Department/Program: Bachelor in Mathematics

A. Identity
   Name   : Operator Algebra
   Code   : MT 512
   Credits   : 3 SKS
   Semester   : 7
   Status   : optional (compulsory for Algebra major)
   Lecturer   : Dr. Rizky Rosjanuardi, M.Si
   Number of lectures   : 16
   Duration of each lecture : 3 x 50 minutes
   Prerequisites   : Real Analysis I & II, Algebraic Structures I & II, Linear
                               Algebra, Complex Analysis. Experience in Topology and
                               Functional Analysis is also prefered.

B. Objectives
   - To understand concepts of operator algebra
   - To understand relation with other subjects in analysis and algebra

C. Topics and Subtopics

TOPICS	SUBTOPICS	Week
1. Hilbert spaces	a. Inner product spaces, normed vector spaces Ruang vektor bernorm b. Sequences in a normed vector spaces c. Cauchy sequences d. Complete spaces	1 1 2 2 3
2. Operators on a Hilbert space	a. Linear operators b. Bounded linear operator c. Adjoints of operators d. Norm of operators e. Types of operators; isometry, unitaty, normal	4 4 5 6 7
3. The space of bounded linear operators on a Hilbert space ($B(H)$)	a. Sum of bounded linear operators on a Hilbert space b. Scalar multiplication of bounded linear operators on a Hilbert space c. Algebraic structures of the set of	8 8 9

	bounded linear operators on a Hilbert space: vector space	9
4.More algebraic structures of *B(H)*	a. *B*(*H*) as a Banach space. b. Composition of bounded linear operators on a Hilbert space................ c. *B*(*H*) as a Banach algebra .... d. *B*(*H*) as a Banach*-algebra	10 11 12
5. *C**-algebra and the Gelfand Naimark Theorem	a. *C**-algebras b. *B*(*H*) as a *C**-algebra. c. Gelfand – Naimark theorem.	13 14-15 16

C. Evaluation
   1. Group take home tasks.
   2. Group presentations.
   3. Individual peresentations.
   4. Daily activities.
   5. Quizes.
   6. Mid test.
   7. Final test.

D. References
   1. Berberian. Sterling K (1961), *Introduction to Hilbert Space,* Oxford Univ. Press.
   2. Ikhwanuddin dan Rosjanuardi. R (2006), *Pengenalan Aljabar Operator dan Teori Aljabar C**, draft .
   3. Khaerudin, B. Rahman, R. Rosjanuardi, (2009), *Operator Toeplitz dan Aljabarnya,* draft.
   4. Muhtar, S, Rosjanuardi. R, dan Sumiaty. E (2006), *Aljabar Operator dan Mekanika Kuantum,* draft.
   5. Raeburn, I (1998), *C*-algebras,* lecture notes, The University of Newcastle.
   6. Rosjanuardi, R (2007), *Twisted Toeplitz Algebras,* lecture notes of a talk given at Chiba University, Japan.

E. Method and approach
   1. Classical.
   1. Discussion.
   2. Online discussion (e-learning)
   3. Presentation

Syllabus

Operator Algebra
(MT 512)

By:
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