MODULE HANDBOOK

Course	:	**Computational Physics II**
Module Level	:	Undergraduate
Code	:	FIK305
Sub-heading, if applicable:	:	-
Courses included in the module, if applicable:	:	-
Semester/Term	:	5th/Third Year
Module Coordinator(s):		Dr. Khusnul Ain, S.T., M.Si
Lecturer(s):	:	Dr. Khusnul Ain, S.T., M.Si. and Dr. Ir. Soegianto Soelistiono, M.Si.
Classification within the curriculum	:	Compulsory Course / ~~Elective Course~~
Teaching format / class hours per week during semester:		3 hours of lectures (50 min / hour)
Workload	:	3 hours of lectures, 3 hours of structural activities, 3 hours of individual study, 13 weeks per semester, and total of 117 hours per semester 3.9 ECTS*
Credit Points	:	3
Requirement(s)	:	Computational Physics I
Learning Outcome	:	LO1 : They have knowledge of classical and modern physics with their relevant problems LO2 : They have ability to apply mathematical methods to solve problems in physics LO3 : They have ability to apply concepts and principles of physics for theoretical analysis, modeling and simulation
Learning Goals/Competences:	:	**General Competence (Skill):** The students are able: to analyze the physics problem by numerical method approachment and program's code in computers. **Specific Competence:** The students are able to: a. Encode program to find the root of nonlinier equation with a numerical method b. Encode program to solve interpolation with a certain logical reason for a particular problem. c. Find general finite difference equation to solve the case of partial differential equation d. Develop finite difference equation for 2D Laplace and Poisson equation with the regular and irregular constraint. e. Use Fourier Transform to solve the Physics problems.
Contents	:	Numerical methods, error, non linier root finding (Regular False, Bisection, Newton, Secant) linear equation system (Gauss

		elimination methods, Gauss Jordan, inverse, Jacobi, Gaus-Seidel) interpolation, fitting data ordinary differential equation (Euler, Heun, polygon repaired, Runge Kutta) partial differential equation (Crank-Nicolson methods, Laplace equation, Poisson equation, parabolic equation, hyperbolic equation) diffusion equation; finite difference (domain, grid point, forward, backward, central difference), Fourier transform, introduction of monte carlo methods by random generator, integral solution by monte carlo.
Soft Skill Attribute	:	Dicipline, can access and process the information.
Study/Exam Achievements	:	Students are considered competent and eligible to pass the course upon obtaining at least 40 of maximum score for the exams (midterm test and final exam), structured activity (group discussion). Final score is calculated as follow: 20% assignment 1 + 20%assignment 2 + 30% midterm + 30% final exam Final grade is defined as follow: A : 75 – 100 AB : 70 - 74.99 B : 65 - 69.99 BC : 60 - 64.99 C : 55 - 59.99 D : 40 - 54.99 E : 0 - 39.99
Forms of Media	:	Powerpoint slides, LCD projectors and whiteboards
Learning Methods	:	Lecture, assessments and group discussion
Referensi	:	a. Capra,S.C. and R.P Canale, 2009, Numerical Methods for Engineers, 6 th Ed., Mc. Graw Hill. b. Gilbert Strang, 2015, Differential Equation and Linear Algebra, Wellesley-Cambridge Press, U.S. c. Stephen W. Goode, Scott A.Annin, 2015, Differential Equations and Linear Algebra, pearson. d. Jesus Rogel Salazar, 2013, Essential mathlab and octav, Taylor and Prancis CRC Press.
Notes:		*Total ECTS={(total hours workloadx50 min)/60 min}/25 hours Each ECTS is equals with 25 hours