

Course Code	TKIE162202	
Course Name	Numerical Method (Course + Tutorial)	
Course Instructors	Noor Akhmad Setiawan; Bondhan Windhuratna; Sarjiya; Igi Ardiyanto; Indah Soesanti; Eny Sukani Rahayu; Samiadji Herdjunanto	
Course Type	Required	
Course Classification	Basic Science & Math	
Credit / Contact Hour per Week	3 / 150 minutes per Week	
Course Description	This course introduce various solving technique related to mathematical modelling, including solving linear equations using direct and indirect methods, root solver, concept of vector and matrix, and optimization.	
Prerequisites Courses	-	
Covered Student Outcome	Fundamental Engineering Knowledge (a) Development of Engineering Solution (b) Data and Experiment (d)	
Learning Outcome		
		Study Program Student Outcome
No	Learning Outcome	SO (a) – SO (k)
1.	Students can solve root search problems from nonlinear equations by applying graphical methods, bracketing methods, and open methods.	Data and Experiment (d)
2.	Students can solve computational problems related to matrix theory such as matrix determinant calculation, matrix inverse, and solving of simultaneous linear equations by applying some methods such as Gauss, Gauss-Jordan, Jacobi, Gauss-Seidel, and LU Factorization.	Development of Engineering Solution (b)
3.	Students understand the problem of Optimization and able to solve both optimization problems that have or do not have a constraint.	Fundamental Engineering Knowledge (a)
4.	Students understand the problems of regression and interpolation and are able to apply the existing methods to solve the problems of regression and interpolation.	Development of Engineering Solution (b)
5.	Students are able to apply the Trapezoidal Method, Simpson's Method, Richardson Method, Extrapolation Method, Romberg Integration Method, Quadrature Method, and Quadrature Gauss Method to solve numerical integral equations.	Development of Engineering Solution (b)
6.	Students able to solve both ordinary differential equations and partial differential equations by applying methods such as Euler method, Heun's method, Midpoint method, Runge-Kutta method, Shooting method, Finite Element Method, and Finite Difference method.	Data and Experiment (d)
Topic	<ol style="list-style-type: none"> 1. Introduction to Numerical Methods 2. Solving Equations 3. Vector and Matrix Concept 4. Determinant 5. Matrix Inversion 6. Solving Linear Algebra Equation using Direct Methods 7. Solving Linear Algebra Equation using Iterations 8. Gauss-Jordan Elimination 	

	<p>9. Optimization 10. Curve Fitting and Interpolations 11. ODE and PDE</p>												
Direct Assessment	<table border="1"> <thead> <tr> <th>Direct Assessment Plan</th> <th>Measured Learning Outcome</th> </tr> </thead> <tbody> <tr> <td>Mid Exam</td> <td>LO1, LO2</td> </tr> <tr> <td>Final Exam</td> <td>LO3, LO4</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Direct Assessment Plan	Measured Learning Outcome	Mid Exam	LO1, LO2	Final Exam	LO3, LO4						
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Final Exam	LO3, LO4												
Indirect Assessment	Questionnaire and direct communication												
References	<p>[1] S. Chapra and R. Canale, 2010, Numerical Methods for Engineers, Mc Graw Hill.</p> <p>[2] A. Gillat and V. Subramaniam, 2014, Numerical Methods for Engineers and Scientist, John Wiley and Sons.</p>												