Course Code	TKEE163125
Course Name	Advanced Control Systems
Course Instructors	Adha Imam Cahyadi
Course Type	Selected Elective
Course Classification	Engineering Topics
Credit / Contact Hour per Week	2 / 100 minutes per Week
Course Description	*Understand about the concepts of controlling especially in frequency approach, also with its analyses and syntheses.*
Prerequisites Courses	*Linear Algebra, Engineering Mathematics, Mathematics for Electrical Engineer, Engineering Physics, Physics for Electrical Engineer, Control Systems*
Covered Student Outcome	**Development of Engineering Solution (b)** **Engineering Design (c)**

Learning Outcome	1. Students are able to model the real system in a nonlinear differential equations lumped parameter, able to linearize and change to linear state space model, transfer function and vice versa. 2. Studens are able to use mathematics and linear algebra to analyze linear state space equation. 3. Students are able to calculate state transition matrix and understand the realization. 4. Students are able to understand concepts of LTI systems stability. 5. Students are able to apply the concepts of Controllability and Observability and its dual condition. 6. Students are able to design state feedback compensator and state estimator
Topic	Analysis of Control Systems in State Space • Introduction • State-Space Representations of Transfer-Function Systems • Solving the Time-Invariant State Equations • Some Useful Results in Vector-Matrix Analysis • Controllability • Observability Norm of signal basic concept: stability, internal stability, assymptotic tracking uncertainty and robustness stabilization design concept under model uncertainty
Direct Asessment	
Indirect Assesment	Questionnaire (EDOM)
References	[1] Chen, Chi-Tsong. *Linear system theory and design*. Oxford University Press, Inc., 1995. [2] Nise, Norman S. *CONTROL SYSTEMS ENGINEERING,* John Wiley & Sons, 2007. [3] Ogata, Katsuhiko. *Modern control engineering*. Prentice Hall PTR, 2001. [4] Dorf, Richard C., and Robert H. Bishop. *Modern control systems*. Prentice

Direct Asessment Plan	**Measured Learning Outcome**
Engineering Design Assignment – Creating Proof of Concept	LO2, LO4
Engineering Design Assignment – Presenting the solution	LO3
Mid Exam	LO1, LO2, LO3
Final Exam	LO4, LO5, LO6

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