

<b>Mata Kuliah</b> <b>Course</b>	Nama MK <i>Name</i>	: Rangkaian Analog <i>Analog Circuits</i>
	Kode MK <i>Code</i>	: EE184501
	Kredit <i>Credits</i>	: 3 sks
	Semester <i>Semester</i>	: V (Wajib) <i>V (Compulsory)</i>
	Beban Belajar <i>Workload</i>	: Kuliah : 3 x 50 = 150 menit/minggu Latihan/tugas : 3 x 60 = 180 menit/minggu Belajar mandiri : 3 x 60 = 180 menit/minggu <i>Lectures : 3 x 50 = 150 min/week</i> <i>Exercises/Assignments : 3 x 60 = 180 min/week</i> <i>Self learning : 3 x 60 = 180 min/week</i>
	Tingkatan <i>Module Level</i>	: Sarjana (S1) <i>Undergraduate</i>
	Penanggung Jawab <i>PIC</i>	: Fajar Budiman, ST, M.Eng
	Pengajar <i>Lecturer</i>	: Dr. Eng Mohammad Attamimi, B. Eng. M. Eng Dr.Ir. Djoko Purwanto, M.Eng Ir. Harris Pirngadi, MT Ir. Tasripan, MT Dr. Ir. Totok Mujiono, MI.Kom. Fajar Budiman, ST, M.Eng
	Bahasa <i>Language</i>	: Bahasa Indonesia dan Bahasa Inggris <i>Bahasa Indonesia and English</i>
	Persyaratan dan Peraturan <i>Requirement and Regulation</i>	: Setiap mahasiswa harus menghadiri setidaknya 75% dari jumlah perkuliahan untuk dapat mengikuti ujian <i>A student must have attended at least 75% of the lectures to sit in the exams</i>

### Deskripsi Mata Kuliah

#### *Description of Course*

Mata kuliah Rangkaian Analog membahas tentang karakteristik rangkaian integrasi penguat operasional, konsep feedback negatif dan positif, rangkaian penguat feedback, komparator, detector level tegangan, hysteresis, rangkaian pembangkit gelombang persegi, segitiga, gigi gergaji, osilator Wien, dan komputer analog, integrator, diferensiator, serta filter aktif Butterworth LPF, HPF, BPF, dan BSF yang diimplementasikan pada penguat operasional.

*The Analog Circuit course discusses the characteristics of integrating operational amplifier circuits, feedback and negative feedback concepts, feedback amplifier circuit, comparator, voltage level detector, hysteresis, square wave circuit, triangle, saw-tooth, Wien oscillator and analog computer, integrator, differentiator, as well as active filters of Butterworth LPF, HPF, BPF, and BSF implemented on operational amplifiers.*

## CPL Prodi yang Dibebankan

### **Learning Outcomes**

(CPL-03) Mampu mendesain komponen, sistem, dan proses yang logis dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi

*(PLO-3) Capable to design logical and realistic components, systems and processes in accordance with specified specifications by considering safety, social, cultural, environmental and economic aspects*

(CPL-10) Mampu mengetahui dan menyikapi perkembangan terkini dibidang ilmu pengetahuan dan teknologi dengan mengedepankan nilai-nilai universal

*(PLO-10) Capable to know and respond to the latest developments in science and technology by promoting universal values*

(CPL-11) Mampu menerapkan metode, ICT, dan perangkat modern dalam penyelesaian permasalahan dibidang teknik elektro

*(PLO-11) Capable to apply methods, ICT, and modern devices in solving problems in the field of electrical engineering*

## Capaian Pembelajaran Mata Kuliah

### **Course Learning Outcomes**

(CPMK-01) Menguasai dan memahami konsep dan prinsip sains alam dan matematika karakteristik penguat operasional serta mahasiswa mampu memahami teori dan konsep penguat feedback negatif, feedback positif, dan komputer analog yang diaplikasikan dengan menggunakan penguat operasional.

*(CLO-01) Mastering and understanding the concepts and principles of natural science and mathematical characteristics of operational amplifiers, and students are able to understand theories and concepts of negative feedback amplifiers, positive feedback, and analog computers that are applied using operational amplifiers.*

(CPMK-02) Mampu menganalisis dan mendisain rangkaian penguat, pembangkit sinyal, osilator, filter, dan komputer analog pada penguat operasional.

*(CLO-02) Able to analyze and design amplifier circuit, signal generator, oscillator, filter, and analog computer on operational amplifier.*

(CPMK-03) Mampu menganalisis dan merancang rangkaian analog pada sistem dalam bidang elektro dengan menggunakan penguat operasional.

*(CLO-03) Able to analyze and design analog circuits on the system in the field of electrical engineering using operational amplifier.*

(CPMK-04) Menunjukkan sikap bertanggungjawab atas pekerjaan di bidang keahlian analisis rangkaian analog khususnya rangkaian penguat operasional secara mandiri.

*(CLO-04) Demonstrating attitude of responsibility on his/her work in the field of analog circuit analysis, especially the operational amplifier circuit independently.*

## Topik/Pokok Bahasan

### **Main Subjects**

1. Karakteristik dasar rangkaian integrasi penguat operasional

*The basic characteristics of integrated operational amplifier circuits*

2. Amplifier : Inverting, Non-inverting, adder, buffer, diferensial, dan instrumentasi  
*Amplifier: Inverting, Non-inverting, adder, buffer, differential, and instrumentation*
3. Komparator : open loop (zero crossing detector), feedback positif (dengan atau tanpa hysteresis)  
*Comparator: open loop (zero crossing detector), positive feedback (with or without hysteresis)*
4. Signal generator dan osilator Wien  
*Signal generator and Wien oscillator*
5. Komputer analog (Integrator, differentiator, adder)  
*Analog computer (Integrator, differentiator, adder)*
6. Filter aktif Butterworth (LPF, HPF, BPF, BSF)  
*Active Filter Butterworth (LPF, HPF, BPF, BSF)*

### **Pembelajaran dan ujian**

#### ***Study and examination***

- Latihan di kelas  
*In-class exercises*
- Tugas 1, 2, 3  
*Assignment 1, 2, 3*
- Ujian tengah semester  
*Mid-term examination*
- Ujian akhir semester  
*Final examination*

### **Pustaka**

#### ***Reference(s)***

- [1] Diktat Kuliah Rangkaian Analog, Hendra Kusuma 2018
- [2] Robert F Coughlin, Frederick F Driscoll, Operational Amplifier and Linear Integrated Circuit, Prentice-Hall International, 2001.
- [3] James M. Fiore, Operational Amplifiers & Linear Integrated Circuits: Theory and Application, 2016
- [4] Ramakant A Gayakward, Op-Amp dan Linear Integrated Circuits, Prentice-Hall, 2000.

### **Prasyarat**

#### ***Prerequisite(s)***

EE184306 Rangkaian Elektronika

*EE184306 Electronic Circuits*