

KELOMPOK 1

EL 2002 Probability and Statistics

Introduction : probability concepts, set theorem, venn diagram, population means; permutation, Combination; Random variables : discrete and continuous, Expected Values, Moment Generating Function, Gaussian probability Density Function, Other pdf, Transformation of random variables, Multivariant random variables, Transformation of Multivariants random variables, Estimation : Point Estimation, Maximum Likelihood Estimation.

EL 2005 Logic Circuits & Digital Techniques (3 credit-hours)

Short Description (~40 words)

Basic building blocks and design methods to construct synchronous digital systems. Alternative representations for digital systems. Bipolar TTL vs. MOS implementation technologies. Standard logic (SSI, MSI) vs. programmable logic (PLD, PGA). Finite state machine design. Digital computer building blocks as case studies. Introduction to computer-aided design software. Formal hardware laboratories and substantial design project.

Offered to:

Study Programs: EL, EC, ET, EP. School: School of Electrical Engineering & Informatics, ITB

Related Courses

EL1001 Introduction to Electric Circuits (Prerequisite)

References/Bibliography

1. S. Brown and Z. Vranesic: *Fundamentals of Digital Logic and VHDL Design*, McGraw-Hill, 2005.
2. M. Zwolinski: *Digital System Design with VHDL*, Prentice Hall, 2000
3. R.K. Dueck: *Digital Design with CPLD Applications and VHDL*, Delmar Learning, 2000 (ISBN 0766811603)

EL 2006 Measurement and Instrumentation (3 credit-hours)

Short Description (~ 40 words)

Measurement principles, signal processor, electrical measurement, sensor & transducer, non electrical measurement, signal generator principle, wave and spectrum analyzer.

Offered to:

Study Programs :EL /EL , EC, EP, ET

School: School of Electrical Engineering & Informatics, ITB)

Related Course

Prerequisite : EL 2003 Electric Circuits.

References

1. Dally, J.W; Riley, W.F.; McConnel, KG, "*Instrumentation for Engineering Measurements*", 2nd Edition, John Wiley & Sons Inc., New York, 1993 (ISBN: 0-471-60004-0)
2. Helfrick, A.D; Cooper, W.D; "*Modern Electronic Instrumentation and*

Measurement Techniques”, Prentice Hall, New Delhi-India , 1996(ISBN: 81-203-0752-6)

EL 2007 Electrical Engineering Laboratory I (1 credit-hour)

Short Description

In this course lectures and laboratory experiments will be given in the introduction to basic electrical engineering instruments: Analog and Digital Multimeters, Signal Generators, and Oscilloscopes; physical observation of circuit theorems; circuit behaviour in DC and first order response; introduction to measurement in digital circuit; basic digital logic gates, combinational and sequential circuits, encoders and decoders, simple digital circuit design and implementation using standard logic and FPGA.

Offered to:

Study Program : EL/ EL, EC, EP, ET
School : School of Electrical Engineering and Informatics.

Related Courses:

Co requisite : EL2003 Electric Circuit
Co requisite : EL2005 Logic Circuit and Digital Technique

Reference:

EL 2008 Electrical Engineering Laboratory II (1 credit-hour)

Short Description

In this course lectures and laboratory experiments will be given in the basic techniques of measuring transmission lines, frequency response, small and large resistance, and electric power along with observation of Diode i-v characteristics and rectifying circuits, BJT and FET –iv characteristics, and their application as small signal amplifiers, switches, and basic logic gates.

Offered to:

Study Program : EL/ EL, EC, EP, ET
School : School of Electrical Engineering and Informatics.

Related Courses:

Co requisite : EL2006 Measurement and Instrumentations
Co requisite : EL2010 Electronics I

Reference:

EL3006 Microprocessor System & Lab.

Short Description

Introduction Microprocessor : Binary, Hexadecimal, Octal, ALU, Instruction Set , Data Bus, Address Bus, Latch, Address decoder ;Register : General purpose, Stack pointer,Index, Flag, Instruction pointer , Accumulator ;Serial Input/Output : Baud rate, Synchronous and Asynchronous serial communication, Data formatting ; Paralel I/O : Unidirectional and Bidirectional , Handshaking ; Memory : ROM , RAM , Flash ; ADC and DAC ; Display:LCD,LED ; Key-pad; Motor : Stepper, Servo.

Offered to:

Study Programs : EL / EL, EC, EP, ET
School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL2003 Electric circuits
EL2010 Electronic 1
EL2005 Digital and Logic circuits

References/ Bibliography :

Mazidi, 2003, *Intel Microprocessors* , Simon Schuster, New York.

EL40Z1 Final-year Project I & Seminar

Description:

The student is planned to do preliminary study / design of her / his final-year project. Under his / her supervisor, the student has to submit the final-year proposal, abstract and finally full paper which should be presented in student's seminar. The student has to work in the laboratory to do his / her research during the semester time.

Offered to:

Study Program: EL / EL
School : School of Electrical Engineering & Informatics, ITB

Related courses:

Prerequisite: 108 credit-hours courses has been taken

References :

EL40Z2 Final-year Project II

Description:

In this individual assignment, the student should continue her/his previous work in EL40Z1 course under the same supervisor. The work resulted in this project could be in the form of any implementation (software/hardware), even in the form of recommendation of solution to the electrical engineering problems. At the end of this project, the student should write the final report, and then defended in front of 3 examiners (lecturers).

Offered to:

Study Program: EL / EL
School : School of Electrical Engineering & Informatics, ITB

Related courses:

Prerequisite : EL40Z1 Final-year Project I & Seminar (passed)
124 credit-hours has been taken

References:

EL4002 Selected Topics (Compulsory, 1 credit)

Introduction: general course description, course objectives, course outline, evaluation. The required general competences of university graduates, the importance of intellectual intelligence, emotional intelligence and spiritual intelligence. The essential skills: communication and language competency, paper & report writing, presentations. Time

management, personality, collaboration, entrepreneurship. Curriculum vitae, application letters. Selected new developments in Electrical Engineering/Biomedical Engineering.

Pre-requisite/Co-requisite:

KU4024 Scientific Writing

References

1. J.David Irwin: *On Becoming An Engineer – A Guide to Career Path*, IEEE Press,1997
2. John Dustin Kemper: *Engineers and their Profession*, Holt Reinhart & Winston, 1991
3. Gerard Blair: *Starting To Manage – The Essential Skills*, IEEE Press, 1995
4. Lloyd E.Shefsky: *Enterpreneurs Are Made Not Born*, McGraw-Hill, 1994
5. M.W.Martin, R.Schinzinger: *Ethics in Engineering*, McGraw-Hill, 1997

EL5005 Advanced Electric Circuit

Short Description

Description of nonlinear resistors, inductors and capacitors. Numerical methods in solving nonlinear and large electric circuits. Description of a generalized nonlinear circuit analysis. Description of a generalized circuit analysis based on circuit topology, two-ports of multiports representations and reciprocity property.

Offered to :

Study Programs : EI, EP. School : School of Electrical Engineering & Informatics, ITB

Related Courses : EL2003 Electric Circuits., EP2005 Numerical Analysis

References/Bibliography

1. L.O.Chua, C.A.Desoer and E.S.Kuh : *Linear and Nonlinear Circuits*. McGraw Hill, 1987

KELOMPOK 2

EP3003 Transmisi Daya (Wajib, 3 SKS)

Silabus Bahasa Inggris

Single and three phase system , active & reactive power, per unit system , power transformers characteristics, mechanical aspect of transmission lines, series impedance and capacitances, corona, audible noise, electrostatic and electromagnetic field of transmission lines, relationship between voltage and current, ABCD circuits, underground cable, transmission lines performances, consideration to loading capability and stability, direct current transmission lines, static var compensation and flexible alternating current transmission system, transmission line reliability, substation reliability.

Program Studi Peserta :

EL/EP : Sekolah Teknik Elektro dan Informatika ITB

EP4051 Power System Analysis

Short Description:

Introduction, power system representation, admittance model & network calculation, impedance model & network calculation, power-flow solutions, symmetrical faults, symmetrical components & sequence networks, unsymmetrical faults, Z_{bus} in contingency analysis, power system stability, power system control, economic operation of power systems.

Offered to Study Programs:

EP/EL: School of Electrical Engineering and Informatics ITB

Related Courses:

Prerequisite : Power Transmission
Corequisite : High Voltage Engineering

Reference:

1. John J. Grainger, W. D. Stevenson, JR, *Power System Analysis*, McGraw-Hill, 1994
2. M. El Hawary, *Electrical Power System, Design & Analysis*, IEEE Press, 1995
- Prabha Kundur, *Power System Stability & Control*, McGraw-Hill, 1994

EP4053 Power systems protection II

Short description :

Power system fault , Protection systems, generator protection , transformer protection, transmission line protection. Distance relays, Directional relays, Differential relays , EHV line protection. Grounding systems, Substation grounding, touch voltage, Medium voltage and industrial protection. Relays coordinations , protection zones.

Offered to:

Study Programs: EL/EP School: School of Electrical Engineering & Informatics, ITB

Related Courses:

Prerequisite : Power systems protection 1

Referensi :

1. PM Anderson, Power System Protection, MCGraw Hill, 1998
2. J. L. Blackburn, Protective Relaying, principles and application, Marcel Dekker, Inc., 1998

KELOMPOK 3

ET3001 Communication Systems

Communications subsystems, Random Processes, Fourier Transformation, Continuous Modulation : Amplitude Modulation, Frequency and Phase Modulation; Transmitters and Receivers, Noise in Communication systems, Pulse Code Modulation

ET3002 Communication System II

Digital Baseband Transmission : Block diagram, matched filter detection, probability of error. Transmission through band limited channel : intersymbol interference, Nyquist criterion for ISI free transmission, eye pattern, baseband equalization. Signal space analysis, maximum likelihood decoding, performance analysis. Digital modulation : amplitude, phase, frequency, hybrid modulation. Synchronization system : carrier, symbol and frame.

ET3007 Telecommunication Engineering Practice I

Amplitude modulation system, Frequency and Phase modulation system, performance of analog communication system, sampling process, error quantization, pulse code modulation. Basic data communication, data modem, local area network installation and administration.

ET3008 Telecommunication Engineering Practice II

Traffic engineering simulation, various model of traffic source, measurement and analysis of traffic, network performance measurement, management and control of traffic, network optimization and dimensioning

ET3020 Microwave and Communication Electronics

Introduction; Radio Frequency Amplifiers: S parameter, Power Gain, Stability, Class of Operation, Low Noise Amplifier, Power Amplifier; Impedance Matching: Impedance Matching Circuitry, Smith Chart, Voltage Standing Wave Ratio, Reflection Coefficient, Return Loss; Mixer: Characteristics, Conversion Gain, Mixers; Radio Frequency Filters, Radio Frequency Oscillators: Oscillation Condition, Negative Resistance Oscillator; Radio Frequency Synthesizers: PLL, Fractional N Division PLL Synthesis, DDS.

ET3030 Electromagnetic Field 2B (EM Field for Telecom. Engineering)

Vector identity and Maxwell equations, EM Field in matters, Poynting theorem, plane wave on the boundary of two mediums, normal incidence, oblique incidence, transmission lines, Smith chart, waveguides, TM and TE modes, rectangular and circular waveguides, coaxial resonators, cavity resonators and modes, short dipole, radiation dipole.

ET3041 Telecommunication Network

Telecommunication network principles; information coding principles; switching technology; telecommunication signalling technology; fundamental technical plan: access network basic plan, numbering plan, synchronization plan, routing basic plan; telecommunication protocols principles; telecommunication services; intelligent network

principles; telecommunication management network principles; performance engineering principles.

ET3042 Teletraffic Engineering

Introduction to teletraffic theory, Traffic volume & intensity, probability review, Poisson, Erlang, Engset and Binomial distribution, Overflow traffic, interconnection, carried to offered traffic conversion, network dimensioning, delay system, traffic measurement, traffic forecasting.

ET4002 Capita Selecta Telecommunications

Writing research proposals and reports, writing job applications and curriculum vitae, planning graduate study and information of scholarship, career planning for telecommunications engineer, engineering ethics and entrepreneurship, intellectual property right, telecommunication economy, policy and regulations. Recent topics on telecommunications, hot issues in telecommunications, and awareness of telecommunication industry (to be delivered by visiting lecturers from telecommunications industry and regulator).

ET 4007 Telecommunications Engineering III (Labs.)

Optical fibre communications: Optical fibre point-to-point communication link performance, link attenuation and bending loss, multiplexing in optical fibre, and line coding in optical communications links.

Telecommunications electronics: Characteristics of amplifier for radio communication, directional coupler, impedance matching, mixer, and multiplier.

Antenna and propagation: Measurement of antenna impedance and VSWR, antenna gain and radiation pattern.

ET 4030 Antenna and Wave Propagation

Element of radio communications system, antenna concept and characteristics, antenna types, antenna parameters, antenna measurements, antenna arrays; introduction to wave propagation, path loss and link budget, types of wave propagations, sky wave propagation, troposcatter communication, wave propagation in water.

ET 4041 Optical Communication System

Characteristic of Telecommunication System with cable conductors and Devices : Attenuation ; Distortion ; SNR / BER ; Hybrid set ; crosstalk ; Echo canceller ; line codes; multiplexer and DeMultiplexer ; XDSL. Optical fiber Telecommunication System parameters and components : Characteristic of standard and special fibers ; attenuation ; Dispersion power budget and Risetime budget, optical transmitters and receivers ; splicing ; connectors ; HFC ; line codes.

ET40K0 Practical Work

ET40Z1 Final Project I and Seminar

ET40Z2 Final Project II

ET5003 Terrestrial and Satellite Communication Systems

Microwave Communication, LOS systems, Characteristics of LOS Propagation, Characteristics of LOS systems, Choice of frequency, Fading diversity reception Modulation scheme, Transmitters-Receivers, Microwave Link Budget, Repeaters Antenna Design, Design of Microwave links. Elements of Satellite Communications, Satellite Orbits, Earth Station, Earth to Space Propagation, Satellite Link Budget, Frequency Division Multiple Access, Time Division Multiple Access, Demand Assignment Multiple Access, Very Small Aperture Terminal Networks, Mobile Satellite Networks.

