Numerical Methods

Module name	Numerical Methods	
Module level	Undergraduate	
Code	IF221115	
Courses (if applicable)	Numerical Methods	
Semester	3	
Lecturer	Dr. Ir. Kartini, S.Kom, MT. (PIC) Eva Yulia Puspaningrum, S.Kom, M.Kom. Yisti Vita Via, S.ST, M.Kom.	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program; compulsory; 3rd semester	
Type of teaching, contact hours	Lectures, < 60 students	
Teaching Methods	Simulation, case study, collaborative learning	
Workload	1. Lectures: 3 sks x 50 = 150 minutes (2 hours 30 minutes) per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private study: 3 x 60 = 180 minutes (3 hours) per week	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Linear Algebra and Matrices	
Courses description	In this course, students discuss the basic concepts of computation involving errors and learning computational methods for solving problems related to nonlinear equations, simultaneous linear equations, differentiation, and integration.	
Learning outcomes and their corresponding PLOs	After completing this module, a student is expected to:	
	CO1 Students are able to understand concepts of analytical, numerical, linear, and nonlinear methods..	PLO3, PLO6
	CO2 Students are able to understand and apply solutions for linear and nonlinear equations using a programming language.	PLO3, PLO6
	CO3 Students are able to understand and implement differentiation and integration concepts using a programming language.	PLO3, PLO6
Content	Basic concepts of analytical and numerical methods, differences between analytical and numerical methods, fundamental concepts of linear and nonlinear equations, solving linear and nonlinear equations using manual calculations and programming languages, solving differentiation concepts using manual calculations and programming languages, solving integral concepts using manual calculations and programming languages.	
Media employed	LCD, whiteboard, websites, books (as references), online meeting, etc.	

Assessments and Evaluation	One written Midterm assessment (60 minutes) and one final oral exam (30 minutes), two short computer-based quizzes, takehome written assignments
Study and examination requirements and forms of examination	The final grade in the module is composed of: • Two short computer-based quizzes: 15% x 2 = 30% • Take-home written assignments: 15% • Written Midterm assessment: 25% • Final oral exam: 30% Students must have a final grade of 55.6% or higher to pass.
Reading List	● Z. Altaç, Numerical Methods for Scientists and Engineers. CRC Pressr, 2024. ● A. Gilat, V. Subramaniam, Numerical Methods for Engineers and Scientists. Wiley, 2023. ● J. Pebralia, Metode Numerik. Eureka Media Aksara, 2022. ● S. C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, 5th Edition. McGraw Hill, 2023. ● C. Snehashish, Jeswal, S. Kumar, Applied artificial neural network methods for engineers and scientists : solving algebraic equations. World Scientific Publishing, 2021. ISBN: 9789811230202. [Online]. Available: https://portal.igpublish.com/iglibrary/obj/WSPCB0010327?searchid=1754983373768uAagN07OEyVT5SQo5kOB3 ● J. P. Corriou, Numerical Methods and Optimization: Theory and Practice for Engineers (Springer Optimization and Its Applications, 187. Springer, 2022. ● Q. Kong, T. Siauw, Alexandre M. Bayen, Python Programming and Numerical Methods. Elsevier, 2021. ● Thoyyibah, R. Maulida, A. F. Rizky, Implementasi Phyton pada Metode Numerik. Eureka Media Aksara, 2024.