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	: **N**UMERICAL **A**NALYSIS
Module level, if applicable	: **D**OCTORAL
Code, if applicable	: MII7270
Semester(s) in which the module is taught	: I (Odd)
Person responsible for the module	: Dr. Nur Rokhman, M.Kom.
Lecturer(s)	: Dr. Nur Rokhman, M.Kom.
Language	: Indonesia
Relation to curriculum	: Doctorate; elective; 1st or 3rd semester.
Credit points	: 3 credits
Type of teaching, contact hours	: Doctorate: lectures for < 5 students. Contact hours are lecture hours.
Workload	: (1) Lectures and discussion: 3 x 50 = 150 minutes (2.5 hours) per week. (2) Exercises and assignments: 3 x 60 = 180 minutes (3 hours) per week. (3) Independent study: 3 x 60 = 180 minutes (3 hours) per week
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.
Recommended prerequisite	: -
Module objectives/ intended learning outcomes	Numerical analysis designs effective ways to find numerical solutions to complex Mathematical problems. On completion of the course, student will be able to CO1: Understanding essential theoretical background and practical skills for the design numerical solutions CO2: Understanding state of the art techniques numerical solution CO3: Have a hands on experience with numerical analysis programming CO4: Develop a research project in a multi-disciplinary field of engineering and science CO5: Improve problem solving and presentation skills

Content	1. Introduction to Numerical Analysis 2. Error Analysis 3. Solutions of nonlinear equation 4. Interpolation and polynomial approximation 5. Numerical differentiation and integration 6. Initial value problems for ordinary differential equation 7. Solutions of linear system 8. Iterative technique in Linear Algebra 9. Approximation theory 10. Approximating Eigenvalues 11. Numerical Solutions of nonlinear system 12. Boundary value problem for ordinary differential equations 13. Numerical solutions to partial differential equations
Study and examination requirements and forms of examination	: Evaluation is done in 3 forms, namely: 1. Two examinations, mid-term and final, 2. Homework assignment, and 3. A short review paper on state-of-the-art methods in numerical analysis Assessment is done using benchmark assessment, with the aim of measuring the level of students' understanding related to the target and class rank.
Media employed	: LCD, blackboard, and websites.
Reading List	1. Richard L. Burden and J. Douglas Faires, 2011, Numerical Analysis. 2. Steven C. Chapra and Raymond P. Canale, 2015, Numerical Method for Engineers.

The Mapping of COs to PLOs

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

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.
Managerial Capability		
PLO2	[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.
PLO3	[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.
PLO4	[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.
Working Capability		
PLO5	[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.
PLO6	[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.
Mastering Knowledge		
PLO7	[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.
PLO8	[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.