ET 5005 Cellular Communications Systems

Concept of cellular communications, co-channel and adjacent channel interference, reuse of radio resources, wireless propagation and wireless multi-path channel models, mitigation techniques of multi-path fading channel impairments, wireless and multiple access techniques : frequency division, time division, and code division multiple access techniques, wireless modulation techniques, wireless coverage and traffic planning and design, power control, performance of wireless communications, standard of wireless communications technology.

ET5012 Wavelet and Multiresolution Analysis

Definition, objectives and advantages of wavelets, signal representation in space and frequency, continuous wavelet transform theory, discrete wavelet transform, multi-resolution analysis, MRA implementation using filter-bank, wavelet applications: compression for communication systems

ET5014 Image and Video Coding

Introduction to Image and Video Coding, Information & Coding, Elements and Basic Compression, Huffman Coding, Arithmetic Coding, Sampling & Quantization, Vector Quantization, Predictive Coding, Transform Coding, Sub-Band Coding, Video Fundamentals, Human Visual System, Scanning, Colour Components, Digital Video, Image Standard Formats, Coding Standard : JPEG, H.261, MPEG-1, MPEG-2, H.263, MPEG-4; Video Transmission, Source Video Characteristics, Video Signal Modeling, Packet Video

ET5015 Speech and Audio Coding

Introduction to speech and audio Coding, Information & Coding, Speech signal modeling. Speech coding: Linear Predictive Coding, Formant Voice Coding, Coded Excited Linear Predictive Coding, Sub-Band Coding, Sinusoidal Transform Coding,

Improved Multi-band Coding, wideband speech coding, audio coding.
Coding standards: ITU, North America, Japan, Immarsat, and standard for security.

ET5022 Telemetry System

Definitions, data collection system, data processing system, IRIG standard, transmission system : amplitude modulation, frequency modulation, FM/FM, PCM/FM, BPSK, PCM/PM, hybrid system, synchronization : bit synchronization, frame synchronization, forward error correction : hamming, convolution, viterbi.

ET5023 Radar and Navigation System

Basic of Radar, functions and parameter of radar systems, radar equation, targets and clutters, extraction of information of radar echoes, tracking radar, transmitter and receiver components, radar antennas, radar signal processing, MTI (Motion Target Indicators), SLAR (Side Looking Aperture Radar), Synthetic Aperture Radar, Topography mapping using InSAR, DEM reconstruction

ET5030 Fields and Wavels in Communication Electronics

Maxwell's equations . The wave equation, wave equation for free space, wave equation in material media. The uniform transmission lines, The lossless lines. Reflection and transmission at the end of a line. Reflection and transmission at a discontinuity on the line. High frequency line, Smith chart. Scattering Matrix and its uses, Hybrid ring, Directional Couplers, Simple analysis using S matrix. Phase shifter, Duplexer, Diplexer. Microwave measurement of impedance, Power frequency attenuation and VSWR, Industrial application of microwave., Three major approaches of computational electromagnetics: the method of moment (MoM), finite element method (FEM) and finite difference time domain (FDTD) method.

ET 5042 Non Linear Optical Communication System

Characteristic of general optical fiber communication system parameters ;
Minimum attenuation and dispersion region ; Linear and Non linear index of refraction ; linear and non linear attenuation and dispersion. Non linear transmission characteristic of optical fiber parameters : SPM ; XPM ; SBS ; SRS ; FWM ; Kerreffect ; hight polarization. Characteristic of single optical channel and multi optical channels system.

ET5043 Computer Networks: Architecture and Protocols

Overview of telecommunication networks, Protocols & OSI Reference Model, TCP/IP Model, Medium Access Control Protocol, LAN Technology & Standard Peer-to-Peer Protokol, Data Link Layer, Network Layer: Addressing & Routing, Transport Layer, TCP Congestion Control, Router Architecture, ATM, Traffic Management, Network Performance.

ET5044 Internet Engineering

Introduction to IP-based network and Internet, protocols and services; TCP/IP suite architecture, advanced technique in TCP/IP, TCP/IP socket: basic, socket programming, API; Web-enhanced

ET 5045 Intelligent Network

Overview of telecommunication network; basic digital signaling; common channel signaling number 7 (CCS #7); concept, definition and evolution of intelligent network; Service provision; physic and functional architecture; ITU-T Vs Bellcore standard; IN call model, Virtual private Network (VPN); service management; TMN; services/features interaction.

ET5046 Broadband Communication Networks

History, and Challenges on Broadband Communications, Broadband ISDN Concept, Highspeed Local Area Networks, Metropolitan Area Network, Frame Relaying Networks, Cell Switching Technology (ATM), Broadband Architecture, ATM Transmission & Switching Techniques, Multimedia Services, TCP/IP over Broadband Networks, Broadband Access Infrastructures, The Emerging of Next Generation Networks.

ET5051 Digital Switching

Introduction to digital switching, speech digitalization, digital transmission and multiplexing, circuit switching, switching on multi-services network, access and multiplexing for integrated services, multi-point circuit switch, multi-rate circuit switch, fast packet switching, routing & non-blocking packet switching, performance of switching network.

ET5052 Telecommunication Software Engineering

Introduction, Software Engineering, software life cycle, formal method, ITU-T standard series Z-100 :MML, series Z-200 : C HILL, series Z-300 :SDL;. SDL Vs UML. Formal specification :using SDL : basic SDL language, concept system, block and process, channel, signal route, time, service, structure and hierarchy for complex system. Example of SDL applications : simple protocols (dummy , on-off ,ping-pong, alternating bit protocol and window), access point system, etc., Using SDL development tool to specified and design a telecommunication system.

ET5053 Telematic services and Technology

Distributed data base, multimedia storage and access techniques on distributed environment, multimedia communication over packet based networks, soft-switch, Quality of service guarantees, access network technology/service, application service provider, Web caching services, VPN.

ET5062 Telecommunication Network Management

Telecommunication Management Network Concept (TMN): FCAPS (Fault, Configuration, Accounting, Performance and Security). TMN functional model; TMN logical model ; Information Model and Structure in TMN : Abstract Syntax Notation, GDMO. Communion Service and protocol in TMN : ACSE, ROSE, CMISE and CMIP; Internet Network Management : Simple Network Management Protocol (SNMP). Distributed Network Management : Mediation Device, Q Adaptor, CORBA.

ET 5063 Telecommunication Regulation & Interconnection

Trends in telecommunication interconnection regulation, interconnection principles, establishing interconnection arrangements, financial and commercial terms of interconnection, technical aspects of interconnection, interconnection with mobile networks, internet interconnection, towards next generation interconnection

KELOMPOK 4

EL 2010 Electronics I

Short Description

Introduction to electronics; Diode: physical operation, IV characteristics, modelling and circuit analyses, circuit application; Bipolar junction transistor (BJT): physical operation, IV characteristics, modelling and circuit analyses, single stage amplifier, transistor as a switch; Field Effect Transistor (FET) :physical operation, IV characteristics, modelling and circuit analyses, single stage amplifier, logic inverter and analog switch, other FET devices; Logic circuit families: bipolar and MOS.

Offered to:

Study Programs : EL / EL, EC, EP, ET

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL2003 Electric circuits

References/ Bibliography :

Adel Sedra and Kenneth Smith. 2003. *Microelectronics Circuits, 5th Ed.*, Oxford University Press, New York.

EL 3011 Electronics II

Short Description

Differential amplifiers: operation and small signal analyses, biasing, active loading; multistage amplifiers; OPAMP : Ideal , Non ideal, Active Filter, Ideal-diode, GIC, Analog Computation; Frequency response: s-domain analyses, low and high frequency responses of transistor amplifiers, wideband amplifier: Feedback: general structures and properties, topologies, stability; Output-Stage and Power Amplifier : classification, class A, class B and AB, biasing ; Oscillator, Signal Generator and Waveform Shaping ; Voltage Regulator : Serial, Paralel, Switching.

Offered to:

Study Programs : EL / EL

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL2010 Electronics I

References/ Bibliography :

Adel Sedra and Kenneth Smith, *Microelectronics Circuits, 5th Ed.*, Oxford University Press, New York, 2003.

EL 4011 Semiconductor devices

Short Description

Introduction to PN junction, Bipolar Junction Transistors, Secondary effect in BJT, Field Effect Transistor, Junction FET, MOS Diode, MOSFET, Secondary Effect in MOSFET, Metal-Semiconductor contacts, MESFET, High Electron Mobility Transistor (HEMT), Heterojunction Bipolar Transistor (HBT), Application Specific Diodes: LED, Laser Diode,

Photo Diode, PIN Diode and Zener Diode, Photovoltaic cell, Gunn Diode, Power Devices: Thyristor, SCR and TRIAC.

Offered to:

Study Programs : EL / EL

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3005 Electrical Engineering Materials

References/ Bibliography :

1. Basuki R. Alam , Diktat Devais Elektronika, Teknik Elektro ITB
2. RS Muller, T. Kamins “Device Electronics for IC” J. Wiley
3. S.M. Sze “Microelectronic Devices” McGraw Hill

EL 4012 Analog Integrated Circuit Design

Short Description

This course gives students a complete picture of analog integrated circuit design including modeling, simulation, layout, and verification. Topics includes: CMOS technology, CMOS device modeling, Layout techniques, CMOS subcircuits, CMOS Operational amplifiers, CMOS comparators, Switched-Capacitor circuits, and Analog IC design methodologies.

Offered to:

Study Program : EL

School : School of Electrical Engineering and Informatics

Related Courses:

EL2010 Electronics I (Prerequisite)

EL3011 Electronics II (Prerequisite)

References/Bibliography:

1. P.E. Allen, D.R. Holberg, “CMOS Analog Circuit Design”, Oxford University Press, 2nd Edition, 2002
2. P. Gray, P.J. Hurst, S.H. Lewis, R.M. Gray, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons, 4th Edition, 2001
3. F. Maloberti, “Analog Design for CMOS VLSI Systems”, Kluwer Academic Press, 2000

EL 4013 Instrumentation system

Short Description

Introduction to Instrumentation Systems: configurations and building blocks; Instrumentation system building blocks: sensors, signal conditioner, signal processor, signal recorder, signal communicator, and display and readout.

Offered to:

Study Programs : EL / EL

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3011 Electronics II

References/ Bibliography :

1. Darold Wobschall, Circuit Design for Electronic Instrumentation: Analog and Digital Devices from Sensor to Display, McGraww-Hill, 1987.
2. Halit Eren, Electronic Portable Instruments: Design and Applications, CRC, 200

EL 4014 IC fabrication**Short Description**

Overview of Semiconductors; NMOS- FET & IC Fabrication Sequences; Pattern Transfer; Oxidation, Diffusion & Ion Implantation; Process Simulation; Thin Film Deposition & Epitaxy; Process Integration; IC Packaging & Test.

Offered to:

Study Programs : EL / EL

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3011 Electronics II

References/ Bibliography :

1. S.A. Campbell : **The Science and Engineering of Microelectronic Fabrication**, Oxford University Press, 1996
2. S. Wolf & R. N. Tauber : **Silicon Processing for the VLSI Era – Vol. 1 Process Technology**, Lattice Press, 1986.
3. O.D. Trapp, et. al. : **Semiconductor Technology Handbook**, Technology Associates, 1982
4. **S.M. Sze : Semiconductor Devices - Physics & Technology**,

EL 4015 VLSI Systems Design**Short Description**

Introduction to VLSI System Design; Historical Perspective; VLSI Design Flow; Design Hierarchy; Concepts of Regularity, Modularity and Locality; VLSI Design Styles CMOS Logic; CMOS Transistors; The CMOS Process; CMOS Design Rules; Combinational Logic Cells; Sequential Logic Cells; Datapath Logic Cells; I/O Cells; Cell Compilers

Offered to:

Study Programs : EL / EL, EC, ET

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL2005 Logic Circuits & Digital Techniques

Prerequisite : EL2010 Electronics I

Prerequisite : EL3006 Microprocessor Systems Lab

References/ Bibliography :

1. Digital Integrated Circuits: A Design Perspective, Jan M. Rabaey, Prentice Hall, Inc., 1996
2. Design of VLSI Systems, Lecture Notes by Yusuf Leblebici and Daniel Mlynek, EPFL-DE Publication, 1997.
(<http://ic.ee.itb.ac.id/~ssarwono/c3iwww.epfl.ch/teaching/webcourse/>)

3. Application Specific Integrated Circuits, Michael J. Smith, Addison Wesley, 1997.
4. Magic/L-Edit Tutorial, Analog Tutorial, Irsim Tutorial, hspice Tutorial, Modelsim Tutorial.

EL 4019 Electronics laboratory

Short Description

Group design projects in various areas of electronics; projects are chosen by students with approval of the instructor; a written report, and an oral presentation are required. Class lectures cover complete design process of electronics circuits: design requirements, selection of technology and circuits realization, testing, and documentation.

Offered to:

Study Programs : EL / EL

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3011 Electronics II

References/ Bibliography :

Electronics: Project Management and Design, D. Joseph Stadtmiller , Prentice Hall, 2001.

EL 5010 Current Topics in Microelectronics

Short Description

A course dealing with selected topics of interest on current progress in microelectronics in one of the following major themes: (1) System Driver (MPU, Mixed Signal, SOC), (2) Design (Design Process, System Level Design, Logical Level Design, Circuit Level Design, Physical Level Design, Design Verification, Design Test, (3) Modeling & Simulation, (4) Process Integration, Devices and Structures, (5) Test and Test Equipment.

Topics are selected at the discretion of the faculty member in charge.

Offered to:

Study Program : EL

School : School of Electrical Engineering and Informatics

Related Courses:

EL2010 Electronics I (Prerequisite)

EL3011 Electronics II (Prerequisite)

References/Bibliography:

1. _____, "International Technology Roadmap for Semiconductor, ITRS, Latest Edition
2. H. Veendric, "Deep Submicron CMOS ICs – From Basics to ASICs", Kluwer Academic Publishers, 2nd Edition.
3. Articles taken from open literature published by IEEE or by IEE

EL 5014 RFIC Design

Short Description

Smith chart, matching networks, distributed elements, microstrip element and circuits, design of microwave amplifier and oscillators, low noise circuits, RF CAD tools, circuit implementation with microstrip.

