

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	Linear Algebra (TKIE161203)							
Covered Student Outcome	Fundamental and Engineering Knowledge (a) Development of Engineering Solution (b) Data and Experiment (d)							
Learning Outcome	<ol style="list-style-type: none"> 1. Students can solve root search problems from nonlinear equations by applying graphical methods, bracketing methods, and open methods. 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. 3. Students understand the problem of Optimization and able to solve both optimization problems that have or do not have a constraint. 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. 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. 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. 							
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 9. Optimization 10. Curve Fitting and Interpolations 11. ODE and PDE 							
Direct Asessment	<table border="1"> <thead> <tr> <th>Direct Asessment 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> </tbody> </table>		Direct Asessment Plan	Measured Learning Outcome	Mid Exam	LO1, LO2	Final Exam	LO3, LO4
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Mid Exam	LO1, LO2							
Final Exam	LO3, LO4							
Indirect Assesment	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 Scientiest, John Wiley and Sons.</p>							