



INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Magister (S2) Teknik Elektro

1	Nama Mata Kuliah / <i>Course Name</i>	: Sistem dan Rangkaian Elektronika / <i>Electronic Circuits and Systems</i>
2	Course Code	: EE254407
3	Kredit / Credits	: 3 SKS
4	Semester / Semester	: 2

Deskripsi Mata Kuliah / Course Description

Mata kuliah ini membahas analisis, perancangan, dan implementasi rangkaian digital dan rangkaian analog dalam sebuah sistem elektronika, serta pengantar teknologi rangkaian terintegrasi. Implementasi rangkaian digital menggunakan piranti terprogram FPGA ditekankan untuk aplikasi pengolahan sinyal. Implementasi rangkaian analog ditekankan untuk rancangan pengolahan sinyal dengan penguat operasional, dengan analisis hingga level transistor. Pembahasan teknologi rangkaian integrasi diberikan sebagai pengantar alur dan teknik desain rangkaian terintegrasi.

This course discusses the analysis, design, and implementation of digital and analog circuits in an electronic system, as well as an introduction to integrated circuit technology. The implementation of digital circuits using FPGA programmable devices is emphasized for signal processing applications. The implementation of analog circuits is emphasized for signal processing designs with operational amplifiers, with analysis down to the transistor level. The discussion of integrated circuit technology is given as an introduction to the flow and techniques of integrated circuit design.

Capaian Pembelajaran Lulusan (CPL) Yang Dibebankan Mata Kuliah / Program Learning Outcomes Charged to The Course

1. (CPL-02) Mampu mengembangkan dan memecahkan permasalahan ipteks dalam bidang keilmuannya melalui riset dengan pendekatan inter atau multidisiplin hingga menghasilkan karya inovatif dan teruji, serta mendapat pengakuan nasional dan internasional.

(PLO-02) Able to develop and solve science and technology problems in their scientific fields through research with an inter or multidisciplinary approach to produce innovative and tested work, and receive national and international recognition.
2. (CPL-04) Mampu menguasai konsep, prinsip keilmuan secara komprehensif, prinsip rekayasa, dan pengetahuan faktual tentang Teknologi Informasi untuk mengembangkan prosedur dan strategi yang diperlukan pada analisis dan perancangan sistem terkait bidang Teknik Elektro.

(PLO-04) Able to master concepts, scientific principles comprehensively, engineering principles, and factual knowledge about Information Technology to develop procedures and strategies required in the analysis and design of systems related to the field of Electrical Engineering.

3. (CPL-05) Mampu mengimplementasikan penyelesaian permasalahan rekayasa yang memperhatikan faktor-faktor ekonomi, kesehatan dan keselamatan publik, kultural, sosial dan lingkungan.

(PLO-05) Able to implement engineering problem solving that takes into account economic, public health and safety, cultural, social and environmental factors.

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mampu menganalisis dan mensintesis rangkaian digital kombinasional dan sekuensial. / *Able to analyze and synthesize combinational and sequential digital circuits.*
2. Mampu merancang rangkaian digital dengan Hardware Description Language. / *Able to design digital circuits with Hardware Description Language.*
3. Mampu membuat implementasi sistem pengolahan sinyal digital dengan FPGA. / *Able to create implementations of digital signal processing systems with FPGA.*
4. Mampu melakukan analisis dan desain rangkaian penguat dan rangkaian logika dengan transistor. / *Able to analyze and design amplifier circuits and logic circuits with transistors.*
5. Mampu melakukan analisis dan desain rangkaian dengan penguat operasional meliputi osilator, filter, pengolahan sinyal. / *Able to analyze and design circuits with operational amplifiers including oscillators, filters, signal processing.*
6. Mampu menjelaskan prinsip alur desain rangkaian terintegrasi dan perkembangan teknologi rangkaian terintegrasi. / *Able to explain the principles of integrated circuit design flow and the development of integrated circuit technology.*

Pokok Bahasan / Contents

1. Dasar teknik digital, rangkaian kombinasional. / *Basic digital engineering, combinational circuits.*
2. Dasar rangkaian sekuensial, Finite State Machine. / *Basic sequential circuits, Finite State Machine.*
3. Hardware Description Language untuk menyatakan rangkaian digital kombinasional dan sekuensial. / *Hardware Description Language to express combinational and sequential digital circuits.*
4. Teknologi dan arsitektur FPGA sebagai piranti terprogram digital. / *FPGA technology and architecture as a digital programmable device.*
5. Implementasi sistem pengolahan sinyal digital dengan FPGA. / *Implementation of digital signal processing systems with FPGA.*
6. Prinsip analisis dan desain rangkaian penguat transistor dan rangkaian logika transistor CMOS statis. / *Principles of analysis and design of transistor amplifier circuits and static CMOS transistor logic circuits.*
7. Prinsip analisis dan desain rangkaian dengan opamp meliputi osilator dan filter. / *Principles of analysis and design of circuits with opamps including oscillators and filters.*
8. Pengantar teknologi rangkaian terintegrasi, alur desain rangkaian terintegrasi. / *Introduction to integrated circuit technology, integrated circuit design flow.*

Prasyarat / Pre-requisite

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Pustaka / Reference**Utama / Primary:**

1. Mano M. Morris and Michael D Ciletti., Digital Design : With an Introduction to the Verilog HDL, VHDL and System Verilog. Sixth ed. Pearson 2018.
2. Razavi, Behzad. Fundamentals of microelectronics. John Wiley & Sons, 2021.

Pendukung / Supporting:

3. Weste, Neil HE, and David Harris. CMOS VLSI design: a circuits and systems perspective. Pearson Education, 2015.