#### The PLO of DP-CS

PLO	Knowledge Area	PLO Description
PLO1	[Values and principles]	A graduate should be devoted to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working around expertise independently.

<b>Managerial Capability</b>		
<b>PLO2</b>	[Professional attitudes]	A graduate should have good interpersonal skills; able to work together within the organization, both as a leader and a member; able to be the initiator; able to manage and delegate tasks; and have a sense of responsibility for their own work as well as take responsibility for the achievement of the organization's work.
<b>PLO3</b>	[Communication skills]	A graduate should be able to communicate effectively and efficiently with stakeholders from various backgrounds; use English well; and able to write and present scientific papers correctly and well.
<b>PLO4</b>	[Life-long learning]	A graduate should be up to date with the state-of-the-art especially in computer science field, able to take parts in the development of computer science field that is engaged in and relate it to other fields throughout life.
<b>Working Capability</b>		
<b>PLO5</b>	[Problem-solving and Scientific skills]	A graduate should be able to analyse science and technology problems in the computer science field, develop alternative solutions through intra disciplinary, interdisciplinary, and trans disciplinary approaches to produce innovative, original, and tested works.
<b>PLO6</b>	[Ability to formulate and do research]	A graduate should be able to formulate research problems through critical, exploratory, and innovative studies both independently and in groups of computer science field that is engaged in and present research results in a scientific paper at regional or international level.
<b>Mastering Knowledge</b>		
<b>PLO7</b>	[Fundamental knowledge]	A graduate should be able to develop knowledge in the field of computer science that is engaged, which includes abstraction, complexity, evolution and philosophy of changes or developments in the field of science.
<b>PLO8</b>	[Applied knowledge]	A graduate should be able to develop theoretical, philosophical, and applied concepts in the field of computer science that is engaged in, and to represent them in a structured and systematic manner.