



INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FAKULTAS TEKNOLOGI ELEKTRO DAN INFORMATIKA CERDAS
DEPARTEMEN TEKNIK ELEKTRO
Program Studi Sarjana (S1) Teknik Telekomunikasi

1	Nama Mata Kuliah / Course Name :	Rangkaian Listrik / Electrical Circuits
2	Kode Mata Kuliah / Course Code :	EL234101
3	Kredit / Credits :	3 SKS
4	Semester / Semester :	1

Deskripsi Mata Kuliah / Course Description

Mata kuliah Rangkaian Listrik membahas tentang Konsep dasar rangkaian dan analisisnya, Hukum dasar rangkaian yang meliputi Hukum Ohm dan Kirchhoff, Metoda analisis node dan mesh, Teori rangkaian yang meliputi teorema superposisi, rangkaian ekuivalen thevenin dan Norton, serta transfer daya maksimum. Topik pembahasan berikutnya adalah prinsip kerja Kapasitor dan induktor, Rangkaian dengan resistor atau induktor (orde satu), serta Rangkaian dengan resistor, kapasitor dan induktor (orde dua) baik seri maupun paralel.

The Electrical Circuits course discusses the basic concepts of circuits and their analysis, Basic laws of circuits which include Ohm's and Kirchhoff's Laws, Methods of node and mesh analysis, Circuit theory which includes the superposition theorem, Thevenin and Norton equivalent circuits, and maximum power transfer. The next topic of discussion is the working principle of capacitors and inductors, circuits with resistors or inductors (first order), and circuits with resistors, capacitors and inductors (second order) both in series and parallel.

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

1. (CPL-04) Mampu menerapkan ilmu pengetahuan alam dan matematika serta teknologi dan rekayasa informasi untuk memperoleh pemahaman komprehensif pada bidang Teknik Telekomunikasi.
(PLO-04) Able to apply knowledge of sciences, mathematics, and information technology to acquire comprehensive understanding of engineering principles in Telecommunication Engineering
2. (CPL-07) Mampu mengidentifikasi, memformulasikan, menganalisis, dan menyelesaikan permasalahan kompleks di bidang teknik telekomunikasi
(PLO-07) Able to identify, formulate, analyze, and solve the complex problems in the field of Telecommunication Engineering

Capaian Pembelajaran Mata Kuliah / *Course Learning Outcomes*

1. Mampu menjelaskan konsep dasar elemen rangkaian listrik (resistor, sumber arus, sumber tegangan, sumber tergantung, dan sumber bebas) serta istilah pada rangkaian listrik (node, branch, loop, dan mesh) / *Be able to explain the basic concepts of electrical circuit elements (resistors, current sources, voltage sources, dependent sources, and independent sources) as well as terms in electrical circuits (nodes, branches, loops, and mesh).*
2. Mampu menjelaskan hukum dasar yang berlaku pada rangkaian listrik seperti Hukum Ohm dan Hukum Kirchoff / *Be able to explain the basic laws that apply to electrical circuits such as Ohm's Law and Kirchoff's Law.*
3. Mampu menganalisis rangkaian listrik dengan menggunakan analisis Node dan Mesh / *Be able to analyze electrical circuits using Node and Mesh analysis.*
4. Mampu memahami dan menganalisis teori rangkaian seperti teori superposisi, transformasi sumber, rangkaian ekivalen Thevenin, rangkaian ekivalen Norton, serta transfer daya maksimum / *Able to understand and analyze circuit theory such as superposition theory, source transformation, Thevenin equivalent circuit, Norton equivalent circuit, and maximum power transfer.*
5. Mampu memahami dan menganalisis Operational amplifier / *Able to understand and analyze Operational amplifier*
6. Mampu menjelaskan konsep dasar kapasitor dan inductor / *Be able to explain the basic concepts of capacitors and inductors.*
7. Mampu memahami dan menganalisis konsep rangkaian orde satu: rangkaian tanpa sumber R-L dan R-C, dan tanggapan lengkap rangkaian R-L dan R-C / *Be able to understand and analyze the concept of a first-order circuit: a circuit without a source R-L and R-C, and a complete response to a series of R-L and R-C.*
8. Mampu memahami dan menganalisis konsep rangkaian orde dua: rangkaian tanpa sumber R-L-C seri, dan paralel, dan tanggapan lengkap rangkaian R-L-C seri, dan paralel / *Be able to understand and analyze the concept of second-order circuits: circuits without a source R-L-C series and parallel, and complete responses to series and parallel R-L-C circuits.*

Pokok Bahasan / *Contents*

1. Konsep dasar rangkaian listrik / *Basic concept of electric circuit*
2. Hukum dasar rangkaian listrik / *Basic laws of electric circuits*
3. Metoda analisa rangkaian (analisa Node dan Mesh) / *Network analysis method (Node and Mesh analysis)*
4. Teorema rangkaian / *The circuit theorem*
5. Operasional Amplifier / *Operational Amplifiers*
6. Kapasitor dan induktor / *Capacitors and inductors*
7. Rangkaian orde satu (RL & RC) / *First order circuit (RL & RC)*
8. Rangkaian orde dua (RLC) / *Second order circuit (RLC)*

Prasyarat / *Pre-requisite*

Pustaka / *Reference*

1. Charles Alexander, Matthew Sadiku, Fundamentals of Electric Circuits, 7th Ed., McGraw-Hill Education, New York, 2021,
2. William H. Hayt, Jr., Jack E. Kemmerly, Jamie D. Phillips, Steven M. Durbin, 9th Ed., Engineering Circuit Analysis, 2019,
3. Robert L. Boylestad, Introductory Circuit Analysis, 13th Ed. Pearson Education Limited, 2016.