UNIVERSITAS INDONESIA
Faculty of Mathematics and Natural Sciences
Department of Mathematics
Building D, Kampus UI Depok 16424, Telp: 021 - 7863439,
Email: sekretariat.math@sci.ui.ac.id, website: https://www.math.ui.ac.id/

MODULE HANDBOOK

Module designation	*Numerical Mathematics*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Dr. Yudi Satria*
Language	*Indonesia*
Relation to curriculum	*Elective*
Teaching methods	*Flipped learning.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload: 9 hours/week x 14 weeks + 5.5 hours/week x 2 weeks = 137 hours.* *Contact hours: 150 minutes lectures.* *Individual study including examination preparation, specified in hours :* *3 hours structured learning and 3 hours individual study per week.*
Credit points	*3 SKS (4.77 ECTS)*
Required and recommended prerequisites for joining the module	*Numerical Methods*

Module objectives/intended learning outcomes	*After completing the course, students have the ability* 1. *To solve the problem of approximating a single variable function using several methods, namely Discrete Least Squares, Orthogonal Polynomials and Least Squares, Chebyshev Polynomials and Economization of Power Series, Rational Functions, Trigonometric Polynomials, and Fast Fourier Transforms Approximation.* 2. *To solve value approximation problems and eigenvectors using several methods, namely, Power, Householder, QR, and Singular Value Decomposition.* 3. *To solve non-linear system of equations by using several methods, namely Fixed points for functions of several variables, Newton's method, Quasi-Newton, and Steepest Descent techniques*
Content	1. *Methods to find the approximation of a single variable function, namely Discrete Least Squares, Orthogonal Polynomials and Least Squares, Chebyshev Polynomials and Economization of Power Series, Rational Functions, Trigonometric Polynomials, and Fast Fourier Transforms Approximation.* 2. *Methods to find eigenvalue approximations, namely Power, Householder, QR, and Singular Value Decomposition (SVD).* 3. *Methods to solve nonlinear systems numerically, namely Fixed points method for functions of several variables, Newton's method, Quasi-Newton, and Steepest Descent techniques.*
Examination forms	*Essay.*

Study and examination requirements	*The final mark will be weighted as follows:* 1. *Assignments (40%)* 2. *Mid-term examination (30%)* 3. *Final-term examination (30%)* *To successfully pass the module it requires a minimum 55% of the total mark.* *Mark* — *Grade* *85—100* — *A* *80—<85* — *A-* *75—<80* — *B+* *70—<75* — *B* *65—<70* — *B-* *60—<65* — *C+* *55—<60* — *C* *40—<55* — *D* *<40* — *E*
Reading list	**Compulsory:** [1] Burden, R.L., *Numerical Analysis (9th International Edition)*, 2011, Canada: Wadsworth, Brooks/Cole, Cengage Learning. **Elective:** [2] Atkinson K. dan Han W., *Elementary Numerical Analysis, 3rd Ed*, 2004, John Wiley & Sons, Inc. [3] Golub, G. H. dan Loan, C.F.V., *Matrix Computations*, 4th Ed., 1995, The John Hopkin University Press.