Offered to:

Study Programs : EL / EL,EM

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3001 Engineering Electromagnetic I

Prerequisite : EL3011 Electronics II

References/ Bibliography

1. Microwave Semiconductor Circuit Design Davis W. Alan, Van Nostrand Reinhold, 1984.
2. Microwave Transistor Amplifier: Analysis and Design Gonzalez Guillermo, Hall, 1984.
3. Microwave Circuit Analysis and Amplifier Design Samuel, Y. Liao, Prentice Hall, 1987
4. High-Frequency Amplifier Ralph S. Carson, Wiley-Interscience, 1982

EL 5015 IC Packaging and Interconnections

Short Description

Review of interconnection and packaging technology, Case studies: 1. Printed circuit board design: floor planning, design rules for digital, analog, power, and high frequency circuits.

2 Printed circuit Technology: PCD processing, circuit and modul assembly, testing procedure, industrial standards for PCB and circuit manufacturing.

Offered to:

Study Programs : EL / EL,EM

School: School of Electrical Engineering and Informatics, ITB

Related Courses

Prerequisite : EL3001 Engineering Electromagnetic I

Prerequisite : EL3011 Electronics II

References/ Bibliography

1. Walter C.Bosshart, *Printed Circuit Boards – Design and Technology*, Tata Mc.GrawHill, 1985.
 2. Other literatures related to content of course
- Internet (supporting)

KELOMPOK 5

EL 3083 Sistem Kendali (Control System: compulsory, 3 credits)

This subject is about control system analysis & design for continuous time linear time invariant systems. It starts with introduction and mathematical modeling of physical systems in which a state space model is briefly introduced.

It is then followed by basic performance and stability analysis. Analysis & design is done using basic approaches in time and frequency domain as well.

Prerequisites:

EL2004 Sinyal & Sistem (Signal & Systems, 3 credits)

References:

1. E.Y. Syamsudin, Aciek Ida W.S., Lecture Notes in Control System (in Indonesian), Electrical Engineering Department, Institut Teknologi Bandung, August 1999.
2. K. Ogata, Modern Control Engineering, 3rd Ed., Prentice Hall, 1997.
3. R.C. Dorf and R.H. Bishop, Modern Control Systems, 7th Ed., Addison-Wesley, 1995.
4. S.M. Shinnars, Modern Control System: Theory & Application, John Wiley & Sons Inc., 1992

EL 4081 Sistem Kendali Digital (Digital Control Systems: compulsory, 3 credits)

The course is about control systems, it focuses on the engineering of systems and upon digital control systems analysis and design. Introduction to digital control systems and control-system modelling, sampling process, linear systems and the sampling process, discrete systems modelling via Z-transform, conventional model, and state-space model. Discrete control analysis, system stability, steady-state error analysis, root-locus analysis and bilinear transformations. State space design methods and control system implementation.

Prerequisites:

EL3083 Sistem Kendali (Control System, 3 credits)

References:

1. Digital Control System Analysis and Design, Phillips, Prentice-Hall, 1995.
2. Digital Control Systems : Theory, Hardware and Software, Houpsis and Lamont, Prentice-Hall, 1992.
3. Leigh, J. R. (James R.). ; *Applied Digital Control : (theory, design, and implementation)*; 2nd Edition, Prentice Hall, New York, 1992.
4. Ogata, Katsuhiko. ; *Discrete-Time Control Systems*; 3rd Edition, Prentice-Hall.

EL 4082 Robotika (Robotics : compulsory, 3 credits)

Introduction : History, Terminologies Classification, Robot Arm Kinematics : Homogen Transformation, Denavit Hartenberg Representation, Forward and Inverse Kinematics; Trajectory Planning : Joint Interpolated Trajectories, Cartesian Path Trajectories; Robot Arm Dynamics : L-E Formulation, N-E Formulation, Sensing: Internal and external

Sensing devices; Robot Programming Language , Robot Level Language, Task-Level Language, Mobile Robot, Steering System Wheel and Leg Robot

Prerequisites:

EL3083 Sistem Kendali (Control System, 3 credits), MA202- Matematika Teknik (Engineering Mathematics), EL4084 Instrumentasi sistem Kendali (Control System Instrumentation)

References:

1. KS Fu, R.C Gonzales, CSG Lee, *Robotics : Control, Sensing, Vision and Intelligence*, Mc Graw Hill Digital Control System Analysis and Design, Phillips, Prentice-Hall, 1995.

EL 4083 Sistem KEndali Multivariabel (Multivariable Control System: compulsory, 3 credits)

Introduction; state space representation: the concept, differential equations with state variable form; state space representation and modeling: electric circuit model, electro-mechanic model, heat and fluid flows model, deriving state space equations from transfer function model; solution of state space equations: transition matrix, homogenous and non- homogenous solutions, characteristic equation. Simulation with Matlab and SIMULINK; Properties of systems: controllability and observability conditions; control system design: state feedback, pole placement, state estimation, compensator design, PID control for multivariable systems, controller design using rational transfer function, disturbance attenuation, stability analysis.

Prerequisites:

EL2004 Sinyal & Sistem (Signal & Systems, 3 credits), EL3083 Sistem Kendali (Control Systems, 3 credits)

References:

1. G.F. Franklin, J.D. Powell, A.Emami-Naeini, Feedback Control of Dynamic Systems, 3rd Ed., Addison-Wesley, 1994.
2. K. Ogata, Modern Control Engineering, 3rd Ed., Prentice Hall, 1997.
3. S.M. Shinnars, Modern Control System: Theory & Application, John Wiley & Sons Inc., 1992

EL 4084 Instrumentasi Sistem Kendali (Control System Instrumentation : compulsory, 3 credits)

The course is about Instrumentations, it focuses on electrical transducer, signal conditioners, and processors.

Introduction: Concepts of Measurement, concepts of Transducer and electrical transducer, and transducer classification.

Performance characteristics of an instrumentation system.

Transducer: Displacement, strain, vibration, pressure, flow, temperature, force and torque. Instrumentation amplifiers, signal generation and processing, filtering and signal analysis, data acquisition and conversion, digital signal transmission and processing.

Prerequisites:

EL2004 Sinyal & Sistem (Signal & Systems, 3 credits), EL3083 Sistem Kendali (Control Systems, 3 credits)

References:

1. Johnson, Curtis, *Process Control Information Technology*, Prentice Hall Inc., Simon & Schuster division, Singapore, 1996
2. Jacob, J. Michael, *Industrial Control Electronics*, Prentice Hall., Simon & Schuster Division, Singapore, 1996
3. Rangan, CS, Sarma GR, Mani VSV, *Instrumentation :Devices and Systems*, McGraw-Hill , 1989

EL5081 Rekayasa Sistem (Systems Engineering : compulsory, 2 credits)

Part One: Introduction to Systems. Part Two: The System Design Process

Part Three: Tools for System analysis. Part Four: Design for Operational Feasibility

Part Five: system Engineering Management. Part six: system Design Application

Prerequisites:

EL3083 Sistem Kendali (Control Systems, 3 credits)

References:

1. Blanchard, B.S., *Systems Engineering and analysis*, 3th Ed., Prentice-Hall, 1998
2. Beam, Walter L., *System Engineering, Architecture and Design*, McGraw-Hill, New York, 1990.
3. Benneth, F. Lawrence, *The Management of Engineering*, John Wiley & Sons, New York, 1996.
4. Steven, Richard, Peter Brook, Ken Jackson, Stuart Arnold, *Systems Engineering*, Prentice Hall, New York, 1998

KELOMPOK 6

EC 4041 Image Processing and Pattern Recognition - (Compulsory, 3 credits)

Introduction to Digital Image Processing, Image Perception and Color, Multidimensional Sampling and Quantization, Review on 2D System and Algebra, Image Transforms, Image Enhancement, Image Restoration, Feature: introduction on pattern analysis and computer vision, Concept of Digital Pattern Recognition, Review on Probability Theory and Linear Algebra (Vectors and Matrices), Bayesian Decision Theory, Quadratic Classifier, Parameter Estimation, Linear Discriminant Function, Introduction to Neural Networks.

Pre-requisite/Co-requisite:

References:

- R.C.Gonzalez and R.E.Woods, *Digital Image Processing*, Pearson Education, 2002
- AK Jain, *Fundamentals of Digital Image Processing*, Prentice Hall International, 1989
- JT Tou and RC Gonzalez, *Pattern Recognition Principles*, Addison Wesley.
- S.Haykin, *Neural Network: A Comprehensive Foundation*, Mac Millan
- RO Duda, PE Hart and DG Stork, *Pattern Classification*, John Wiley
- DJC MacKay, *Information Theory, inference and Learning Algorithm*, Cambridge University Press

KELOMPOK 7

EL 3021 Fundamentals of Biomedical Engineering (Compulsory, 3 credits)

Introduction & general course description. Definition of Biomedical Engineering and its multidisciplinary nature, medical procedure, medical information, coverage areas. Introduction to anatomy & physiology and medical terminology. Bio-electric potentials: fundamental laws, examples, characteristics and measurements. Biomedical transducers & sensors, operational amplifiers, instrumentation & biomedical amplifiers. Equipment & electrical safety, macroschock & microschock hazards, equipments to protect against electrical hazards. Introduction to Biomedical instrumentation: block diagrams, subsystems & elements, functional descriptions, examples of simple diagnostic and therapeutic instruments. Selected topics and new developments.

Pre-requisites:

EL2003 Electric Circuits

EL2010 Electronics I

References:

1. John D.Enderle, Susan M.Blanchard, Joseph D.Bronzino: *Introduction to Biomedical Engineering*, Academic Press, 2000
2. Joseph J.Carr & John M.Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001
3. Richard Aston: *Principles of Biomedical Instrumentation and Measurement*, Merril Publishing Company, 1990

EL 4021 Fundamentals of Anatomy & Physiology (Compulsory, 3 credits)

An introductory course designed to provide undergraduate engineering students with basic anatomy & physiology concepts for research & design in biomedical engineering. Materials covered include basic terminology, cell, homeostasis, muscular, respiratory, cardiovascular and neural systems.

References

1. Vander Sherman, Luciano: *Human Physiology*, McGraw-Hill Inc., New York, 1994
2. Kent M.Van de Graff, Stuart Ira Fox: *Concept of Human Anatomy Physiology*, Wm.C. Brown Publishers, Dubuque, 1995
3. Ganong, William F: *Review of Medical Physiology*, Lange Medical Publication, 1996

EL 4022 Computer Applications in Biomedical Engineering (Compulsory, 3 credits)

Discuss various computer applications, specifically microcomputer, in biology, health-care and medical domain. Topics include computer network, patient-history taking, hospital information system, expert system, artificial intelligence, artificial neural networks, patient monitoring

Pre-requisite/Co-requisite:

References:

- Joseph D.Bronzino (ed): *The Biomedical Engineering Handbook*, CRC Press & IEEE Press, 2000
- Joseph J.Carr & John M.Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001

EL 4023 Biomedical Physics (Compulsory, 3 credits)

Introduction, Forces on and in the body, the Skeleton, Heat & Cold in Medicine, Energy, Work, Pressure & Power of the body. Physics of the Lungs, Cardiovascular System, the Ear & Hearing, Eyes & Vision. Electricity & Magnetism within the body, Cardiovascular Instrumentation, Applications of Electricity & Magnetism. Introductory Nuclear Medicine.

Pre-requisite:

EL3021 Fundamentals of Biomedical Engineering

References

1. John R.Cameron, James G.Skofronik: *Medical Physics*, John Wiley, 1990
2. John G.Webster (ed): *Biomedical Instruments – Application & Design*, John Wiley, 1998
3. Russell K.Hobbie, *Intermediate Physics for Medicine and Biology*, Springer Verlag, 1997

EL 4025 Biomedical Signal Processing (Compulsory, 3 credits)

General course objectives and overview. Introduction, ECG signal characteristics, analog amplifiers and filters. Basics of digital filtering, Finite Impulse Response (FIR) Filters & Infinite Impulse Response (IIR) Filters; Integer Filters, Adaptive Filters. Signal Averaging, Data Reduction Techniques. Simulation and application examples.

Pre-requisite:

EL3021 Fundamentals of Biomedical Engineering

References

1. Willis J.Tompkins (ed): *Biomedical Digital Signal Processing*, Prentice Hall, 1995
2. Joseph J.Carr & John M.Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001

EL 4027 – Biomedical Image Processing (Compulsory, 3 credits)

A Brief Introduction on Biomedical Imaging Techniques. Review on Image Processing (Image Transforms, Image Enhancement and Image Restoration), Image and Video Coding for Biomedical Applications (JPEG2000, DICOM, and Telemedicine). Computer-Assisted Medical Image Analysis, Image Reconstruction from Projection. Introduction to Computed Tomography, Imaging With Ionizing Radiation. Overview on: Magnetic Resonance Imaging, Ultrasound Imaging, and Biomagnetic Imaging.

References:

- Z-H Cho, JP Jones, & M.Singh, *Foundations of Medical Imaging*, Wiley

- R.C.Gonzalez and R.E.Woods, *Digital Image Processing*, Pearson Education, 2002
- AK Jain, *Fundamentals of Digital Image Processing*, Prentice Hall International, 1989
- Zhi-Pei Liang & Paul C.Lauterbur: *Principles of Magnetic Resonance Imaging – A Signal Processing Perspective*, IEEE Press, 2000
- M.Misiti, Y.Misiti,G.Oppenheim and J-M.Poggi, *Wavelet Toolbox User's Guide*, The Mathworks Inc.
- *Image Processing Toolbox User's Guide*, The Mathworks Inc.
- Steve Webb: *The Physics of Medical Imaging*, Adam Higer, 1988

EL 4029 Laboratory Experiments on Biomedical Engineering

(Compulsory, 1 credit)

Overview on the laboratory experiments: requirements, procedure, evaluation. Laboratory experiments topics: 10 modules that include: Fundamentals on Biomedical Engineering, Introduction to Anatomy & Physiology, Biomedical Physics, and Biomedical Signal Processing. At the end of each session, every student is required to submit a Laboratory Report/Journal.

