Module Description

Module Name	**Mathematical Physics III**
Modul Level	Undergraduate
Code	18H02190603
Courses (if applicable)	Elective Courses
Semester	5th
Person responsible for the module	Azwar Sutiono, S.Si., M.Si.
Lecturer	Prof. Tasrief Surungan, Ph.D. Azwar Sutiono, S.Si., M.Si.
Language	Indonesian Language and English
Relation to Curriculum	Undergraduate degree program, elective, 5th semester
Type of Teaching, Contact Hours	**Teaching methods**: [collaborative learning], [project-based learning], [problem-based learning]. **Teaching forms**: [lecture], [tutorial] **Schedule**: Tuesday, 9.10-11.40 WITA
Workload	For this course, students are required to meet a minimum of 136.00 hours in one semester, which consist of: - 40.00 hours for lecture, - 48.00 hours for structured assignments, - 48.00 hours for private study
Credit Points	3 Credit Points (equivalent with 5.1 ECTS)
Requirements According to the Examination Regulations	A student must have attended at least 80% of the lectures to sit on the final examination.
Mandatory Prerequisites	Mathematical Physics I & II
Module objectives/intended learning outcomes	After completing the course, Students are able: **Intended Learning Outcomes (ILO):** ILO 2: Students are able to use the fundamental principles of physics in modeling and computation to solve the complex physical problem. ILO 6: Students are able to use the mathematical method to solve the physical related- problem. **Course Learning Objective (CLO):** After completing this course, students are expected to be able to master material about matrix basics and linear algebra, vector spaces and linear transformations, inner product spaces and orthogonality, boundary value problem, finite difference method, and finite element method. **Sub CLO**

	based on matrix. ILO-6 ⇒ CO-2 (two weeks): Students have solutions on general vector space problems. ILO-6 ⇒ CO-3 (two weeks): Students have a solution on Euclidean vector space. ILO-2 ⇒ CO-4 (four weeks): Students solve a differential equation problem using a finite difference method. ILO-2 ⇒ CO-5 (four weeks): Students solve a differential equation problem using finite element method specially approximation method and weighted residual method.
Content	Students will learn about: 1. Matrix Basics and Linear Algebra. 2. Vector Spaces and Linear Transformations. 3. Inner Product Spaces and Orthogonality. 4. Introduction to the Boundary Value Problem. 5. Finite Difference Method. 6. Finite Element Method.
Forms of Assessment	Assessment techniques: [participation], [written test], Assessment forms: [mid-term exam], [final term exam], [assignment], The number of Assessment and Evaluation: Assignment 1; Evaluation (Mid-Term and Final term); Project. Assignment = 5%, Mid-term exam = 25%, Project =40%, Final-term exam = 30%. CO 1 => ILO 6: 5% (Assignment 1) CO 2 => ILO 6: 10% (Mid examination number 1) CO 3 => ILO 6: 15% (Mid examination number 2) CO 4 => ILO 2: 20% (Project 1) CO 4 => ILO 2: 15% (Final examination number 1) CO 5 => ILO 2: 20% (Project 2) CO 5 => ILO 1: 15% (Final examination number 2)
Study and examination requirements and forms of examination	● Assignment 1 ● Mid examination ● Project 1, 2 ● Final examination
Media Employed	LED, Whiteboard, Learning Management System (SIKOLA).

	2. Randall J. Le Veque, 2007, Finite Difference Methods for Ordinary and Partial Differential Equations, Society for Industrial and Applied Mathematics. 3. D. V. Hutton, 2004, Fundamentals of Finite Element Analysis, McGraw-Hill Company.