MATA KULIAH	**Nama Mata Kuliah**	: Elektronika Digital
	Kode MK	: VI231312
	Kredit	: 3 SKS
	Semester	: III

DESKRIPSI MATA KULIAH
Matakuliah Elektronika Digital ini termasuk dalam rumpun matakuliah *Basic Science* di Departemen Teknik Instrumentasi FV – ITS. Matakuliah ini membahas tentang komponen – komponen elektronika dalam dunia digital, gerbang logika, State Machine, aljabar Boolean serta penyederhanaannya. Mata kuliah ini juga memberikan keterampilan bagi mahasiswa dalam memprogram dan mensimulasikan sebuah sistem digital menggunakan bahasa pemrograman Hardware Description Language (HDL) serta mengaplikasikannya dalam Field Programmable Gate Array (FPGA)
CAPAIAN PEMBELAJARAN LULUSAN YANG DIBEBANKAN MATA KULIAH
1. Mampu mengkaji kasus penerapan ilmu pengetahuan dan teknologi di bidang keahlian sesuai standar kompetensi kerja, serta mampu mengambil keputusan secara tepat dari hasil kerja sendiri maupun kerja kelompok dalam bentuk laporan tugas akhir atau bentuk kegiatan pembelajaran lain yang luarannya setara dengan tugas akhir melalui pemikiran logis, kritis, inovatif, bermutu dan terukur dengan mempertimbangkan kesehatan, keselamatan, keamanan, dan lingkungan. (CPL-2) 2. Mampu berkomunikasi, menulis laporan serta membuat presentasi secara efektif. (CPL-4) 3. Mampu menerapkan pengetahuan matematika, ilmu alam, dasar-dasar instrumentasi pengukuran, pengendalian dan pengamanan untuk prosedur, proses, sistem maupun metodologi teknik yang diterapkan dalam suatu proses industry. (CPL-5) Mampu menunjukkan pemahaman tentang masalah sosial keteknikan, kesehatan, keselamatan, hukum, budaya dan tanggung jawab yang

relevan pada praktik penerapan rekayasa teknologi instrumentasi. (CPL-10)

CAPAIAN PEMBELAJARAN MATA KULIAH

- Mahasiswa mampu memahami prinsip penggunaan gerbang logika dasar
- Mampu memahami prinsip penyederhanaan persamaan fungsi logika menggunakan aljabar Boolean.
- Mampu menggunakan komponen – komponen elektronika yang berhubungan dengan aplikasi digital.
- Mampu memahami dan mengaplikasikan *Hardware Description Language* (HDL) pada *Field Programmable Gate Array* (FPGA).
- Mahasiswa mampu memahami dan menggunakan *State Machine* pada aplikasi sistem instrumentasi.

POKOK BAHASAN

1. Pengantar Elektronika Digital
2. Sistem bilangan digital dan proses konversi antar sistem bilangan
3. Aritmatika Bilangan Binner
4. Operasi Gerbang Logika Dasar
5. Rangkaian Kombinasi Gerbang Logika
6. Boolean dan penyederhanaannya
7. Penyederhanaan menggunakan Karnaugh Maps (K-Maps)
8. Penyederhanaan menggunakan Metode Tabulasi (Quine-McCluskey)
9. Arithmetic Logic Unit (ALU)
10. Finite State Machine (FSM)
11. Hardware Description Language (HDL)
12. Field Programmable Gate Array (FPGA)

PRASYARAT

PUSTAKA

Buku:

1. Sabir Kumar Sakar, Asish Kumar De, Souvik Sarkar, "*Foundation Of Digital Electronic and Logic Design*".
2. Daniel Adam Stek, "*Analog and Digital Electronics*", 3rd edition.
3. Palnitkar, Samit, "*Verilog A guide to digital design*", 2nd Edition, Prentice Hall, 2003.
4. Brown, Stephen, Vranesic, Zvonko, "*Fundamental of digital logic with verilog design*", McGraw-Hill, 2003.
5. Enoch. O. Hwang, "*Digital Logic And Microprocessor Design With VHDL"*, Team ELECTRONIX, 2004 .

COURSE	**Course Name**	: Digital Electronic
	Course Code	: VI231312
	Credit	: 3 SKS
	Semester	: III

DESCRIPTION OF COURSE

This course is included in the Basic Science class in the Instrumentation Engineering Department of FV - ITS. This course discusses the electronic components in the digital world, logic gates, State Machines, Boolean algebra and its simplification. This course also provides students with skills in programming and simulating a digital system using the Hardware Description Language (HDL) programming language and applying it in the Field Programmable Gate Array (FPGA)

LEARNING OUTCOMES

1. Able to review cases of the application of science and technology in the field of expertise according to work competency standards, and able to make appropriate decisions from the results of their own work and group work in the form of a final project report or other forms of learning activities whose output is equivalent to the final project through logical, critical, innovative, quality and measurable thinking by considering health, safety, security and the environment. (CPL-2)
2. Able to communicate, write reports and make presentations effectively. (CPL-4)
3. Able to apply knowledge of mathematics, natural sciences, basics of measurement instrumentation, control and security for procedures, processes, systems and engineering methodologies applied in an industrial process. (CPL-5. Able to demonstrate an understanding of engineering social issues, health, safety, law, culture and responsibility relevant to the practice of applying instrumentation technology engineering. (CPL-10)

COURSE LEARNING OUTCOME

- Students are able to understand the principle of logic gates
- Students are able to understand the simplification process using Boolean Algebra
- Students are able to use electronic components for digital application.
- Students are able to understand and utilize Hardware Description Language (HDL) into Field Programmable Gate Array (FPGA).
- Students are able to understand and use Finite State Machine (FSM) for instrumentation system.

MAIN SUBJECT

1. Introduction to Digital Electronics
2. Digital number system and conversion process between number systems
3. Binner Number Arithmetic
4. Basic Logic Gate Operation
5. Combination circuit of logic gates
6. Boolean and its simplification
7. Simplification using Karnaugh Maps (K-Maps) 7.
8. Simplification using Tabulation Method (Quine-McCluskey) 8.
9. Arithmetic Logic Unit (ALU)
10. Finite State Machine (FSM)
11. Hardware Description Language (HDL)
12. Field Programmable Gate Array (FPGA)

PREREQUISITES

REFERENCE

Book:

1. Sabir Kumar Sakar, Asish Kumar De, Souvik Sarkar, "*Foundation Of Digital Electronic and Logic Design*".
2. Daniel Adam Stek, "*Analog and Digital Electronics*", 3rd edition.

3. Palnitkar, Samit, "*Verilog A guide to digital design*", 2nd Edition, Prentice Hall, 2003.
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5. Enoch. O. Hwang, "*Digital Logic And Microprocessor Design With VHDL"*, Team ELECTRONIX, 2004 .