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MODULE HANDBOOK

Module Name	*Fractal and Its Applications*
Module level, if applicable	*Master Program*
Code, if applicable	*MMM-6323*
Subtitle, if applicable	-
Courses, if applicable	*Fractal and Its Applications*
Semester(s) in which the module is taught	*3rd (third)*
Person responsible for the module	*Chair of the Lab. of Applied Mathematics*
Lecturer(s)	*Dr. Nanang Susyanto, M.Sc.*
Language	*Bahasa Indonesia*
Relation to curriculum	~~*Compulsory*~~ / ***Elective*** */ ~~Specialisation~~* *Names of other study programmes with which the module is shared: -*
Teaching methods	*lecture, lesson, project.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload:* - *136 hours per semester* *Contact hours (please specify whether lecture, exercise, laboratory session, etc.):* - *150 minutes (2.5 hours) lectures per week for 14 weeks, 180 minutes (3 hours) structured activities per week, in total is 16 weeks per semester, including mid exam and final exam.* *Private study including examination preparation, specified in hours:* - *180 minutes (3 hours) individual study per week*
Credit points	*3*

Required and recommended prerequisites for joining the module	- *Analysis I (MMM-5101)* - *Existing competences in metric space.*
Module objectives/intended learning outcomes	*Upon successful completion, students will have ability to* *CO 1. Construct and analysis the structure of fractal space* *CO 2. Apply the iterated function system to the problems related to structure in fractal space* *CO 3. Analysis the dimension of a fractal set* *CO 4. Construct and analysis Julia sets* *CO 5. Apply fractal to other disciplines*
Content	*a. Introduction: motivation and examples, geometrical approach for transformation, Collage map, definition, and example of fractal* *b. Haussdorf metric and fractal space: fractal space, metric space, metric on fractal space.* *c. Iterated function space: contractive map, attractor and its existence, Collage Theorem* *d. Dimension: example, fractal dimension, similarity dimension, box-counting* *e. Julia Set: Dynamical system in R, Dynamical system in C, escape time algorithm* *f. Applications*
Examination forms	*Oral presentation, Essay*
Study and examination requirements	*To pass the course, students are expected to get a minimum grade of D.* *The final mark will be computed from a proportional weight of assignments, mid examination and final examination. The final mark will be weighted as follows:* *No Assessment methods — Weight (percentage)* *1. Final Examination — 40% (20% case based)* *2. Mid-Term Examination — 25% (10% case based)* *3. Project and Presentation — 35%*
Media employed	*Boards, projectors, Laptop/Computer*
Reading list	*1. Barnsley, M.F., 2012, Fractals Everywhere: New Edition, Dover Books on Mathematics.* *2. Falconer, K., 2006, Fractal geometry: Mathematical fpoundations and applications, John Wiley & Sons.* *3. Lapidus, M.L. and Frankenhuijsen, M., 2013, Fractal Geometry, Complex Dimensions and Zeta Functions Geometry and Spectra of Fractal Strings, Springer* *4. Pesin, Y. and Climenhaga, M., 2009, Lectures on fractal geometry and dynamical systems, Student mathematical library, vol. 52, Americal Mathematical Society.*

CO-PLO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CO 1			√	√		
CO 2			√	√		
CO 3				√	√	
CO 4				√	√	
CO 5					√	

Last Modified Date : 8 August 2022