

Mata Kuliah Course	Nama MK <i>Name</i>	: Dasar Sistem Pengaturan : <i>Introduction to Control Systems</i>
	Kode MK <i>Code</i>	: EE184404
	Kredit <i>Credits</i>	: 3 sks
	Semester <i>Semester</i>	: IV (Wajib) : <i>IV (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>	: Ir. Rusdhianto Effendie AK, MT
	Pengajar <i>Lecturer</i>	: Ir. Rusdhianto Effendie AK, MT
	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

Dasar Sistem Pengaturan merupakan mata kuliah yang mendasari ilmu pada bidang studi teknik sistem pengaturan. Mata kuliah ini mempelajari tentang bagaimana sistem pengaturan bekerja, bagaimana mendesain serta menganalisisnya. Materi yang dipelajari sebagai pengantar meliputi definisi sistem pengaturan, komponen-komponen sistem, konfigurasi sistem open loop dan closed loop serta contoh aplikasinya. Kemudian dilanjutkan dengan mempelajari pemodelan sistem mulai dari sistem elektrik, mekanik dan elektro-mekanik. Selanjutnya, hal yang dipelajari yaitu tentang diagram blok, diagram aliran sinyal, karakteristik respon sistem dalam domain waktu dan kestabilan sistem. Terakhir, membahas tentang desain kontroler PID serta teknik tuning-nya.

Introduction to Control Systems is the underlying subject of the control system engineering field of studies. This course discusses how it works, how to design and analyze it. The learning materials as introductory notions are control system components, open loop and closed loop system configurations and examples of its applications. Then forwarded with system modelling of electrical, mechanical and electro-mechanical systems. Furthermore, the important thing is about the block diagram, the signal flow diagram, the system characteristics, response analysis in the time domain

and the system stability. Having completed the concept, it also learns about the design of PID controllers and its tuning method.

CPL Prodi yang Dibebankan

Learning Outcomes

(CPL-01) Mampu menerapkan ilmu pengetahuan alam dan matematika pada bidang teknik elektro

(PLO-1) Capable to apply knowledge of natural sciences and mathematics to solve electrical engineering problem

(CPL-05) Mampu mengidentifikasi, memformulasikan dan menyelesaikan permasalahan dibidang teknik elektro

(PLO-5) Capable to identify, formulate and solve problems in the field of electrical engineering

(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

Capaian Pembelajaran Mata Kuliah

Course Learning Outcomes

(CPMK-01) Mampu menjelaskan konsep dan prinsip pemodelan sistem, analisis kestabilan, menentukan spesifikasi respon dan perancangan sistem pengaturan

(CLO-01) Ability to explain system modelling concepts and principles, stability analysis, determine response specifications and control system design.

(CPMK-02) Mampu memodelkan sistem, menganalisa kestabilan sistem, menentukan spesifikasi respon dan merancang sistem pengaturan.

(CLO-02) Able to model the system, analyze the stability of the system, determine the response specifications and design the control system.

(CPMK-03) Mampu menggunakan software simulasi Matlab atau yang sejenisnya untuk analisis dan visualisasi respon sistem pengaturan.

(CLO-03) Able to use Matlab simulation software or the like for analysis and visualization of system responses.

(CPMK-04) Menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahlian sistem pengaturan.

(CLO-04) Have a passion to improve knowledge in the field of control systems to improve the quality of Indonesian society in the mastery of technology.

Topik/Pokok Bahasan

Main Subjects

1. Definisi dan konsep sistem pengaturan
Definition and concept of control system
2. Model matematika sistem dinamik dalam bentuk persamaan differensial, fungsi alih, diagram blok, dan grafik aliran sinyal
Dynamic system mathematical model in the form of differential equations, transfer function, block diagram, and graph of signal flow

3. Spesifikasi respon sistem
Specification of system response
4. Analisis Kestabilan Sistem
System Stability Analysis
5. Perancangan kontroler PID secara analitik
Design of PID controller analytically
6. Tuning kontroler PID dengan metode Ziegler-Nichols
Tuning PID controller with Ziegler-Nichols method
7. Simulasi sistem pengaturan menggunakan kontroler PID
Control system simulation with PID controller

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] Ogata, Katsuhiko: "Modern Control Engineering", 3rd Ed., Prentice-Hall 1997
- [2] Kuo, Benjamin C. "Automatic Control System 8th Ed."
- [3] Jacob, J.M.: "Industrial Control Electronics: Application and Design", PHI 1989

Prasyarat

Prerequisite(s)

EE184305 Sinyal dan Sistem
EE184305 Signals and Systems