Pre-requisites/Co-requisites:

- EL3021 Dasar Teknik Biomedika
- EL4021 Dasar Anatomi & Fisiologi
- EL4023 Fisika Biomedika
- EL4025 Pengolahan Sinyal Biomedika

References

1. Willis J.Tompkins (ed): *Biomedical Digital Signal Processing*, Prentice Hall, 1995
2. Joseph J. Carr & John M. Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001
3. Biopac Laboratory Manual

EL 5021 Biomedical Instrumentation (Elective, 2 credits)

General course objectives and overview of biomedical instrumentation. General block diagram of biomedical systems, specifications and functional description; the electronics building blocks. Measurements systems, simple diagnosis and therapeutic instruments. Clinical laboratory instruments.

Pre-requisite/Co-requisite:

EL 3021 or EB 6001

References :

1. Joseph J. Carr & John M. Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001
2. John G. Webster (ed): *Bioinstrumentation*, John Wiley, 2004
3. John G. Webster (ed): *Biomedical Instruments – Application & Design*, John Wiley, 1998

EL 5022 Biomedical Engineering Industry (Elective, 3 credits)

Introduction: general course objectives and overview. Related topics and activities: research & development, Intellectual Property Rights, entrepreneurship, manufacturing & production, approvals, economics and marketing considerations. *Clinical Engineering & Safety* problems. Selected topics, *moral & ethical issues*, and case studies. Industrial visits.

Pre-requisite/Co-requisite:

EL 3021 or EB 6001

References :

1. Magazines & Proceedings: IEEE – Engineering in Medicine & Biology Society Magazine, Instrumentation & Measurements
2. John D. Enderle, Susan M. Blanchard, Joseph D. Bronzino: *Introduction to Biomedical Engineering*, Academic Press, 2000 [Chapter: 1, 19, 20]
3. Joseph J. Carr & John M. Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001 [Chapter: 26]

EL 5023 Biological Control System (Elective, 2 credits)

Introduction: general course overview, fundamentals of biological control system. Application of engineering analysis in life sciences. Application of control system theory and mathematical model in biological systems. Computer modeling and simulation. Examples of biological systems, e.g.: cardiovascular system, control of movements, fast eye movement control system. Closed-loop drug delivery systems.

Pre-requisite/Co-requisite:

EL 3021 or EB 6001

Reference :

- Joseph D. Bronzino (ed): *The Biomedical Engineering Handbook*, CRC Press & IEEE Press, 1995 [Section XV Physiologic Modeling, Simulation, & Control]

EL 5024 Electromagnetic & Ultrasonic Waves in Biomedical Eng.

(Elective, 3 credits)

The course describes the applications of electromagnetic waves and ultrasounds in Biomedical Engineering. It includes the basic principles & characteristics, applications in diagnostic & therapeutic equipments, and possible potential health implications. Transducers, waves generation, theoretical background, implementations of both electromagnetic waves and ultrasound. New developments and their applications.

Pre-requisite/Co-requisite:

- EL 3021 or EB 6001

References :

1. Om P. Gandhi: *Biological Effects and Medical Applications of Electromagnetic Energy*, Prentice-Hall, 1990

2. Joseph J. Carr & John M. Brown: *Introduction to Biomedical Equipment Technology*, Prentice-Hall, 2001. [Ch 17 Medical Ultrasonography; Ch 18 Electrosurgery Generators; Ch 24 Electromagnetic Interference to Medical Electronic Equipment]
3. Joseph D. Bronzino (ed): *The Biomedical Engineering Handbook*, CRC Press & IEEE Press, 2000 [Section IX]

EL 5025 Biomechanics (Elective, 2 credits)

Introduction, terminology, course overview. Biomechanics fundamentals, physiology, its measurements and the required instruments. Biomechanics of living tissues and muscles. Measurements and analysis of forces & movements. Pulmonary and Cardiovascular systems. Gas exchange and transport mechanism. Bone joints and lubrications. Prosthesis. Biomechanics and Sport Medicine. New development on Biomechanics & applications.

Pre-requisite/Co-requisite:

EB6001 or EL3021

References :

1. Duane Knudson: *Fundamentals of Biomechanics*, Kluwer Academic/Plenum Publishers, 2003
2. Daniel J. Schneck, Joseph D. Bronzino: *Biomechanics – Principles and Applications*, CRC Press, 2003
3. Joseph D. Bronzino (ed): *The Biomedical Engineering Handbook*, CRC Press & IEEE Press, 2000 [Section III Biomechanics].

KELOMPOK 8

IF10T1 Concept of Technology (2 units)

Philosophy and history of science, technology and art; local and global development of science, technology and art. Model, system, feedback, stability, decision making, optimization, and problem-solving case study; application of science, technology and art for human prosperity; intellectual property rights.

Related Courses :

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References

1. Mark T Holtzapple and W. Dan Reece. Concepts in Engineering. McGraw-Hill, 2005
2. Lecture Notes: Concept of Technology, ITB – 2003
3. Saswinadi S. (Editor) “Menerawang Masa Depan Ilmu, Teknik, dan Seni Dalam Budaya Masyarakat Bangsa Indonesia”, Penerbit ITB 1990

IF1101 Introduction to Information Technology (2 units)

This course discusses the Information and Computer Technology history, development, and its influences. Topics to be discussed: Basic concepts of Information Technology, Computer System, Operating Systems, Application Program, Computation, Information System, Data Structure, Programming, Network, Internet, Multimedia, Application of Computer, Technology and Society, Security, Copyright, Ethics, Information Network, Intranet, Extranet, e-XXX, telecommunication, and workgroup. The aim is to give students the basic knowledge of Information Technology and computer wares usable nowadays.

Related Courses

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References

1. Behan, K., and D. Holmes, 1990, *Understanding Information Technology*, Edisi ke-2, Prentice-Hall
2. Sanders, D.H., 2000, *Computers Today*, Edisi ke-4, McGraw-Hill Book

IF1191, Web Programming (2 units)

This course gives the students a basic knowledge of Web and Web Programming. The programming is restricted to the static web page. The Web database and dynamic aspects are not discussed here. The topics are: Web Basic Concept, HyperText Markup Language (HTML), Basic Concept of Markup Language, Syntacs, the use for document representation and layout, Client Side Script with Javascript, HTML integration, CSS and JavaScript, Interaction of Client Side Script and Server Side Script, Design issues and Web Application Usability.

Related Courses

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References

1. Breedlove, Bob. et al., 1996, *Web Programming Unleashed*, Edisi ke--, Sams.net Publishing
2. Cintron, Dave, 1999, *Fast Track Web Programming. A Programmer's Guide to Mastering Web Technologies.*, Edisi ke--, John Willey & Sons
3. Negrino, T., and D. Smith, 1999, *JavaScript for the World Wide Web: Visual QuickStart Guide*, Edisi ke-3, Peachpit Press

IF1281, Algorithm and Programming (4 units)

This course gives the students the ability to solve problems using functional and procedural programming paradigm. This includes a medium scale programming implementation using at least one programming language for each paradigm. Topics to be discussed: Functional programming: paradigm, function and expression, arithmetic expression, conditional, recursive, recurrent analysis, ADT (Abstract Data Type), list, tree, list of list, clock, list, tree, list of list and Procedural programming: procedural paradigm and its programming language, type, variable and constant, expression, sequence, conditional instructions, recursive scheme.

Related Courses

1. IF2101 Human Computer Interaction, Prohibited.

References

1. Liem, Inggriani, 1998, *Diktat Kuliah IF223 Algoritma dan Pemrograman*, Edisi ke--, Departemen Teknik Informatika ITB
2. Liem, Inggriani, 1998, *Program Kecil dalam Bahasa Pascal*, Edisi ke--, Departemen Teknik Informatika ITB
3. Liem, Inggriani dan Sri Purwanti, 1998, *Diktat Kuliah Pemrograman Fungsional*, Edisi ke--, Departemen Teknik Informatika ITB

IF2101 Human Computer Interaction (2 units)

Overview of Human Computer Interaction, user-centered design, psychological aspects in interaction, human-computer interaction modeling, usability inspection methods, user requirement analysis, interaction models, (direct manipulation, icon and visual design, task analysis & design), principles and guidelines in user interface design, case study of interaction design.

Related Courses :

1. IF1001 – Introduction to Information Technology

2. IF2191 – Computer Organization and Architecture

References

1. J. Preece, Rogers and Sharp. *Interaction Design: beyond Human-Computer Interaction*. John Wiley & Son, 2002.
2. B. Shneiderman. *Designing the User Interface: Strategic for Effective HCI*, 3rd edition, Addison-Wesley, 1998.

IF2181 Data Structure (3 units)

The course will give the introduction, design and implementation of internal data structure for complex problem and medium scale computer program.

Topics covered: Abstract Data Type, primitive operations and its application: table, matrix, stack, queue, lists, list of list, binary tree. Implementation at least in two programming languages (e.g. Pascal and C).

Knowledge and skill in the area of procedural and functional programming is a prerequisite.

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.

References

1. Liem, Inggriani, 1998, *Diktat Kuliah IF222 Struktur Data*, Edisi ke--, Departemen Teknik Informatika ITB
2. Liem, Inggriani, 1998, *Catatan Singkat dan Program Kecil dalam Bahasa C*, Edisi ke--, Departemen Teknik Informatika ITB
3. Kernighan and Ritchie, 1998, *The C Programming Language*, Edisi ke--, Prentice Hall

IF2191 Computer Organization and Architecture I (3 units)

Introduces computer architecture and organization of functional units, and data representations. Topics include conventional von Neumann architecture, the internal representation of data, instruction sets and formats, addressing, the fetch/execute cycle, and memory architectures.

Related Courses :

1. IF1101 Introduction to Information Technology, pre-requisites

References

1. Hennessy & Patterson : *Computer Organization & Design*, 2nd Ed., Morgan Kaufmann, 1998.
2. Stallings : *Computer Organization and Architecture*, 6th Ed., Prentice Hall Inc. , 2000.
3. [TAN99] Tanenbaum : *Structured Computer Organization*, 3rd Ed., Prentice-Hall Inc., 1999.

IF2151 Discrete Mathematics (4 units)

Logic (especially propositional logic) and proof, set theory, matrice, relation and function, mathematical induction, algorithm and integers (number theory), combinatoric and discrete probability, boolean algebra, graph and its aplication, tree and its aplication, algorithm complexity.

Related Courses :

(none)

References

1. Kenneth H. Rosen, *Discrete Mathematic and Its Application 5th Edition*, McGraw-Hill, 2003.
2. C. L. Liu, *Element of Discrete Mathematics*, McGraww-Hill, 1985.
3. Rinaldi Munir, *Diktat Kuliah IF2151 Matematika Diskrit*, Teknik Informatika ITB, 2004

IF2152, Probability and Statistics (3 Credits)

This course discusses concept and model of probability and statistic, and its applications in real life. The material of this course covers probability, sample space, events, algebra of events, counting sample points, probability of events, probability axioms, conditional probability, Bayes' rule, random variable, probability distributions, discrete random variables, continuous random variables, functions of variable random, transform methods, derivation of sample distribution, estimation theory, and hypothesis testing. The aim of this course is to provide ability to analyze data.

Related Courses

1. MA1122 Calculus I, Prerequisites.

References

1. Walpole, Ronald E. and Raymond H.M., 2002, *Probability and Statistics for Engineers & Scientists*, Edisi ke-7, Prentice-Hall

IF2251 Algorithmic Strategies (2 units)

Brute force algorithms, heuristic, greedy algorithms, divide and conquer algorithms, graph traversal (especially Depth First Search or DFS and Breadth First Search or BFS), backtracking algorithms, branch and bound algorithms, dynamic programming, pattern matching.

Related Courses :

1. IF2151 Discrete Mathematics - pre-requisites
2. IF2181 Data Structures - pre-requisites

References

1. Richard E. Neapolitan, *Foundations of Algorithms*, D.C. Heath and Company, 1996
2. Levitin, *Introduction to the Design & Analysis of Algorithms*, Addison-Wesley, 2003.
3. Ir. Rinaldi Munir, MT, *Diktat kuliah IF2251 Strategi Algoritmik*, Teknik Informatika ITB, 2006.
4. Ellis Horowitz & Sartaj Sahni, *Fundamental of Computer Algorithms*, Pitman Publishing Limited, 1978

IF2252, Informatical Logics (2 Credits)

Fundamental of logics, propositional logic, propositional proofs, propositional resolution, relational logics, first-order logics, relational proofs, relational resolution, herbrand method, unification, ordered-resolution, automatic theorem proving, Prolog programming language.

Related Courses

1. IF2151 Matematika Diskrit, Prerequisites.

References

1. Korfhage, Robert.R., 1999, *Logics and Algorithms*, Edisi ke-- , John Wiley & Sons
2. Fitting, Melvin, 1996, *First-Order Logic and Automated Theorem Proving*, Edisi ke-- , Springer-Verlag

IF 2253 Formal Language and Automata (3 units)

Operations of Strings and languages, Chomky hierarchy, finite state automata: deterministic, nondeterministic finite automata, finite automata with epsilon- transition,

regular expressions, properties of regular expressions, context free languages, pushdown automata, properties of context free languages, turing machines, and applications

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.

Bibliography

1. Aho, A.V., and J.D. Ullman, 1972, *The Theory of Parsing, Translation and Compiling*, Edisi ke-- , Prentice Hall
2. Hopcroft, J.E. and J.D. Ullman, 2001, *Introduction to Automata Theory, Languages*

IF2261, Software Engineering (4 units)

This course aims to discuss some basic notions of Software Engineering and complete software lifecycle. The course material consists of all software development phases, including : software analysis, software design, software construction, testing and maintenance. Software development methods, such as SDLC and OOSE, are subject of exploration for student practice works. The objectives of this course are giving the overall software engineering methodologies and applying software development techniques in the real world.

Related Courses

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Bibliography

1. Pressman, Roger S., 2004, *Software Engineering: A Practitioner's Approach*, 6th edition, Mc Graw-Hill
2. Coad, Peter and Yourdon, Edward, 1990, *Object Oriented Analysis*, First edition, Prentice Hall International
3. Jacobson, Ivar, G. Booch and J. Rumbaugh, 1999, *The Unified Software Development Process*, 1st edition, Addison-Wesley
5. Ian Sommerville, *Software Engineering*, 7th edition, ---and *Computation*, Addison Wesley

IF2281 Object Oriented Programming (4 units)

After having experience on complex data structure implementation, students will learn advanced Object Oriented Programming in this course.

