21B33C613 – Computer Numerical Control

Module designation	Computer Numerical Control (Undergraduate)
Semester(s) in which the module is taught	6th
Person responsible for the module	Dyah Darma, S.T., M.Tel.Eng., Wirawan Setialaksana, S.Pd., M.Sc., Nurul Mukhlisah Abdal, S.Si., M.Si.
Language	Indonesia – English
Relation to curriculum	This course is an elective course
Teaching methods	Lecture, Presentation
Workload (incl. contact hours, self-study hours)	CH: 09.00-17.00 Face to face: 3x50 minutes / week Independent Study: 3x50 minutes / week Structured assignment: 3x50 minutes / week
Credit points	3 SKS (equivalent 5.1 ECTS)
Required and recommended prerequisites for joining the module	Basic Mathematics, Discrete Mathematics
Module objectives/intended learning outcomes	**Program Learning Outcomes (PLO)** PLO 3: Internalize academic values, norms and ethics; PLO 5: Able to design, engineer and implement software; in vocational education; PLO 7: Able to read information data and make appropriate decisions in the context of solving problems in the ICT field PLO 11: Able to apply mathematics, science and engineering principles to solve complex engineering problems in the field of informatics and computer engineering **Course Learning Objectives (CLO)** This course is a course that discusses the basic concepts of computing that contain errors and studies computational methods for solving problems of nonlinear equations, simultaneous linear equations, interpolation, derivatives and numerical integrals. **Sub CLO:** Sub-CLO 1: Be able to state the need and benefits of numerical computing and explain the concept of error

	Sub-CLO 2: Able to compare algorithms to determine numerical solutions to nonlinear equations Sub-CLO 3: Able to compare algorithms to determine numerical solutions to linear equations Sub-CLO 4: Able to determine methods for curve fitting Sub-CLO 5 Able to apply the rules for numerical integration Sub-CLO 6 Able to solve derivative problems using numerical methods Sub-CLO 7 Able to solve ordinary differential equation problems using numerical methods
Content	Students will learn about: ● Error Concept: Understanding Error and its Sources, Significant Figures, Floating Point, Machine Epsilon, Error Propogation ● Numerical Solution of Nonlinear Equations: Bisection Method, Regula Falsi Method, Fixed Point Iteration Method, Newtonraphson Method, Secant Method ● Numerical Solution of Linear Equations: Gauss Elimination Method, Gaussjordan Elimination Method, Jacobi Iteration Method, Gaussseidel Iteration Method, LU Decomposition Method, and Cholesky Decomposition Method ● Data Matching with Regression Methods and Interpolation Methods ● Numerical Integrating: Quadrilateral Rule, Trapezoidal Rule, Midpoint Rule, Simpson 1/3 Rule, Simpson 3/8 Rule, and Monte Carlo Method ● Numerical Derivation: Numerical Derivative Approach, Derivation of Formulas with Taylor Series, Derivation of Formulas with Polynomial Interpolation. ● Numerical Solutions: Euler's Method, Heun's Method, 1st Order Rungekutta Method, 2nd Order Rungekutta Method, 3rd Order Rungekutta Method, 4th Order Rungekutta Method
Examination forms	Assessment Techniques: Exam, Presentation, Case Based Learning Assessment Forms: Assignment, Presentation Assessment
Study and examination requirements	● Students have to inform the lecturer when they are not able to attend the class due to sickness etc ● Active in making projects by showing participation in making projects in class ● Able to present and answer questions that exist during project presentations
Readng List	● Chapra, Steven C. 2005. Numerical Methods for Engineers and Scientits. 7th Ed. Boston: McGraw-Hill Inc. ● Munir, R. 2006. Metode Numerik, Edisi Revisi. Informatika, Bandung. ● Burden, R. L. & J. D. Faires. 2011. Numerical Analysis. 9th Ed. Boston: Brooks/Cole.