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MODULE HANDBOOK

Module name	Introductory Control Theory
Module level, if applicable	Bachelor
Code, if applicable	MMM-3312
Subtitle, if applicable	
Courses, if applicable	Introductory Control Theory
Semester(s) in which the module is taught	6^{th} (sixth)
Person responsible for the module	Chair of the Lab. of Applied Mathematics
Lecture(s)	Dr. Ari Suparwanto, M.Si.
Language	Bahasa Indonesia
Relation to curriculum	Bachelor Degree, Elective, 6^{th} semester
Type of teaching, contact hours	150 minutes lectures and 180 minutes structured activities per week.
Workload	Total workload is 136 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.
Credit points	3
Requirements according to the examination regulations	Students have taken Introductory Control Theory course (MMM-3312) and have an examination card where the course is stated on.
Recommended prerequisites	Students have taken the module of Introduction to System Theory (MMM-3310) and have participated in the final exam of the module.
Module objectives/intended learning outcomes	After completing this course the students have ability to : CO 1. analyze control theory problems, the open-loop and closed-loop control and determine the feedback control and the observer design. CO 2. analyze the separation principle of feedback control and the observer. CO 3. solve the decoupling problem by state feedback. CO 4. Apply some methods to determine the solution of the open-loop and closed-loop linear quadratic optimal control.
Content	Models of open-loop and closed-loop (feedback) controller. Feedback control and pole placement. Observers. The separation principle. Decoupling by State Feedback. The open-loop linear quadratic optimal control. Lyapunov equation. The closed-loop linear quadratic regulator. The Riccati differential equations. The steady state linear quadratic regulator. The algebraic Riccati equations.
Study and examination requirements and forms of examination	The final mark will be weighted as follows: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination — 40% 2 — Mid-Term Examination — 30% 3 — Quiz and Homework (Project) — 30% The initial cut- off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively.
Media employed	Board, LCD Projector, Laptop/Computer
Reading List	1. Frank Lewis, 1992, *Applied Optimal Control*, Prentice Hall International. 2. Huibert Kwakernaak and Raphel Sivan, 1972, *Linear Optimal Control Systems*, Wiley, Interscience Division of John Wiley and Sons.

	3. Katsuhiko Ogata, 1990, *Modern Control Engineering,* 2nd ed. Englewood Cliffs, N.J,: Prentice Hall, Inc. 4. Chen, C.-T., 1984, "*Linear Systems Theory and Design*", CBS College Publishing, New York. 5. Olsder, G.J., 1994, "*Mathematical Systems Theory*", VSSD, The Netherlands.

PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CO 1				√		√			√
CO 2				√	√	√			√
CO 3				√		√	√		√
CO 4				√		√			√