MODULE HANDBOOK

Modul Name:	**Mathematical Physics I**
Modul Level:	Undergraduate
Abbreviation, if applicable:	FIT201
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/Term:	3rd / Second Year
Module Coordinator:	Drs. Adri Supardi,MS.
Lecture(s):	Drs. Adri Supardi,MS. and Drs. R. Arif Wibowo, M.Si.
Language:	Bahasa Indonesia
Classification Within The Curriculum:	Compulsory Course / ~~Elective Course~~
Teaching format/ class hours per week during semester:	4 hours of lectures (50 minutes/hour)
Workload:	4 hours of lectures, 4 hours of tutorial and structured activities, 4 hours of individual activities, 13 weeks per semester, and total of 156 hours per semester ~ 5,2 ECTS
Credit Points:	4
Requirement(s):	(MAD 101) Calculus I, (MAD 106) Calculus II and (FID103) Basic Physics II
Learning Goals/Competences:	**General Competence (Knowledge):** Have a knowledge of various mathematical tools and its practicality in physics **Specific Competences:** 1. The ability to apply mathematics to solve simple physics problems 2. The ability to identify or formulate a mathematical model to solve physics problems 3. The ability to apply mathematics to solve problems of mechanics, electricity and magnetism, thermodynamics

Contents:	**Infinite Series:** Definition, convergence and divergence, test of convergence, power series, expanding function in power series; **Complex Number:** Concept and algebra of complex number, polar representation, de Moivre's theorem, complex logarithm, complex power, hyperbolic function; **Fourier Series:** Periodic function, trigonometric series, arbitrary periodic function, complex Fourier series, Parseval theorem; **Derivatives and Differentiation:** Partial derivatives, total differential, total derivatives, exact and inexact differential, chain rule, change of variable, thermodynamic relation; **Ordinary Differential Equations:** Separable variable, first order homogeneus equations, exact equation, variational parameter, second order homogeneus linear equation, characteristic equation, damped oscillation, forced oscillation, resonance, simultant equation; **Vector Space:** Linear vector space, algebra of vector space, linear combination, linearly independent, linearly dependent, bases, dimension of vector space, norm, scalar product, orthogonality, ortonormal basis, Gram-Schmidt ortogonalisation, changes of basis, linear transformation, similarity; **Operator and Matrix:** Definition, matrix as operator, bilinear form, simetry operator, hermitian, uniter, eigen vector dan eigen value, diagonalisation; **Tensor:** Definition, change of basis, Cartesian tensor, order of Cartesian tensor, algebra of tensors, metric tensor, coordinates transformation; **Vector Analysis:** Vector field, derivatives of vector, directional derivatives, divergence, curl, coordinat transformation, curvilinear coordinates, surface integral , line integral, Green theorem, Stoke's theorem, divergence theorem; **Variational Calculus:** Euler equation, branchistochrone problem, dependent variable, Lagrange equation, isoperimetric problem, varied notations.
Soft Skill Attribute:	Effort and ethic
Study/Exam Achievements:	Students are considered competent and eligible to pass the course upon obtaining at least 40% of the maximum score for midterm test, final exam, quizzes and homework. The type of assessment is essay test. Final score is calculated as follow: 20% homework + 10% quizzes + 32.5% midterm test + 32.5% final exam + 5% soft skill. 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
Learning Methods:	Lecture, discussion, tutorial
Forms of Media:	Powerpoints slides, LCD projectors and whiteboards
Literature(s):	1. Boas, M.L., *Mathematical Methods in the Physical Sciences*, 3rd ed., JohnWiley, 2005. 2. Arfken, G.B. and Weber, H.J., *Mathematical Methods for Physicist,*5th ed., Academic Press,1995. 3. Hobson, Riley and J. Bence, 2006, *Mathematical Methods for Physics & Engineering,* Cambridge University Press. 4. Kreyszig, E., 2005, *Advanced Engineering Mathematics*, John Wiley, New York
Notes:	*Total ECTS = {(total hours workload × 50 min) / 25 hours Each ECTS is equals with 25 hours.