



# UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Department of Computer Science and Electronics

Sekip Utara Bulaksumur Yogyakarta 55281 Telp: +62 274 546194 Fax: +62 274 546194 Email: dep-ike.mipa@ugm.ac.id

## Doctoral Programme of Computer Science

Telephone : (0274)546194

Email : s3ik.mipa@ugm.ac.id

Website : <http://dcse.fmipa.ugm.ac.id/site/id/s3-ilmu-komputer/>

Module name : COMPUTATIONAL INTELLIGENCE

Module level, if applicable : DOCTORAL

Code, if applicable :

Semester(s) in which the module is taught : 1 (Odd)

Person responsible for the module : Prof. Dra. Sri Hartati, M.Sc., Ph.D.

Lecturer(s) : Prof. Dra. Sri Hartati, M.Sc., Ph.D., Drs. Retantyo Wardoyo, M.Sc., Ph.D., Dr. Sri Mulyana, M.Kom.

Language : Indonesian

Relation to curriculum : Elective course

Credit points : 3 credits

Type of teaching, contact hours : Classical, Independent Study, Writing paper, Presentation.  
Contact hours: lecturer's contact hours

Workload : (1) Lectures and discussion:  $3 \times 50 = 150$  minutes (2.5 hours) per week. (2) Exercises and assignments:  $3 \times 60 = 180$  minutes (3 hours) per week. (3) Independent study:  $3 \times 60 = 180$  minutes (3 hours) per week.

Requirements according to the examination regulations : -

Recommended prerequisite : Artificial Intelligence

Module objectives/ intended learning outcomes : Computational intelligence course is designed to provide artificial intelligence knowledge, especially those related to soft computing and its applications. Materials discussed include Soft computing and AI Characteristics, Concepts of Soft Computing, Neural Networks, Genetic Algorithms, Case-Based Reasoning, and Swarm Intelligence.

After completing this course, students are expected to be able to understand methods in computational intelligence and solve problems by implementing these methods.

	<p>CO1: Comprehend and be able to explain the basic concepts of Computational Intelligence and Artificial Intelligence</p> <p>CO2: Comprehend and be able to explain the basic concepts of and apply the Genetic Algorithm.</p> <p>CO3: Comprehend and be able to explain the basic concepts of and apply Neural Networks.</p> <p>CO4: Comprehend and be able to explain the basic concepts of and apply Case-Based Reasoning.</p> <p>CO5: Comprehend and be able to explain the basic concepts of Swarm Intelligence, and apply some algorithms of Swarm Intelligence.</p> <p>CO6: Be able to explain the state-of-the-art in the field of Computational Intelligence, contemporary research topics, and the future direction of research and development in this field.</p>
Content	: Topics covered for this course: Introduction to Computational Intelligence in conjunction with Artificial Intelligence; Introduction to Soft Computing and its applications; Concepts and applications of Neural Networks; Genetic Algorithm; Case-Based Reasoning; Introduction, algorithm, and application of Swarm Intelligence.
Study and examination requirements and forms of examination	<p>: Evaluation is done in 3 forms, namely:</p> <ol style="list-style-type: none"> <li>1. Two examinations: mid-term and final,</li> <li>2. A modeling assignment, and</li> <li>3. A short review paper on state-of-the-art methods in formal methods.</li> </ol> <p>Assessment is done using benchmark assessment, with the aim of measuring the level of students' understanding related to the target.</p>
Media employed	: Whiteboard, LCD, online meeting
Reading List	: James M. Keller, Derong Liu, and David B. Fogel: "Fundamentals of Computational Intelligence", IEEE Press, 2016

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

<b>PLO</b>	<b>Knowledge Area</b>	<b>PLO Description</b>
<b>PLO1</b>	[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.