Module Handbook

Module Name:	Simulation and Modeling of Physical Systems
Module Level:	Bachelor
Abbreviation, if applicable:	FI4002
Sub-heading, if applicable:	
Courses included in the module, if applicable:	
Semester/term:	fourth year
Module coordinator(s):	
Lecturer(s):	
Language:	Bahasa Indonesia
Classification within the curriculum:	~~General Studies~~ / ~~Major Subject~~ / Elective Studies
Teaching format / class hours per week during the semester:	3 hours lectures, 2 hours practicum
Workload:	3 hours lectures, 2 hours practicum and structured activities, 2 hours individual study, 16 weeks per semester, and total 112 hours a semester
Credit Points:	3
Requirements:	1. MA1101 Mathematics IA 2. MA1201 Mathematics IIA 3. FI1101 Elementary Physics IA 4. FI1201 Elementary Physics IIA
Learning goals/competencies:	**Knowledge :** **Skill :** **Competencies** :
Content:	Introduction: review of all topics and rules of lectures, review of competencies, numerics and programming, representation and data analysis using graphics. Numerical methods in physics: review of computing tools and programming in physics; simple particle systems, random number systems and their applications in physical cases. Digital signal processing fourier transform, fourier series and its application in signal processing (time series data). Grid-based simulation method: finite difference method (FDM), basic concepts and applications in the case of temperature, finite element method (finite element method/FEM), stress distribution, steady state temperature system, FEM in complex physical systems. Particle-based simulation methods: particle systems and molecular dynamics. Artificial intelligence: Artificial Neural Network, Support Vector Machine.
Study/exam achievements:	Students are considered to be competent and pass if at least get 50% of maximum mark of the mid-term test, final examination, home work, independent works and laboratory works.
Forms of Media:	Slides and LCD projectors, blackboards, lab.
Literature:	1. W. H. Press, W.T. Vettering, et.al (2002) Numerical Recipes in C, The Art of Scientific Computing,Cambridge Press 2. C++ language toolboks 3. Wirth, Niclaus, Algorithms+Data Structures = programs, Prentice Hall
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