

Mata Kuliah Course	Nama MK <i>Name</i>	: Sistem Digital dan Mikroprosesor : <i>Digital and Microprocessor Systems</i>
	Kode MK <i>Code</i>	: EE184401
	Kredit <i>Credits</i>	: 4 sks
	Semester <i>Semester</i>	: IV (Wajib) : <i>IV (Compulsory)</i>
	Beban Belajar <i>Workload</i>	Kuliah : 4 x 50 = 200 menit/minggu Latihan/tugas : 4 x 60 = 240 menit/minggu Belajar mandiri : 4 x 60 = 240 menit/minggu : <i>Lectures : 4 x 50 = 200 min/week</i> <i>Exercises/Assignments : 4 x 60 = 240 min/week</i> <i>Self learning : 4 x 60 = 240 min/week</i>
	Tingkatan <i>Module Level</i>	: Sarjana (S1) : <i>Undergraduate</i>
	Penanggung Jawab <i>PIC</i>	: Astria Nur Irfansyah, ST, M.Eng, PhD
	Pengajar <i>Lecturer</i>	: Astria Nur Irfansyah, ST, M.Eng, PhD
	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 ini membahas teori dan perancangan sistem digital, komponen dasar sistem digital dan sistem mikroprosesor beserta komponen penyusunnya. Implementasi rangkaian digital meliputi implementasi rangkaian kombinasional dan sekuensial, dan diarahkan sebagai dasar implementasi sistem mikroprosesor yang meliputi aspek arsitektur hingga pada level gerbang logika. Pembahasan sistem mikroprosesor juga meliputi aspek pemrograman Assembly, konsep subrutin, stack, dan interupsi, teknik antarmuka input/output dan memori.

This course discusses the theory and design of digital systems, basic components of digital and microprocessor systems and their constituent components. The implementation of digital circuits includes the implementation of combinational and sequential circuits, and is directed as the basis for implementing the microprocessor system which includes architectural aspects up to the logic gate level. The discussion of microprocessor systems also includes aspects of Assembly programming, the concept of subroutines, stacks and interrupts, input/output interface techniques and memory.

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-09) Mampu belajar mandiri untuk menumbuhkan kemampuan belajar sepanjang hayat

(PLO-9) Capable to learn independently to foster lifelong learning abilities

(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 dasar sistem dan teknologi digital meliputi sistem bilangan biner, gerbang logika, rangkaian kombinasional, rangkaian sekuensial, teknologi IC digital, serta prinsip sistem mikroprosesor yang meliputi aspek implementasi pada level register transfer dan gerbang logika, aspek piranti lunak berupa program yang dieksekusi mikroprosesor, serta aspek pengembangan sistem berbasis mikroprosesor.

(CLO-01) Mastering basic digital systems and technology including binary number systems, logic gates, combinational circuits, sequential circuits, digital IC technology, and microprocessor system principles which include implementation aspects at the transfer register and logic gate levels, software aspects in the form of programs executed by microprocessors, and aspects of developing microprocessor-based systems.

(CPMK-02) Mampu melakukan penyederhanaan implementasi rangkaian kombinasional dengan teknik Karnaugh Map.

(CLO-02) Able to simplify the implementation of combinational circuits using the Karnaugh Map technique.

(CPMK-03) Mampu merancang dan melakukan simulasi desain ALU (arithmetic logic unit) dan microarchitecture CPU (central processing unit) berdasarkan sebuah instruction set sederhana.

(CLO-03)

Able to design and simulate ALU (arithmetic logic unit) and CPU (central processing unit) microarchitecture designs based on a simple instruction set.

(CPMK-04) Mampu menyusun program aras rendah untuk sistem mikroprosesor.

(CLO-04) Able to compile low level programs for microprocessor systems.

(CPMK-05) Mampu merancang sistem minimal berbasis mikroprosesor.

(CLO-05) Able to design microprocessor-based minimal systems.

(CPMK-06) Memahami konsep sistem komputer beserta komponen penyusunnya seperti CPU, I/O unit, memory unit, dan instruction set, sehingga mampu mengeksekusi program.

(CLO-06) Understanding the concept of a computer system and its constituent components such as CPU, I/O unit, memory unit, and instruction set, that they are able to execute programs.

(CPMK-07) Memahami konsep perancangan digital, bahasa pemrograman untuk sistem mikroprosesor.

(CLO-07) Understanding the concept of digital design, a programming language for microprocessor systems.

(CPMK-08) Menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri.

(CLO-08) Demonstrate an attitude of responsibility for work in their field of expertise independently.

Topik/Pokok Bahasan

Main Subjects

1. Teori teknik digital, sistem bilangan biner, aljabar Boolean, gerbang logika.
Digital engineering theory, binary number system, Boolean algebra, logic gates.
2. Rangkaian kombinasional, Sum of product, penyederhanaan rangkaian kombinasional, teknik Karnaugh map.
Combinational sequences, Sum of product, simplification of combinational circuits, Karnaugh map technique.
3. Rangkaian sekuensial, state machine, flip flop, register.
Sequential circuits, state machines, flip flops, registers.
4. Aritmetika digital, adder, two's complement, BCD, floating point, pengali, carry propagation.
Digital arithmetic, adder, two's complement, BCD, floating point, multiplier, carry propagation.
5. Teknologi IC digital, logic families, noise margin, TTL, CMOS, fan in/fan out.
Digital IC technology, logic families, noise margin, TTL, CMOS, fan in / fan out.
6. Model dan arsitektur komputer (CPU, I/O, memori, bus data dan instruksi, arsitektur Von Neumann, arsitektur Harvard, pengalamatan memori, set instruksi, kode mesin)
Computer model and architecture (CPU, I/O, memory, data and instruction bus, Von Neumann architecture, Harvard architecture, memory addressing, instruction set, machine code)
7. Dasar pemrograman sistem mikroprosesor dengan assembly, development toolchain, subrutin, stack, dan interrupt.
Basic programming of microprocessor systems with assembly, development toolchain, subroutines, stack, and interrupts.
8. Teknik antarmuka, memory interfacing, input-output port.
Interface techniques, memory interfacing, input-output port.

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] David Harris & Sarah Harris, "Digital Design and Computer Architecture", 2nd edition, Morgan Kaufmann, 2013, USA.
- [2] Morris Mano, Charles Kime, "Logic and Computer Design Fundamentals", 5th edition, Pearson, 2015.
- [3] David A. Patterson dan John L. Hennessy, "Computer Organization & Design: The Hardware / Software Interface", Morgan Kaufmann, 2017, USA.

Prasyarat

Prerequisite(s)

EW184102 Dasar Pemrograman

EW184102 Basic Programming