Topics covered: Object Oriented Paradigm and programming; Class, Object; Object life time (creation, allocation, destruction), Object operation (attachment, comparison); Generic class; Inheritance & polymorphism; Exception; using library; implementation of concept with OO language (minimum, 2 OO languages). For each OO language, students will work in a team for final project (design and implementation of large scale software product using OO paradigm).

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.
2. IF2181 Data Structure, Prerequisites.

Bibliography

1. Liem, Inggriani, 2002, *Diktat Kuliah Pemrograman Berorientasi Objek*, Edisi ke-- , Departemen Teknik Informatika ITB
2. Dulimarta, H D, 1999, *Bahasa C++*, Edisi -, Departemen Teknik Informatika ITB
3. Meyer, B., 1997, *Object Oriented Software Construction, second edition*, Prentice Hall
4. Stroustrup, B., 2000, *The C++ Programming Language, third edition*, AT & T
5. Gosling G, Joy B, Steel G, Bracha G, 2005, *The Java Programming Language Specification, third edition*, Sun Microsystem

IF3111, Databases (3 Credits)

Fundamental of database and database system management, database architecture, data independence, query language, data modelling, conceptual data model, relational model, entity-relationship model., relational database, mapping from conceptual schema to relational scheme, integrity, relational algebra, relational calculus, SQL, relational database design, functional dependency, normalization (1NF, 2NF, 3NF, BCNF).

Related Courses

1. IF2151 Discrete Mathematics, Prerequisites.
2. IF2252 Informatical Logics, Prerequisites.

Bibliography

1. Date, C.J., 2000, *An Introduction to Database System*, Edisi ke-7, Addison Wesley
2. Silberschatz, A., H.F. Korth and S. Sudarshan, 2002, *Database System Concepts*, Edisi ke-4, McGraw-Hill
3. Halpin, T., 2001, *Information Modelling and Relational Databases : From Conceptual Analysis to Logical Design*, Morgan Kaufmann

IF3131 Artificial Intelligence (3 Credits)

Students will learn the basic concepts in Artificial Intelligence (AI). Topics included are Introduction to AI, The Concept of Intelligent Agent as the core in AI, and capabilities of Intelligent Agent which consist: Problem Solving, Knowledge and Reasoning, Planning, Learning, and Communicating.

Related Courses:

2. IF2251 Algorithm and Strategy, Prerequisite
3. IF2252 Informatics Logics, Prerequisite
4. IF2253 Automaton and Formal Language Theory, Prerequisite

References

1. Stuart J Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*, Prentice-Hall International, Inc, 2002
2. Rich, Elaine, *Artificial Intelligence*, McGraw-Hill, 1983

IF3171 Information System (3 credits)

This subject gives an understanding and knowledge about function, type, structure, and role of computer based information system (IS) in an organization. The subject includes management and business, type of IS, role & goal of IS, IS planning, requirement identification, system analysis, system design, system implementation and maintenance. Students taking the subject would have an ability to do analysis and determine needs of organization information, and also knows how to transform it into an appropriate information system design so the organization would be more productive and would have competitive advantage.

Related Courses

1. IF2261 Rekayasa Perangkat Lunak, Prerequisites.
2. IF3111 Basis Data, Co-requisites.

References

1. Steven Alter : Information System, Foundation of e-business, Prentice Hall, 2002.
2. Dennis Haley : System Analysis & Design John Willey & Sons, 2003.
3. Valacich Joseph S. : Essential of System Analysis & Design, Prentice Hall Inc., 2001.

IF3211, Database Systems (3 Credits)

This course discusses several aspects of Database Management Systems (DBMSs). Areas to be discussed including database system overview, relational operator, database integrity (including constraints, assertions, validation mechanism, database programming, and triggers), transaction management, database recovery, database security, database machines, physical storage, database tuning, and advanced topics in database systems. At the end of the course, the students are expected to understand each component of DBMS and to be able to use the functionalities offered.

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.
2. IF3111 Database, Prerequisites.
3. IF3191 Operating System, Prerequisites.

Bibliography

1. Silberschatz A., H.F. Korth and S. Sudarshan, 2002, *Database System Concepts*, Edisi ke-4, McGraw-Hill

2. Date, C.J., 2000, *An Introduction to Database System*, Edisi ke-7, Addison Wesley
3. Grosshans, D., 1986, *File Systems Design and Implementation*, Edisi ke--, Prentice Hall

IF3221 Computer Graphics (2 Credits)

The objectives of this course gives the students the understanding of the concept, technique, design and implementation of computer graphic base application.

Topics to be discussed: Basic of graphical and geometrical element , Simple Geometric Transformation, Composite transformation, Coordinat system and transformation, Solid modeling, Viewing Management, Overlapping structure, Segmentation structure, Topological structure, Curve modeling, Animation modeling.

Related Courses

1. IF1101 Introduction to Information Technology, Prerequisites.
2. IF1281 Algorithm and Programming, Prerequisites.
3. IF2191 Computer Organization & Architecture I, Co-requisites.

Bibliography

1. Lucas, M., 1992, *The La realisation des logiciels graphiques interactifs*, Editions Eyrolles.
2. Newman, W. and Sproull, R.F, 1989, *Principles of Interactive Computer Graphics*, Mc Graw Hill, New

IF3261, Software Project Management (2 Credits)

This subject gives an understanding and knowledge about software project management. The subject includes definition of software project management, project planning, project budgeting, project executing, project controlling, configuration management, and closing project. Students taking the subject would have an ability to anticipate and adapt to each phases of software development project.

Related Courses

1. IF2261 Software Engineering, Prerequisites.
2. IF3171 Information System, Prerequisites.
3. TI4051 Industrial Management, Prerequisites.

Bibliography

1. McConnell, S., 1998, *Software Project*, Microsoft Press
2. Kathy Schwalbe, 2003, *IT Project Mangement*, Course Technology Ptr.
3. Mc Leod, G.,1996, *Managing Information Technology Project*, Course Technology-ITP

IF3262, Software Project (3 units)

In this course, the students will have an experience in real software project. The students have to analyze, design, and implement the software according to the given Term of Reference. After taking this course, the students also will have an experience working in group, and using some standard documentation in software engineering

Related Courses

1. IF2261 Software Engineering, Prerequisites.
2. IF3261 Software Project Management, Co-requisites.

Daftar Pustaka

1. Pressman, R.S., 2001, *Software Engineering: A Practitioner's Approach*, Edisi ke-5, Mc Graw-Hill
2. Jacobson, Ivar, G. Booch and J. Rumbaugh, 1999, *The Unified Software Development Process*, Edisi ke--, Addison-Wesley

IF3291, Computer Networks and Security (4 Credits)

This course deals with wide-aspects of computer networks and its security system. Course materials include: The introduction and uses of computer networks, related hardwares, softwares and examples. OSI Layers: Physical, Data Link, Network, Transport, Session, Presentation and Application, TCP/IP for Internet and security issues. The main purpose of this course to provide students with understandings on important topics in computer networks as foundations for advanced materials.

Related Courses

1. IF3191 Operating System, Prerequisites.

Bibliography

1. Tanenbaum, A., 2003, *Computers Networks*, Edisi ke-4, Prentice Hall
2. Stallings, W., 2002, *Data and Computer Communications*, Edisi ke--, Prentice Hall

IF3292, Internet Programming (2 units)

Basic concept of internet, Common Gateway Interface with database and other protocols, server side script (PHP, JSP) with database and other protocols (FTP, SNMP, IMAP, POP3, HTTP), XML, Java Internet Programming, case-study.

Related Courses

1. IF1191 Pemrograman Web, Prerequisites.
2. IF3111 Basis Data, Prerequisites.

Bibliography

1. Breedlove, Bob. et al., 1996, Web Programming Unleashed, Edisi ke-- , Sams.net Publishing
2. Felton, Mark, 1997, CGI Internet Programming with C++ and C, Edisi ke-- , Prentice Hall

IF4051, Numerical Method (3 units)

This course discusses techniques of mathematical computation using computer. The material of this course covers: errors analysis, solution of non-linear equation, system of linear equation solutions, polynomial interpolation, numerical integration, numerical derivation, and solution of ordinary differential equation with initial value. The aim of this course is to provide ability to write computer programs of mathematical computation.

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.
2. MA2132 Matrix and Vector space, Prerequisites.

Bibliography

1. Chapra, S.C. and R.P. Canale, 1985, Numerical Methods for Engineers with Personal Computer Applications, Edisi ke-- , MacGraw-Hill
2. Mathews, J.H., 1992, Numerical Methods, Edisi ke-- , Prentice-Hall
3. Munir, R., 2003, Metode Numerik, Edisi ke-- , Departemen Teknik Informatika - ITB

IF4061, Software Analysis & Design (3 units)

This course aims to provide basic knowledge in Object –oriented Software Development as new software development paradigm and to give its different methods and techniques. The course material consists of object oriented analysis and design, such as Object Modeling Technique (OMT) and Object-Oriented Software Engineering (OOSE), using Unified Modeling Language (UML) as analysis and design tools.

Related Courses

1. IF2261 Software Engineering, Prerequisite.
2. IF2281 Object Oriented Programming, Prerequisite.

Bibliography

1. Peter Coad. and Edward Yourdon, 1990, Object Oriented Analysis, 1st edition, Prentice Hall International
2. Rumbaugh, J. et al., 1990, Object-oriented Modeling and Design, 1st edition, Prentice Hall International
3. Jacobson, Ivar, 1992, Object-Oriented Software Engineering, Addison Wesley

IF4062, Interaction Engineering (2 units)

Interaction problem description, usability engineering concepts, user centered design concepts, interaction modelling, interaction design for application software case study.

Related Courses

1. IF2261 Software Engineering, Prerequisites.
2. IF3171 Information System, Prerequisites.

Bibliography

1. Lindsay, P.H. and D.A. Norman, 1989, Human Information Processing, an Introduction to Psychology, 2nd edition, Academic Press
2. Schneiderman, B., 1998, Designing the User Interface, Strategies for Effective Human Computer Interaction, Edisi ke-3rd, Addison-Wesley
3. Dix, A., J. Finlay, G. Abowd, and B. Russel, 1993, Human Computer Interaction, edition, Prentice Hall

IF4071, Office Automation (2 units)

Office concepts, automation principles, integrated office automation concepts, office automation strategies, office automation development phases.

Related Courses

1. IF2261 Software Engineering, Prerequisites.
2. IF3171 Information System, Prerequisites.

Bibliography

1. Ray, C., J. Palmer, and A. Wohl, 1991, Office Automation, A System Approach, Edisi ke--, OSRA South Western Publicity Co.

IF4072, Enterprise Information System (3 units)

Business function, Enterprise Information System and decision making relations, data and process requirements, enterprise system architecture, enterprise information system development, business process integration, Enterprise Resource Planning (ERP) development tools.

IF40Z1, Final Project I (3 units)

For graduating, students must do problem solving related to computing and formally defended. This activities are divided into 2 subjects, i.e., Final Project I and Final Project II. Before doing Final Project I, the students get the explanation regarding the methodology to solve problem and also the procedure for doing Final Project and how to do defense. In the last part of Final Project I, the student must attend the seminar for defending their works.

Related Courses

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Bibliography

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IF40Z2, Final Project II (3 units)

Students continue their activities in IF40Z1 Final Project I, to design (and implement) solution for the problem. Final review, known as sidang, guarantees that all activities have been done completely and the results have achieved minimal targets of Final Projects II.

Related Courses

1. IF40Z1 Final Project I, Prerequisites.

IF40K1 Internship (2 Credits)

Short Description

This course facilitates students to learn how to work in industries, how to implement theories from courses in industrial real problems, and how to act professionally as employee. Students have to work in industries for at least two months, able to write reports about the work and present it in front of the class. Reports and presentations are evaluated by lecturers, and the final grade is composed of the evaluation from supervisor in work place and lecturers,

Related Courses

1. IF2261 Software Engineering, Prerequisite
2. IF3171 Information Systems, Prerequisite

References

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IF4201, Social and Professional Issues in Information Technology (3 units)

Social aspects, ethical and professional obligation, computer-based system risk, professional ethics, intellectual property rights, computer crimes, computer applications in various fields.

Related Courses

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Bibliography

1. Ayres, I., 1999, *The Essence of Professional Issues in Computing*, Edisi ke-- , Prentice Hall

IF5001 Special Topics (2 units)

This course discusses new topics and trends in information retrieval on the Internet. The topics covered include the architecture of modern search engines, page rank, hub & authority, recommender systems, personalization, content-based filtering, social/collaborative filtering, user profile learning, digital library and innovative applications on the Internet.

Related Courses :

1. IF5055 – Information Retrieval System

References

1. Ian H. Witten, Alistair Moffat, and Timoty C. Bell. 1994. *Managing Gigabytes: Compressing and Indexing Documents and Images*. Van Nostrand Reinhold.
2. S. Brin, and L. Page. 1998. The Anatomy of a Large-Scale Hypertextual Search Engine. *Proceedings of the Seventh International Conference on World Wide Web*. 30:107–117.
3. W. Meng, C. Yu, and K.L. Liu. 2002. Building Efficient and Effective metasearch Engines. *ACM Computing Surveys*. 34(1):48-89.
4. J.A. Konstan. 2004. Introduction to Recommender Systems: Algorithms and Evaluation. *ACM Transactions on Information Systems*. 22(1):1–4.

IF5011, Non-Relational Database (3 Credits)

This course discusses several database models, other than relational, as an alternative for the relational model that has been used widely. Topics include the fall back of relational systems, and a thorough discussion on non relational databases (e.g. temporal databases, object oriented databases, and deductive databases). At the end of the course, the students are expected to be able to use various database systems ... the problem domain.

Related Courses

1. IF2252 Logika Informatik, Prerequisites.
2. IF3111 Basis Data, Prerequisites.
3. IF3211 Sistem Basis Data, Prerequisites.

