MODULE HANDBOOK

Course	:	**physics modelling**
Module Level	:	Undergraduate
Code	:	FIK303
Sub-heading, if applicable:	:	-
Courses included in the module, if applicable:	:	-
Semester/Term	:	6th/Third Year
Module Coordinator(s):		Dr, Soegianto Soelistiono MSi
Lecturer(s):	:	Dr. Nurul Ukhrowiyah, S.Si., M.Si.
Classification within the curriculum	:	~~Compulsory Course~~ / Elective Course
Teaching format / class hours per week during semester:		2 hours of lectures (50 min / hour)
Workload	:	2 hours of lectures, 2 hours of structural activities, 2 hours of individual study, 14 weeks per semester, and total of 84 hours per semester 2.8 ECTS*
Credit Points	:	2
Requirement(s)	:	Computational Physics II
Learning Outcome	:	1. LO2: Apply mathematical methods in solving physics problems 2. LO3: Solve everyday dynamics in mechanical or electrical models through mathematical equations 3. LO6: Accustomed to modeling natural events around him and applying information technology and being able to take advantage of the problems encountered in the field
Learning Goals/Competences:	:	**General Competence (Skill):** 1. understand how a model equation is formed 2. Understand the concept of data retrieval and analyze it 3. Understand the concept of the dynamics of sensitive natural systems **4.** Understand the concept of theoretical models and field data **Specific Competence:** The students are able to: 1. Distinguish between models, reality, theory, and law 2. Give examples of quantitative and qualitative models 3. analyzing deterministic and stochastic models of reality 4. provide examples of closed solutions and numerical / simulation solutions 5. evaluate physical events through mathematical function analysis

Contents	:	Introduction to models, reality, theory, and law; Differences in Physics Modeling and Mathematical Modeling. Modeling Types: quantitative and qualitative models, deterministic and stochastic models. Component and Procedure Modeling: Objects, interactions, object systems, and processes. Analysis of mathematical functions and graphs, types of variables and scale of data. Finite difference and Finite Element, monte carlo Case examples: Mechanical and Electrical Modeling; Modeling the Physiology of the Human Body; Modeling sensitive systems, 2D and 3D simulations.
Soft Skill Attribute	:	Creativity, communication, discipline, cooperation.
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	:	1. Boundless. “Models, Theories, and Laws.” *Boundless Physics*. Boundless, 21 Jul. 2015. Retrieved 28 Dec. 2015 from https://www.boundless.com/physics/textbooks/boundless-physics-textbook/the-basics-of-physics-1/the-basics-of-physics-31/models-theories-and-laws-195-6078/ 2. Metaxas, D. N., 1992, PHYSICS-BASED MODELING OF NONRIGID OBJECTS FOR VISION AND GRAPHICS, A thesis submitted in conformity with the requirements for the Degree of Doctor of Philosophy, Graduate Department of Computer Science, University of Toronto, 3. Guo, J., 2004, CARBON NANOTUBE ELECTRONICS:

		MODELING, PHYSICS, AND APPLICATIONS, A Thesis Submitted to the Faculty of Purdue University, In Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy, 4. John G. Michopoulos, Charbel Farhat, Jacob Fish, 2005, Survey on Modeling and Simulation of Multiphysics Systems, Computational Multiphysics Systems Laboratory U.S. Naval Research Laboratory Washington DC, Institute for Computational and Mathematical Engineering stanford University, Rensseleaer Polytechnic Institute Troy, NY, 5. Hestenes, D., Toward a modeling theory of physics instruction , Published in: Am. J. Phys. 55 (5), May 1987, pp 440-454, 6. Marcus A. Brubaker, Leonid Sigal, David J. Fleet, 2009, Physics-Based Human Motion Modeling for People, A Short Tutorial, Department of Computer Science, University of Toronto, Disney Research, Pittsburgh, PA, 7. René Doursat, Mark Read, José Halloy, 2016 (donwnload), Introduction to complex systems and agent based modeling, … .
Notes:		*Total ECTS={(total hoursworkloadx50min)/60min}/25hours Each ECTS isequalswith25hours