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Doctor in Mathematics

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MODULE HANDBOOK

Module Name	**Advanced Linear Systems Theory**
Module level, if applicable	**Doctor**
Code, if applicable	**MMM 7207**
Subtitle, if applicable	
Courses, if applicable	**Advanced Linear Systems Theory**
Semester(s) in which the module is taught	**First year**
Person responsible for the module	**Chair of Algebra Research Group**
Lecturer(s)	• **Prof. Dr. Sri Wahyuni** • **Dr. Ari Suparwanto**
Language	**Indonesia**
Relation to curriculum	**Elective courses**
Teaching methods	**Lecture, presentation**
Workload (incl. contact hours, self-study hours)	**(Estimated) Total workload:** **Contact hours: 150 minutes lectures per week, 180 minutes structured activities per week, 180 hours individual study, 16 weeks per semester (including mid-term and final examinations), in total 136 hours per semester.**
Credit points	**3**

Required and recommended prerequisites for joining the module	**Before taking this course, students must master the introduction mathematical system theory over a field, introduction to ring theory, and introduction to module theory.**
Module objectives/intended learning outcomes	**Upon successful completion of this course, students are able to:** • **CO 1: clarify various concepts, philosophies, definitions and important properties of advanced systems theory which will be studied in this dissertation research support course** • **CO 2: prove the concepts of advanced systems theory which will be related to the topics studied in this dissertation research support course,** • **CO 3: make a conjecture on the continuation of the problem on the concept of advanced systems theory which will be related to topic studied in the dissertation research support course,** • **CO 4: develop special knowledge related to advanced systems theory concepts which will be related to the topics to be studied in dissertation research supporting courses**
Content	• **This course provides material to students about advanced concepts in the field of advanced systems theory to support the dissertation. Namely mathematical fundamentals for analysis of linear systems. Maps and operators in finite and infinite dimensional linear vector spaces, metric spaces, and inner-product spaces. Introduction to representation theory. Eigensystems. Spectral theorems and singular value decomposition. Continuity, convergence and separability. Sturm-Louisville theory.** • **Topics will be taken from the field of advanced systems theory research which is a bridge for students to the development of advanced systems theory research in general.** • **Topics and syllabus will be adapted to the material needs and topics of students in research supporting the dissertation.**

Examination forms	**Lectures, a compulsory project, compulsory assignments.**
Study and examination requirements	**The final mark will be weighted as follows:** **No Assessment methods (components, activities) Weight (percentage)** **1 Final Examination 20 – 30 %** **2 Mid-Term Examination 20 – 30 %** **3 Project 50 - 55 %** **To pass the course, the minimum grade is B.**
Media employed	**White Board, LCD Projector, Laptop/Computer**
Reading list	• Panos J. Antsaklis **and** Anthony N. Michel, ***Linear Systems***, Birkhauser, **2006.** • **Ben M. Chen, Zongli Lin, Yacov Shamash, *Linear Systems Theory: A Structural Decomposition Approach*, Birkhausers, 2004.** • **C.T. Chen, *Linear Systems Theory and Design.* Oxford University Press, 3rd Edition, 1999.** • **Robert Brown. *Introduction to random signals and applied Kalman filtering : with MATLAB exercises.* John Wiley & Sons, Inc., Hoboken, NJ, 4th edition, 2012.** • **Wilson J. Rugh, Linear System Theory, 2nd Edition, Prentice Hall, 1996** • **F. Callier and C. Desoer, Linear System Theory, Springer Verlag, 1991.** • **Franks, L.E. *Signal Theory*. Revised ed. Dowden & Culver, 1981.** • **G. Strang, Linear Algebra and its Applications 3rd edition, 1988.**

CO-PLO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CO-1	V		V		V	
CO-2		V		V		V
CO-3	V		V		V	
CO-4		V		V		V
CO-5	V		V		V	
CO-6	V	V	V	V	V	V

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