Bibliography

1. Hughes, J.G., 1994, *Object Oriented Databases*, Edisi ke-- , Prentice Hall
2. Colomb, R.M., 1998, *Deductive Databases and Their Applications*, Edisi ke-- , Taylor & Francis
3. Tansel, A.U. (ed.), 1993, *Temporal Databases*, Edisi ke-- , Addison Wesley

IF5012 Database Technology (3 credits)

Review Physical File structure and access method, database system (especially for data structures and queries) and computer technology related. Introduction of Data

Warehouse, Data Mining, including operations (clustering, classification, etc.) and multidimensional data structures.

Related Courses

1. IF2181 : Data structure
2. IF3111 : Database
3. IF3211 : Database Systems

References

1. J. Han, M. Kamber, Data Mining: Concept and Techniques, Academic Press, 2001
2. A. Silbershultz, Henry F. Korth, S. Sudarshan, Database System Concepts, Mc. Graw Hill, 1997.

IF5013 Database Theory (3 units)

A systematic and comprehensive treatment of the formal theory of the relational model of data which is the foundation of current database management systems. It is intended to serve main purpose of helping students develop skills in the proof of theorems by employing various techniques and methodologies.

Related Courses

IF 3111 – Basis Data

References

1. Atzeni, De Antonellis – Relational Database Theory, Benjamin Cummings, 1993
2. Mark Levene, George Loizou - A guided Tour of Relational Databases and Beyond, Springer 1999

IF5014 Distributed Database System (3 units)

The course is intended to give brief idea about concept of distributed database systems. Important issues in this course include:

- Architecture of distributed database system:
 - Transparency
 - Standardization
 - Model of architecture
- Design of Distributed Database:
 - Design of Fragmentation
 - Design of Allocation
 - Replication
- Distributed Query Optimization
- Control of Concurrent Transaction

Related Courses :

1. IF3111 Database, pre-requisites
2. IF3211 Database Systems, pre-requisites
3. IF3291 Computer Network & Security, pre-requisites

References

1. Ozsü, M.T., and P. Valduriez, 1999, *Principles of Distributed Database System*, 2nd Edition, Prentice Hall
2. Atre, S., 1992, *Distributed Database, Corporate Processing, and Networking*, McGraw-Hill
3. Ceri, S., and G. Pelagatti, 1985, *Distributed Databases Principles and Systems*, McGraw-Hill

IF5031 Knowledge Based Systems (3 units)

The course covers Principles of knowledge-based systems; Knowledge representation and problem solving; knowledge acquisition and machine learning; knowledge level modelling, expert systems lifecycles and expert system shells.

It aims to provide the students with basic knowledge of knowledge based systems and practical experience in implementing the systems.

Related Courses :

1. IF3131 Artificial Intelligence, pre-requisites

References

1. Brachman, Ronald J. and Hector J. Levesque, *Knowledge Representation and Reasoning*, Morgan Kaufmann Publishers, 2004
2. Puppe, Frank, *Systematic Introduction to Expert Systems*, Springer Verlag, 1994.
3. Schreiber, Guss, Bob Wielinga and Joost Breuker, *KAD A Principled Approach to Knowledge-Based System Development*, Academic Press, 1993

IF5032 Machine Learning (3 units)

This course covers the key techniques in machine learning and data mining technology, gives their theoretical background and shows their application. The topics includes: decision tree algorithms, rule learning and inductive logic programming, neural net, genetic algorithm and genetic programming, lazy learning, clustering, evaluating the performance of machine learning algorithms.

The aim is to provide the students with basic theoretical knowledge of various paradigms in machine learning and data mining techniques. It also provides practical experience on applying those machine learning techniques for solving knowledge acquisition problem.

Related Courses :

1. IF2152 Probability and Statistics, pre-requisites
2. IF3131 Artificial Intelligence, pre-requisites

References

1. Mitchell, Tom, *Machine Learning*, McGraw-Hill, 1997
2. Witten, Ian and Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations*, Morgan Kaufmann, 2000

IF5033, Artificial Intelligence Applications (3 units)

Artificial intelligence applications in industry, business, social, politics, entertainments, and engineering, knowledge management, semantic web, voice recognition, natural language processing, and the state of the arts of each applications.

Related Courses

1. IF3131 Artificial Intelligence, Prerequisites.

Bibliography

1. , *American Association of Artificial Intelligence*, Edisi ke-- , AI Magazine
2. , *Association of Computing Machinery*, Edisi ke-- , Intelligent Systems

IF5041 Image Processing and Interpretation (3 Credits)

The objectives of this course gives the students for understanding the concept, technique, design and implementation of Image Interpretation base application. Topics to be discussed: Digital Image Properties , Image perception, Color Representation, Image Transformation, Point Base Transformation, Histogram Base Transformation, Geometrical Base Transformation, Chain code Structure, Region Base Transformation, Image Compression, Image File Format.

Related Courses

1. IF1101 Introduction to Information Technology, Prerequisites.
2. IF1281 Algorithm and Programming, Prerequisites.
3. IF 3221 Computer Graphics, Prerequisites.

References

1. Gonzales and Wood., 2002, *Digital Image Processing* , Edisi ke 2, Prentice Hall
2. Young,I.T. and Gerbrands,J.J, 2000, *Image Processing Fundamentals*, Academic Press
3. Steve, M.,2001, *Intelligent Image Processing*, John Willey and Sons

IF5051, Modeling and Simulation (3 Credits)

This course discusses modeling theory of real systems and discrete simulation using two approaches, event-oriented and process-oriented simulation. This course covers model definition, types of model and simulation (discrete events, continuous events, web based,

parallel discrete events), event oriented simulation, process oriented simulation, statistical analysis, random generator for various distributions, single server queuing system, multi-server queuing systems. The aim of this course is to provide knowledge of modeling and discrete simulations, especially for problems that do not have analytical solutions.

Related Courses

1. IF2152 Probabilitas & Statistika, Prerequisites.

Bibliography

1. Gordon, G., 1991, *System Simulation*, Edisi ke-- , McGraw-Hill
2. Law, A.M., and W.D. Kelton, 1991, *Simulation Modeling and Analysis*, Edisi ke-- , McGraw-Hill

IF5052, Combinatorial Algorithms (3 Credits)

This course discusses combinatorial problems, graph theory and its applications. This course covers permutation, combination, inverse and generation of permutation, generating functions, recurrence relations and their solutions, graph coloring, traveling salesman problem, Chinese postman problem, and maximum flow for graph. The aim of this course is improve ability for solving combinatorial problems and graphs.

Related Courses

1. IF2151 Discrete Mathematics, Prerequisites.
2. IF2181 Data Structure, Prerequisites.
3. IF2251 Algorithmic Strategy, Prerequisites.

Bibliography

1. Reingold, Deo, Nievergelt, 1977, *Combinatorial Algorithms : Theory and Practice*, Edisi ke-- , Prentice-Hall
2. Skiena, S., 1997, *The Algorithm Design Manual*, Edisi ke-- , Springer Verlag
3. Tucker, A., 1984, *Applied Combinatorics*, Edisi ke-- , John Wiley & Sons

IF5053, Compiler Techniques (3 Credits)

Principle of compiler and interpreter, lexical analysis, finite-state automaton, syntactical analysis, grammar, syntax-tree, syntax diagram, top-down and bottom-up parsing, LL(1) parser, recursive-descent parser, LR(1) parser, semantical analysis, intermediate-code generation, code-optimization, code-generator.

Related Courses

1. IF1281 Algorithm and Programming, Prerequisites.
2. IF2253 Formal Language and Automata, Prerequisites.
3. IF2291 Computer Organization and Architecture II, Prerequisites.

Bibliography

1. Tremblay, J.P., Sorenson, 1985, *The Theory and Practice of Compiler Writing*, Edisi ke-- , McGraw-Hill
2. Terry, P., *Programming Language Translation : A practical approach*, Edisi ke-- , Addison-Wesley Publishing
3. Aho, A.V., and J.D. Ullman, 1972, *The Theory of Parsing, Translation and Compiling*, Edisi ke-- , Prentice Hall

IF5054 Cryptography (3 units)

Introduction, attacks to cryptography, mathematical foundation, classical algorithms, modern algorithms, stream cipher, block cipher, DES, AES, public-key cryptography, RSA, El-Gamal, Knapsack, hash function, authentication and digital signature, cryptography protocols, key management, public-key infrastructures (PKI), steganography and watermarking, cryptography in daily life.

Related Courses :

1. IF2151 Discrete Mathematics - pre-requisites
2. IF3291 Computer Network and Its Security

References

1. Schneier, Bruce, *Aplied Cryptography 2nd*, John Wiley & Sons, 1996
2. Menezes, Alfred J., Paul C van Oorschot, dan Scott A. Vanstone, *Handbook of Applied Cryptography*, CRC Press, 1996.
3. Stallng, W., *Cryptography and Network Security, Principle and Practice 3rd Edition*, Pearson Education, Inc., 2003
4. Ir. Rinaldi Munir, MT, *Diktat kuliah IF5054 Cryptography*, Teknik Informatika ITB, 2004.

IF5055 Information Retrieval System (3 units)

Information retrieval test collection, precision and recall, vector space model, term weighting method, stemming, stop word, query expansion, relevance feedback, automatic thesaurus construction, probabilistic model, search engine, information filtering, information extraction, text classification and categorization, text clustering, text mining.

Related Courses :

1. IF2152 Probability and Statistics, pre-requisites
2. MA2132 Matrix and Vector Space, pre-requisites

References

1. Salton, Gerard, *Introduction to Information Retrieval*, McGraw-Hill, 1989
2. Van-Rijsbergen, Keith, *Information Retrieval*, Butterworths, London.
3. Maristella Agosti and Alan Smeaton, *Information Retrieval and Hypertext*, Kluwer Akademik Publishers, 1996

IF5071, System Re-engineering (2 Credits)

This course discuss about the concept of business process reengineering in corporation by using information technology. Subject taught are Business Process Reengineering, critical success factor, change enablers, BPR failures, BPR methodology, BPR tools, rapid re-engineering . Objectives of the course are give knowledge to the students how to evaluate process in organization, asses the system, and propose the new business process by using information technology.

Related Courses

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Bibliography

1. Manganelli, R., 1994, *The Reengineering Handbook*, Edisi ke--, Amacom

IF5091, Distributed Systems (3 units)

Principles and characteristics of distributed system models, interprocess communication, distributed objects and remote invocation, network security, name services, CORBA, Time and Global States, coordination and agreement, distributed operating system, distributed file system, distributed multimedia system, concurrency and transaction control, distributed transactions, data replication.

Related Courses

1. IF3191 Operating System, Prerequisited.
2. IF3291 Computer Network and Security, Prerequisited.

Bibliography

1. Coulouris, G., J. Dallimore and T. Kindberg, 2001, *Distributed System, Concept and Design*, Edisi ke--, Addison Wesley Publishing Company, Inc.

IF5092, Systems Programming (3 Credits)

The course will give the student the knowledge and practical experience on computer system programming, using provided system call to control hardware. The course comprises low-level (hardware level) programming technique: signal, pipe, thread programming, device driver programming, non-PC programming, Semaphore, Shared Memory, Message Queue. The course aimed the student to be able to implement a program that will directly interact/work with operating system and control the hardware or existing hardware interface.

Related Courses

1. IF2191 Computer Organization and Architecture I, Prerequisited.
2. IF2291 Computer Organization and Architecture II, Prerequisited.

3. IF3191 Operating System, Prerequisited.

Bibliography

1. Matthew, N., and R. Stones, 1999, *Beginning Linux Programming*, Edisi ke-2, Wrox Press Ltd
2. Rubini, A., and J. Corbet, 2001, *Linux Device Drivers*, Edisi ke-2, Oâ€™Reilly & Associates

IF5093 Wireless & Mobile Computing (3 units)

The course' objectives are to develop understanding on basic concepts of wireless and mobile computing which include network technology, protocols, and applications, as well as to develop basic skills on implementing simple protocols and applications for wireless and mobile environments. The topics covered include wireless transmission, mobile communication systems, wireless LAN, network and transport layer protocols, and wireless and mobile applications.

Related Courses :

1. IF3291 – Computer Network and Security, pre-requisited

References

1. J. Schiller, *Mobile Communications*, 2nd ed., Addison-Wesley, 2003.
2. C. Perkins, *Mobile IP: Design Principles and Practices*, Addison-Wesley, 1998.

IF5094, Multimedia System (3 units)

Multimedia system definition and scope, componen technology for multimedia application content : sound/audio, image/graphics, video/animation, compression and decompression technology, software development for multimedia applications.

Related Courses

1. IF1191 Web Programming, Prerequisited.
2. IF1281 Algorithm and Programming, Prerequisited.
3. IF3221 Computer Graphics, Prerequisited.
4. IF3291 Computer Network and Security, Prerequisited.

Bibliography

1. Bunzel, M.J., and S.K. Morris, 1993, *Multimedia Application Development*, Edisi ke-- , Artech House, Norwood, Massachusetts
2. Steinmetz, R., and K. Nahrstedt, 1995, *Multimedia: Computing, Communications And Applications*, Edisi ke--, Prentice Hall

KELOMPOK 9

EL60Z1 Thesis I

Thesis I formulates research planning which will be completed in Thesis II. To conduct Thesis I, a student must have decided a topic for his or her research which has been approved by his/her supervisor. During completing the Thesis I, the student conducts a literature study, makes discussion with the supervisor, accomplishes initial research survey and writes a research proposal. At the end of the Thesis I period, the student have to present a seminar to reviewers.

EL70Z1 Thesis II

Thesis II realizes a research which has been formulated and prepared in Thesis I. The research must be carried out by a student in the laboratory where he/she belong as a member of the laboratory. At the end of his/her research, the student has to write a thesis. The thesis draft which has been approved by the supervisor will be examined by at least 3 reviewers.

EL8001 Advanced Electrical Engineering

This lecture is aimed to broaden vision in the field of electrical engineering which can be achieved by:

- “Studium Generale” in electrical engineering where the substance might be varies year to year. Several sessions will cover topics on dissertation writing and research methodologies
- Assignment given by supervisor(s)
- Take a relevant master level lecture

EL8002 Advanced Topic in Electrical Engineering

This lecture is aimed to give a student an in depth comprehension in a particular topic to support his/her research which can be given in a form of:

- Assignment given by the supervisor(s)
- Take a relevant master level lecture

EL8003 Advanced Engineering Mathematics

This lecture covers “Studium Generale” in advanced mathematics applications in engineering.

