



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

INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
FACULTY OF INTELLIGENT ELECTRICAL & INFORMATICS TECHNOLOGY
DEPARTMENT OF ELECTRICAL ENGINEERING
Bachelor Degree Program in Electrical Engineering

1	Nama Mata Kuliah / Course Name : Sistem Mikroprosesor dan Mikrokontroler / <i>Microprocessor and Microcontroller Systems</i>
2	Kode Mata Kuliah / Course Code : EE234407
3	Kredit / Credits : 3 SKS
4	Semester / Semester : 4

Deskripsi Mata Kuliah / Course Description

Mata kuliah Sistem Mikroprosesor dan Mikrokontroler membahas konsep komputer digital dan mikroprosesor, serta dasar penggunaan mikrokontroler. Arsitektur komputer yang umum dan sederhana diperkenalkan. Desain prosesor sederhana meliputi set instruksi, datapath, desain ALU dan controller, serta pemetaan memori. Mikrokontroler AVR dibahas mulai dari arsitektur, set instruksi, periferal, serta pemrogramannya dengan assembly dan bahasa C. Dengan mata kuliah ini, mahasiswa diharapkan mampu memahami prinsip mikroprosesor dan menggunakan mikrokontroler AVR dengan periferal internal dan antarmuka komponen eksternal dalam aplikasi sederhana. / *The Microprocessor and Microcontroller Systems course covers the concepts of digital computers and microprocessors, as well as the basics of using microcontrollers. Common and simple computer architectures are introduced. The design of a simple processor includes instruction sets, data paths, ALU and controller design, and memory mapping. The AVR microcontroller is discussed, starting from its architecture, instruction set, peripherals, and programming using assembly and C languages. With this course, students are expected to understand the principles of microprocessors and use AVR microcontrollers with internal peripherals and external component interfaces in simple applications.*

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

CPL 3 Mampu mengelola pembelajaran diri sendiri, dan mengembangkan diri sebagai pribadi pembelajar sepanjang hayat untuk bersaing di tingkat nasional, maupun

internasional, dalam rangka berkontribusi nyata untuk menyelesaikan masalah dengan mengimplementasikan teknologi informasi dan komunikasi dan memperhatikan prinsip keberlanjutan serta memahami kewirausahaan berbasis teknologi / *Able to manage one's own learning and continually self-develop as a lifelong learner to compete at the national and international levels, with the goal of making a tangible contribution to problem-solving by implementing information and communication technology and considering sustainability principles, as well as understanding technology-based entrepreneurship.*

CPL 5 Mampu mendesain komponen, sistem, dan proses yang logis dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi / *Able to design components, systems, and processes that are logical and realistic in accordance with specified specifications, while considering safety, social, cultural, environmental, and economic aspects.*

Capaian Pembelajaran Mata Kuliah / Course Learning Outcomes

1. Mampu menjelaskan konsep sistem digital, sistem bilangan, dan model dasar sistem mikroprosesor. / *Able to explain the concept of digital systems, number systems, and the basic model of microprocessor systems.*
2. Mampu menganalisis dan merancang arsitektur prosesor dan sistem mikroprosesor sederhana. / *Able to analyze and design simple processor and microprocessor system architectures.*
3. Mampu memahami arsitektur, peta memori, dan set instruksi dasar mikrokontroler 8-bit. / *Able to understand the architecture, memory map, and basic instruction set of 8-bit microcontroller.*
4. Mampu menerapkan pemrograman mikrokontroler dalam bahasa Assembly dan C. / *Able to apply microcontroller programming in Assembly and C languages.*
5. Mampu merancang perangkat keras dan program antarmuka mikrokontroler. / *Able to design hardware and program microcontroller interface devices.*

Pokok Bahasan / Contents

1. Teori teknik digital, sistem bilangan biner, gerbang logika, rangkaian kombinasional dan sekuensial. / *Digital engineering theory, binary number systems, logic gates, combinational and sequential circuits*
2. Model dan arsitektur komputer (CPU, ALU, I/O, memori, bus data, bus alamat dan instruksi, arsitektur Von Neumann, arsitektur Harvard) / *Computer theory and architecture (CPU, ALU, I/O, memory, data bus, address bus, Von Neumann architecture, Harvard architecture)*
3. Desain arsitektur prosesor sederhana (set instruksi, kode mesin, datapath, microprogramming, siklus instruksi), teknik pengalamatan memori dan antarmuka memori sistem mikroprosesor / *Design of simple processor architecture (instruction sets, machine code, datapath, microprogramming, instruction cycles), memory addressing techniques, and memory interfaces in microprocessor systems*
4. Arsitektur mikrokontroler 8 bit (AVR atau PIC), set instruksi dasar, register, pemrograman aritmetika dan logika dengan assembly, memori, stack, dan function call pada AVR/PIC. / *8-bit microcontroller architecture (AVR or PIC), basic instruction*

sets, registers, arithmetic and logic programming using assembly language, memory, stack, and function call on AVR/PIC.

5. Struktur program mikrokontroler dalam assembly dan C, compiler C dan assembler / *Program structure for microcontrollers in assembly and C, C compiler and assembler.*
6. GPIO, Timer/Counter, Interrupt, analog input/output, ADC. / *GPIO, Timer/Counter, Interrupts, analog input/output, ADC.*
7. Komunikasi serial UART, SPI, I2C. / *Serial communication using UART, SPI, I2C.*

Prasyarat / Pre-requisite

Pustaka / Reference

1. Sarah Harris and David Harris. 2015. Digital Design and Computer Architecture: ARM Edition (1st. ed.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA.
2. Ardi Winoto, 2008, Mikrokontroler AVR ATmega8/32/16/8535 dan pemrogramannya dengan Bahasa C pada WinAVR
3. Sepehr Naimi, Sarmad Naimi, and Muhammad Ali Mazidi. 2017. The AVR Microcontroller and Embedded Systems Using Assembly and C: Using Arduino Uno and Atmel Studio (2nd. ed.). MicroDigitalEd.com.
4. ATmega328p 8-bit AVR Microcontroller with 32K Bytes In-System Programmable Flash Datasheet