

Course Code	TKEE162105							
Course Name	Analog Electronics							
Course Instructors	Prpto Nugroho, Eka Firmansyah							
Course Type	Required							
Course Classification	Engineering Topics							
Credit / Contact Hour per Week	2 / 100 minutes per Week							
Course Description	Understanding, analyzing and designing various types of analog circuits, using CAD.							
Prerequisites Courses	Basic Electronics							
Covered Student Outcome	Development of Engineering Solution (b) Engineering Design (c)							
Learning Outcome	<ol style="list-style-type: none"> Students are able to understand how the various basic circuits work. Students are able to do circuit design. Students are able to simulate and analyze the circuit. 							
Topic	<ol style="list-style-type: none"> Basic MOS Transistor <ol style="list-style-type: none"> Operation Region: Triode Region, Saturation, I / V characteristics MOS device model PMOS transistors BJT amplifier CMOS amplifier <ol style="list-style-type: none"> General concept: biasing, realization of current source MOS Amplifier: Common Source , Common Gate, Source follower Op-Amp Application Cascaded amplifiers and current mirrors <ol style="list-style-type: none"> Cascaded amplifier: As a current source, as an amplifier Current mirror: Bipolar, CMOS Differential amplifier <ol style="list-style-type: none"> General: Differential signals and differential pairs Bipolar differential pair: Qualitative, small signal, and large signal analysis MOS differential pair: Qualitative, small signal, and large signal analysis Other concepts: cascaded pair, commonmode rejection, active load Frequency response <ol style="list-style-type: none"> Frequency response of CS & CE amplifier Effect of internal Capacitance and high frequency model of BJT & MOS High frequency model of Source & Emitter Follower amplifier Tools for the analysis of amplifier responses at high frequencies Response of CS & CE amplifier at high frequency CG and Cascaded amplifier response at high frequency Response of Source & Emitter Follower amplifier at high frequency Response of differential amplifier at high frequency Other broadband amplifier configuration Example of cascaded amplifier Feedback <ol style="list-style-type: none"> Types of Amplifier Final stage amplifier and power amplifier <ol style="list-style-type: none"> Classification of final amplifier Class A amplifier Class B amplifier Class AB amplifier Biasing in Class AB amplifier CMOS final stage amplifier BJT power amplifier IC power amplifier CMOS power transistor 							
Direct Assessment	<table border="1"> <thead> <tr> <th>Direct Assessment Plan</th> <th>Measured Learning Outcome</th> </tr> </thead> <tbody> <tr> <td>Mid Exam</td> <td>LO1, LO2</td> </tr> <tr> <td>Final Exam</td> <td>LO2, LO3</td> </tr> </tbody> </table>		Direct Assessment Plan	Measured Learning Outcome	Mid Exam	LO1, LO2	Final Exam	LO2, LO3
Direct Assessment Plan	Measured Learning Outcome							
Mid Exam	LO1, LO2							
Final Exam	LO2, LO3							
Indirect Assessment	Questionnaire (EDOM)							
References	[1] Robert L. Boylestad & Louise Nashelsky", Electronic Devices and Circuit							

	<p>Theory", 8th edition, Prentice Hall, 2002.</p> <p>[2] Albert P. Malvino & David J. Bates, "Electronic Principles", McGraw-Hill, 7th Edition, 2006.</p> <p>[3] Behzad Razavi, "Fundamental of Microelectronics", McGraw-Hill International Edition, 2001.</p> <p>[4] Adel S. Sedra & Kenneth C. Smith, "Microelectronics Circuits", Oxford Series in Electrical and Computer Engineering, 6th edition, 2011.</p>
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