EL80Z1 Proposal Writing Phase

This course prepares and writes a research proposal for a dissertation which have to consider novelty of the topic, scientific contribution and implementation feasibility. At the end of the lecture a student has to give a seminar before his/her supervisor(s) and other lecturers and research peers in the laboratory.

EL80Z2 Qualification Examination

This examination is carried out at the end of the second (2nd) semester which will look at capabilities and readiness of the student to make a dissertation based on the proposal which has been put forward. Qualification examination will be conducted by Postgraduate Program Committee which will give an assessment together with the supervisor(s). The result of the examination will be a recommendation either capable or incapable to continue to the next stage.

EL80Z3 Method Development Stage I**EL90Z5 Dissertation Writing Stage I**

This course is a writing dissertation stage which must comply with a correct format, grammatical rules and relevant substance.

EL90Z9 Dissertation Examination (Closed Examination)

This course is a final assessment in term of correctness and originalities of the substance of the dissertation. The student must defend his/her dissertation in form of an oral exam before a board of supervisors and reviewers.

KELOMPOK 10

EP6152 Advance Power System Protection

Short description :

Power system protection , System reliability evaluation, capacity and reliability of power station, Interconnection system reliability, spinning reserve, composite reliability of power plant and transmission line, Protection system design, Line protection system analysis, Frequency dependence power generation analysis, frequency response models analysis.

Offered to:

Study Programs: EL/EP School: School of Electrical Engineering & Informatics, ITB

Related Courses:

Prerequisite : Power systems protection 1
Prerequisite : Power systems protection 2

References:

1. PM Anderson, Power System Protection, McGraw Hill, 1998
 2. J. L. Blackburn, Protective Relaying, principles and application, Marcel Dekker, Inc., 1998
- Roy Billiton, Realibility Evaluation of Power Systems, Pitman Advanced Publishing program, 1984.

EP6252 Perencanaan Sistem Tenaga lanjut (Pilihan, 3 SKS)

Silabus Bahasa Inggris

Introduction : Corporate planning process , State planning & energy policy Long term Power system planning : Long term forecasting technic & models, BOX – jenkins forecasting procedure, Generation expansion planning : Generation economic & component cost analysis, Generation planning mathematical models, Generation planning WASP methods, Generation planning JASP methods, Transmission expansion planning : Heuristic transmission network planning, Sensitivity analysis methods, Mathematical model for long term network palnning, Optimal network palnning.

EP7151 Power System Stability & Control

Short Description:

Introduction to the power system stability problem, synchronous machine theory and modeling, synchronous machine parameters, synchronous machine representation stability studies, AC transmission, power system loads, excitation systems, prime mover and energy supply systems, control of active power and reactive power, small-signal stability, transient stability, voltage stability, subsynchronous stability, methods of improving stability.

Offered to Study Programs:

EP/EL: School of Electrical Engineering and Informatics ITB

Related Courses:

Prerequisite : Power System Analysis

Reference:

1. Prabha Kundur, *Power System Stability & Control*, McGraw-Hill, 1994
2. P. M. Anderson, A. A. Fouad, *Power System Control and Stability*, IEEE Press, 1994
3. Graham Rogers, *Power System Oscillations*, Kluwer Academic Publishers, 2000

KELOMPOK 11

ET6000 Advanced Digital Communications

Power spectral density of digital baseband signals. Signal space concepts, projection of signals to basis functions, performance of MAP detectors. Baseband equalization : transversal equalizer, automatic equalization. Continuous phase modulation. Carrier synchronization : open loop systems, closed loop systems, Costas loop. Symbol synchronization. Frame synchronization : probability of miss detection and false alarm. Transmission through fading channels.

ET6010 Information Theory and Coding

Part I: Information Theory:

Introduction: set and probability. Information measure: entropy, joint entropy, conditional entropy, mutual information. Information source and source coding. Channel communication information theory. Differential entropy and Gaussian channel. Capacity of space time channel. Rate distortion.

Part II : Channel Coding

Introduction : Galois Field, vector space and matrix. Linear block codes : generator matrix, parity check matrix, syndrome computation for error correction, Hamming code, minimum distance, error correction and error detecting capabilities. Linear cyclic codes : encoding and decoding by feedback shift registers. Convolutional codes : encoder structures, trellis diagram, maximum likelihood decoding, Viterbi decoding. Reed Solomon codes.

ET6012 Statistical Digital Signal Processing

Discrete time random processes: filtering random process, spectral factorization, ARMA, AR, and MA processes. Signal Modeling: Pade, Prony methods, linear prediction, autocorrelation, covariance methods, Levinson-Durbin algorithm.

Lattice filter: analysis and synthesis filters, Burg methods. Optimal filter: Wiener and Kalman filters. Adaptive filter: LMS algorithm, RLS algorithm, application of adaptive filter. Application of statistically digital signal processing.

ET6020 Computer-Aided RF Circuit Design

Introduction to rf circuit design which provides practical design theories for the design and synthesis of rf circuits, focus on the application of transmission line theory to design of basic circuit components used in rf communication systems. A variety of rf planar circuits and network analysis method is discussed. Introduction of high frequency CAD tools used to design and simulate rf circuits and optimize the rf circuits designed.

ET6031 Computational Method for Micro-and Millimeter Waves

Introduction to numerical methods, finite difference method, computation of eigen values using finite difference, FDTD, variational methods, moment method, scattering computation using moment method, spectral analysis using Fourier series and Fourier

integral, spectral analysis of microstrip transmission line, microstrip circuit analysis using spectral method

ET 6033 Antenna System

Electrically small antennas; arrays; wire antennas and feeding arrangements; aperture antenna, such as slots, horns, and parabolic reflectors; antennas for multiple frequencies, including log-periodic and other frequency independent types; receiving antennas and the concept of antenna temperature; antenna measurements and evaluation.

ET6035 Random Fading Channel

Introduction : definitions: Short Term and Longterm Fading, Coherence Bandwidth, Delay Spread, Doppler Spread; Line of Sight propagation, Deterministic Processes, Frequency-Non Selective Stochastic and deterministic Channel Model, Frequency-Selective Stochastic and deterministic Channel Model, Empirical Models, Wideband Fast Fading

ET6040 Queuing Networks

Review of Probability Theory, Random Variables & Stochastic Processes, Queuing Paradigm, Queuing Theory, Queuing Model, Single Markovian Queue, Little's Law, M/M/1, Burke Theorem & Reversible process, State Dependent M/M/1, Other Markovian Queue M/M/.../..., Finite Source Queue, M/G/1, Pollczek-Khinchin, Tandem Queue, Open Jackson Network, Closed Jackson Network, Product Form Solution, Recursive Solution, Convolution Algorithm, Mean Value Analysis, Discrete Time Queuing System, Simulation Model, Case Studies: Resource Sharing Networks, Switched Networks, Multistage Networks.

ET6041 Access Network Technology

Network access, transmission media : copper, optical fiber, radio; ATM based access; Access interface and protocol (V5.1, V5.2, VB5, formatting, protocol control, link control, PSTN protocol, ISDN signaling); user access technology (ADSL, SDSL, HDSL, VDSL, HFC); coding on access network; Optical Access network (PON, ONU, transmitter, ATM PON, protocols); radio based access network.

ET6043 Performance Engineering of Computer and Communications

Network Performance Concept, Network Performance Metrics: Throughput, GOS, QOS, Delay, Network Performance Analysis & Evaluation: Analytical Methods, Modeling & Simulation, Discrete Event Simulation, Measurement Methods and Network Management (Experimental Methods), Performance Analysis & Evaluation Issues in Circuit Switched, Packet Switched and Network Protocols, Source Traffic Modelling, Network Simulator using NS2.

ET6052 Protocol Engineering

Introduction, history of protocol, formal description techniques, protocol structure : elements, service and environment, vocabulary and format, procedure rule , error control, flow control, protocol specification and modeling, validation model, correctness requirements, protocol design, Finite state machine, Conformance testing, Synthesis and protocol validation, protocol development tools (SDLtool, SPIN, Z/aves. etc.)

ET 7001 Special Topics in Radio Communications

Principle of spread spectrum communication systems : direct sequence, frequency hopping. Spreading sequences : PN sequence, Gold codes, Hadamard codes. Code synchronization : coherent and non-coherent systems. Transmission through fading channels, rake receivers. Introduction to CDMA cellular communication systems : intra and inter cell interference, system capacity, intra and inter cell interference, power control. Introduction to RF planning for CDMA systems.

ET7011 Array Signal Processing

Introduction to ASP, signals in space and time, aperture and array, delay and sum beamforming, spatial filtering, frequency domain beamforming, array resolution, discrete-time beamforming, adaptive array processing, constrained optimization in array processing, eigen-analysis of array, robust-adaptive array, array algebra, eigen solution of maximum SNIR, LMS array algorithm, DOA estimation, multisource-multijammer beamforming, introduction to space-time coding

ET 7041 Telecommunication Network Planning

Introduction, problems on planning (capacity, delay, reliability, cost), traffic model (continuous, discrete, burstiness, self-similarity, ATM source model), planning network methods (requirement analysis, graph theory, optimization, network management), Backbone network planning (heuristic, Kleinrock Independence Approximation), Access Network planning (minimum spanning trees, Esau-William's Algorithm, Sharma's Algorithm, Kahn's Algorithm, Kershenbaum-Chou algorithm).

ET7053 Telematic Security System

Introduction to security, malicious program, cryptography, network security framework, firewall, network denial of service attack and defenses, authentication technology, network server security, wireless and mobile security, host and network intrusion detection system

ET70Z1 Thesis I

Thesis I formulates research planning which will be completed in Thesis II. To conduct Thesis I, a student must have decided a topic for his or her research which has been approved by his/her supervisor. During completing the Thesis I, the student conducts a literature study, makes discussion with the supervisor, accomplishes initial research survey and writes a research proposal. At the end of the Thesis I period, the student have to present a seminar to reviewers.

ET 70Z2 Thesis II

Thesis II realizes a research which has been formulated and prepared in Thesis I. The research must be carried out by a student in the laboratory where he/she belong as a member of the laboratory. At the end of his/her research, the student has to write a thesis. The thesis draft which has been approved by the supervisor will be examined by at least 3 reviewers

KELOMPOK 12

EM6011 Solid-state Electronics

Short Description

Material science, electric and thermal conduction on solid state, modern solid state theorem, semiconductor, dielectric material and isolation, magnetic and superconductivity characteristics.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EL4011 Semiconductor Devices

References/ Bibliography

S.O Kasap, Principles of Electronic Materials and Devices, Mc Graw Hill, 2002

EM6012 IC Technology

Short Description

Overall discussion on semiconductor and IC fabrication; NMOS and PMOS device; IC process; Simulation process, CMOS Integrated process, Bipolar and BiCMOS process, Isolation technology, Contact technology, Multilevel interconnection technology.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography

1. S. Wolf : Silicon Processing for the VLSI Era Vol. 2 Process Integration, Lattice Press, 1990
2. S. A. Campbell : **The Science and Engineering of Microelectronic Fabrication**, Oxford University Press, 1996
3. S. Wolf & R. N. Tauber : **Silicon Processing for the VLSI Era – Vol. 1 Process Technology**, Lattice Press, 1986
4. O. D. Trapp, et. al : **Semiconductor Technology Handbook**, Technology Associates, 1982

EM6013 Device Modelling

Short Description

Review of Semiconductor physics: drift-diffusion, static and dynamic characteristics of p-n junction diode, BJT and HBT, FET and thin film transistor, SPICE model for BJT and Gummel Poon model, MOSFET model and BSIM3, parameter extraction techniques.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography

:

5. D. Roulston, *Bipolar Semiconductor Devices*, McGraw Hill, 1990.
6. N. Arora, *MOSFET Models for VLSI Circuit Simulation*, Springer-Verlag, 1993.
7. P. Antognetti and G. Massobrio, *Semiconductor Device Modeling with SPICE*, McGraw Hill, 1988.
8. D.W. Greve, *Field Effect Devices and Applications*, Prentice Hall Series in Electronics and VLSI, 1998.

EM6014 Sensor Technology

Short Description

Modelling and simulation of microsensor and actuator, bulk micromachining technology, direct bonding wafer technology, sensor packaging, magnetic sensor based on lateral magnetotransistor, thermal sensor, silicon planar photo sensor, CCD, sensor for automotive industry, signal processing on micromachine sensor, controlled oscillator and application for sensor.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography

:

Ljubisa Ristic, *Sensor Technology and Devices*, Artech House, 1994.

EM6015 Advance Packing Technology

Silabus Ringkas

VLSI device and device interconnection, IC packaging technology, interconnection capacitance, interconnection resistance, transmission path, cross talk and noise, power distribution, high speed clock system, system performance modeling

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

HB Bakoglu, *Circuits, Interconnection and Packaging for VLSI*, Addison-Wesley

EM6016 Failure Analysis and Reliability

Short Description

An overview of electronic devices and their reliability; Defect, contaminants and yield; The mathematics of failure and reliability; Mass transport - Induced Failure; Electronic charge - Induced Damage; Environmental damage to electronic products; Examining devices under electrical stress; Future directions and reliability issues

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM6012 IC Technology

References/ Bibliography :

1. Milton Ohring : Reliability and Failure of Electronic Materials and Devices , Academic Press, 1998
2. Dieter K. Schroder : Semiconductor Material and Device Characterization , John Wiley & Sons, 1990

EM6017 Compound Semiconductor

Short Description

Pengenalan pada semikonduktor majemuk, Penumbuhan epitaksi untuk semikonduktor, Karakterisasi analitik dan pengujian, Sifat elektronik heterojunction, Aplikasi dasar semikonduktor majemuk heterostruktur.

Introduction on compound semiconductor, epitaxial growth on semiconductor, basic application of heterostructure semiconductor.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM 6011 Solid-State Electronics

References/ Bibliography :

5. Sze, Physics of Semiconductor Devices, 1981
6. Kasap, Principles of Electronic Materials and Devices, 2000.

Achmad Fuad Masud, 17Feb., 2006

EM6021 Advance VLSI Design**Short Description**

Introduction; Technology Roadmap; Industrial growth and market VLSI System Design Issues (1); Design Methodology; Design Implementation Trade-Off (2); Performance factors; Re-use Methodology Overview Hardware Modeling Language (1); VHDL concepts; Modeling Combinational Circuits (2); Modeling Sequential Circuits (3); Modeling Finite State Machines (4); VHDL Test Bench Fundamental of FPGA Design (1); FPGA Advantage Tool Flow

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EL4015 VLSI System Design

References/ Bibliography :

1. HDL Chip Design, Douglas J. Smith, Doone Publications, 1996.
2. Design of VLSI Systems, Lecture Notes by Yusuf Leblebici and Daniel Mlynek, EPFL-DE Publication, 1997.
(<http://ic.ee.itb.ac.id/~ssarwono/c3iwww.epfl.ch/teaching/webcourse/>)
3. Application Specific Integrated Circuits, Michael J. Smith, Addison Wesley, 1997.
4. **FPGA Advantage Tutorial**

EM6022 Mixed-Signal VLSI Design**Short Description**

This course provides basic techniques for the analysis and design of mixed signal circuits for implementing interfaces between analog and digital signals in CMOS VLSI systems. Topics include: Overview of Data Conversion Systems; MOS Devices and Technology; Review of CMOS Op-Amps; Sample & Hold Circuits; Review of CMOS Comparators; Sampled-data Amplifiers and Integrators; MOS D/A Converters; A/D Converter

Architectures; Pipelined A/D Converters; Folding & Interpolating A/D Conversion; Oversampled A/D Conversion; Cascaded Sigma-Delta Modulators; Decimation Filters

Offered to:

Study Program : Master Program in Microelectronics
School : School of Electrical Engineering and Informatics

Related Courses:

EL4012 Analog Integrated Circuits Design

References/Bibliography:

1. R.J. Baker, *CMOS: Mixed-Signal Circuits Design*, John Wiley & Sons, 2002
2. B. Razavi, *Principles of Data Conversion System Design*, IEEE Press, 1996
3. K. Martin and D.A. Johns, *Analog Integrated Circuits Design*, John Wiley & Sons, 1997

EM6023 VLSI Testing

Short Description

Pengenalan pengujian dan ATE, ekonomi pengujian dan pemodelan fault, simulasi logika dan fault, pengukuran testabilitas, ATPG kombinasional, ATPG sekuensial, pengujian memori, pengujian analog, pengujian fault waktu tunda dan IDDQ, perancangan yang mudah diuji, built-in self-testing, boundary scan dan test bus analog, pengujian sistem.

Introduction to testing and ATE, economical testing and fault modeling, logic and fault simulations, testability measurement, combinational ATPG, sequential ATPG, memory testing, analog testing, delay fault testing and IDDQ, testable design, built-in self-testing, boundary scan and analog bus test, system testing.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography

- 1 M. Abramovici, M. A. Brener, A. D. Friedman : Digital System Testing and Testable Design , Revised Printing, 1990, IEEE Press
- 2 W. Needham : Designer Guide to testable ASIC Devices , Van Nostrand Reibhold, 1991
- 3 Miczo : Digital Logic Testing & Simulation , John Wiley & Sons, 1987
- 4 R. Wilkin : Testing Digital Circuits : An Introduction , Van Nostrand Reibhold, 1986

- 5 M. Brushnell, V. Agrawal : Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits, Kluwer Academic Press, 2000

EM6024 Advance RFIC Design

Short Description

Kuliah ini membahas prinsip perancangan rangkaian dan sistem elektronika untuk pembangkitan, transmisi dan penerimaan sinyal listrik dalam bentuk frekuensi radio dengan pembahasan pada tingkat transistor dan tingkat rangkaian khususnya pada teknik-teknik rangkaian terbaru.

Principle of circuit design and electronic system for generation, transmission, and receiving electrical signal in radio frequencies on transistor level and circuit level.

Offered to

Study Program/ Option : EL / EM
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EL 5014 RFIC Design

References/ Bibliography :

1. T. Lee, "The design of CMOS Radio Frequency Integrated Circuits", Cambridge University Press 1998.
2. B. Razavi, "RF Microelectronics", Prentice Hall 1998.

EM6025 VLSI DSP Systems

Short Description

The course covers VLSI technology, architecture, and design of DSP systems. Introduction to DSP algorithms; Processing Requirements; RISC and DSP Cores; Architecture for the DCT; Hardware for Motion Estimation; Hardware for Entropy Coding; Implementation of JPEG Processor; IC for Video Codecs; DSP Enhancement for General Purpose Processor

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

4. Bhaskaran dan Konstantinides, Image and video compression standards: Algorithms and architectures, second edition, Kluwer Academic Publishers, 1997.
5. Nishitani et. Al., VLSI Video/Image Signal Processing, Kluwer Academic Publishers, 1993.

EM6028 VLSI Signal Processing Architectures

Short Description

This course aims at the design and implementation of DSP systems via integrated circuits. A key component of the course is a project focused on algorithm design, architecture design, and logic synthesis. Topics include: Overview of Digital Signal Processing (DSP); DSP Algorithms; Implementation of Fundamental Operations; Overview of Digital Design using VHDL; Algorithm Transformation Techniques; Architectural Transformation Techniques; VLSI Implementation Styles; Case Studies

Offered to:

Study Program : Master Program in Microelectronics
School : School of Electrical Engineering and Informatics

Related Courses:

-

References/Bibliography:

1. K. K. Parhi : *VLSI Digital Signal Processing Systems*, John Wiley & Sons, 1999
2. L. Wanhammar: *DSP Integrated Circuits*, Academic Press, 1999
3. P. Pirsch: *Architectures for Digital Signal Processing*, John Wiley & Sons, 1998
4. U. Meyer-Baese: *Digital Signal Processing with Field Programmable Gate Arrays*, Springer-Verlag, 2001

EM6031 Microelectronics System : Data Acquisition, Sensors and Actuators

Short Description

Sensor technology, sensors in measurement systems, sensor development and characterization, electric network based sensors and mechanical sensors, sensor signal conditioning, mechanical sensors, mechanical sensors, thermal sensors, radiation sensors, chemical sensors, sensor signal processing,

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :**EM6032 Electronics Instrumentation Systems****Short Description**

Basic configurations of modern electronics instruments, electronics instrument characteristics, building blocks for electronics instrumentation systems, electronic measurement instrumentation behaviour. Electronic instrumentation system platforms for relevant topic examples which include novelty in their design.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

5. Rangan, Sarma, Mani. *Instrumentation: Devide and System*. Tata Mc. Graw-Hill, 1992.
6. Jacon Fraden. *Handbook of modern sensor : Physics, Design and Applications*. AIP press, Springer-Verlag, New York, 1996.
7. Webster. *Medical Instrumentation : Application and Design*. Houghton Mifflin Company, 1996.

EM6034 Digital System Impelementation**Short Description**

Digital system Implementation: firmware and hardware-software based technology. Firmware implementation on ASIC and FPGA. Hardware implementation for general, microprocessor, and digital-signal processor based systems. Various level of software design: assembly, high-level, bias and OS based. Introduction to real-time OS. Partitioning in digital system and hardware-software solution separation. Digital system components, bus and communication structures, interfaces, memory architecture. Embedded system and specific application boards. Large system design using CAD.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

Michael John Sebastian Smith, "Application Specific Integrated Circuit Design"

EM6035 Noise in Electronic Systems

Short Description

Introduction to the area of low noise design, fundamental of noise physics, noise decription and modelling in pasive and active devices, technique for circuit noise performance prediction, technique fir reducing noise in circuit design.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

1. Noise Theory of Linear and Nonlinear Circuits, Engberg & Larsen
2. Motchenbacher & Connelly, Low-Noise Electronic System Design , Wiley Interscience
3. Ott, Noise Reduction Techniques in Electronic Systems
4. van der Ziel, Noise in Solid State Devices and Circuits

EM7011 Microsystem Fabrication and Packaging

Short Description

Microfabricated sensors, actuators, components and systems; Micromachining and microfabrication technology; Design and simulation tools for microsystems; Integrated electronics for microsystems; Packaging and assembly technology; Microsystem applications

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM6012 IC Technology

References/ Bibliography :

3. Stephen D. Senturia, "Microsystems", Kluwer Academic Publishers, Boston, 1998.
4. Stephen D. Senturia, "Microsystem Design", Kluwer Academic Publishers, Boston, 2000.
5. Rao R. Tummala, "Fundamentals of Microsystems Packaging", McGraw-Hill, 2001.

EM7012 Photonic Devices/ Waveguiding

Short Description

Fundamental of wave and opto-quantum electronics in devices photonics; Application of photonic devices in optical communication and laser; Optical communication modules: amplifier, modulator, switches, types of optical fibres, WDM and OTDM elements, phot detector, and nonlinear optical devices.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

Hermann A. Haus, Waves And Fields In Optoelectronics, Printice Hall

EM7021 SoC Design

Short Description

Introduction to System Level Design; Algorithmic Models for HW/SW Trade-Off Analysis; Design Partition and IP Selection; Software Codesign; Hardware Codesign; Structural Level SoC Design: Specification for IP Design and Reuse, Top Level Design, High-Level Synthesis, Partitioning and Decomposition, Sub-Block Integration and RTL/Netlist Testing.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography

- :
1. M. Keating, P. Bricaud , and R.J. Rickford : *Reuse Methodology Manual for System-on-a-Chip Design, 3rd Edition*, Kluwer Academic Publishers, 2002
 2. B. Cohen: *Component Design by Example*, VhdlCohen Publishing, 2002
 3. F. Nekogaar: *From ASICs to SoCs: A Practical Approach to Design and Verification*, Prentice-Hall 2003

EM7031 Microelectronics Design Study

Short Description

Introduction to project environments, management of electronic product development projects, research and information gathering, problem definition and product requirement and specification, developmet of solutions and work scheduling, initial design, component selection, prototype design and implementation, design verification, design modification, and project execution evaluation, design case studies: instrumentation system, communication system.

Offered to

Study Program/ Option : EL / EM
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite :

References/ Bibliography :

3. D. Joseph Stadtmiller, Electronics Project Management and Design, Prentice Hall.
4. Charles A Harper, Electronics System Design, McGraw-Hill.

EM7032 Hardware Software Codesign

Short Description

Introduction; Model and architecture for embedded system specification; Specification languages for embedded system design; Specification example; Translation to VHDL; System partitioning ; Design quality estimation: (1) Hardware estimation (2) Software estimation; Specification refinement; System-design methodology.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM6021 Advance VLSI Design

References/ Bibliography :

1. "Specification and Design of Embedded Systems", Daniel D. Gajski, Frank Vahid, S. Narayan, & J. Gong, Prentice Hall, 1994.
2. "The Codesign of Embedded System: A Unified Hardware/Software Representation", Sanjaya Kumar, James H. Aylor, Barry W. Johnson, Wm. A. Wulf, Kluwer Academic Publishers, 1996.

EM60Z1 Thesis I

Short Description

Thesis topic exploration and selection, thesis research proposal preparation, preliminary research execution, research proposal and paper documentation, presentaion and evaluation. Use of bibliography and research log, writing and publishing work in scientific journals and conferences. The activiies in this course should be directly continued in EM70Z2 Thesis II. The topics must from within these subjects: microelectronics process and devices, microelectronics circuit design, and microelectronics application systems.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM6012 prasyarat
Prerequisite : EM6021 prasyarat
Prerequisite : EM6031 prasyarat

References/ Bibliography

EM70Z2 Thesis II

Short Description

Continuation of Thesis 1: in-depth research in the topics of microelectronics devices, process, circuit design and system applications, research proposal execution, data gathering and analyses of research results, discussion and deduction of conclusion, paper writing, thesis writing and examination. Students are encouraged to send their papers to scientific journals or meetings.

Offered to

Study Program/ Option : EL / ME
School: School of Electrical Engineering and Informatics

Related Courses

Prerequisite : EM60Z1

References/ Bibliography

KELOMPOK 13

EK6111 Perancangan Sistem Kendali (Control System Design: compulsory, 3 credits)
Controller design frameworks: control system architecture, controller specifications, controller design methods; analytic tools: norms of signals, norms of systems, geometry of design specifications; design specifications: realizability & closed-loop stability, performance specifications, differential sensitivity specifications, robustness specifications via gain bounds; introduction to optimal control; calculus variables methods; dynamic programming; parameter optimization; linear quadratic control;
References: <ol style="list-style-type: none">1. S.P. Boyd, Linear Controller Design: Limits of Performance, Prentice Hall Int., 19912. M. Jamsidhi et.al., Computer-Aided Analysis and Design of Linear Control Systems, P Prentice Hall Int., 19923. G.C. Goodwin, S.F. Graebe, M.E. Salgado, Control System Design, Prentice Hall Int., 2002

EK6181 Sistem Kendali Embedded (Embedded Control System: compulsory, 3 credits)
Embedded systems overview; design challenges: optimization design metrics; processor, IC, and design technologies; Custom single purpose processors: hardware; combinational & sequential logic; custom single-purpose processor design; RT-level processor design; optimizing single-purpose processor design; General purpose processors: Software; basic architecture; operations; programmer's view; development environment; application-specific instruction-set processors (ASIPs); general purpose processor design; standard single-purpose processors: Peripherals; timers, counter, UART, PWM, LCD & keypad controllers; stepper motor controllers; A/D converters, real-time clocks; Memory: common memory types; composing memory; memory hierarchy and cache; advanced RAM; Interfacing: communication basics, I/O addressing, interrupts, DMA, arbitration, multilevel bus architectures; advanced communication principles; serial, parallel, & wireless protocols; Digital camera example: simple camera functions; user's & designer's perspective; requirements specifications & design alternatives; State machine & concurrent processes: models vs languages; text vs graphics; basic finite state machine (FSM) model; finite state machine with data-path (FSMD); hierarchical/concurrent FSM; program-state machine models (PSM); concurrent processes; concurrent process model; communication & synchronization; dataflow models; real-time systems; control systems application: open & closed loop systems, general control system and PID controllers; software coding; PID tuning; practical issues related to computer-based control.
References: <ol style="list-style-type: none">1. F. Vahid and T Givargis, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley, New Jersey, 2002

EK6121 Sistem Kendali Kejadian Diskrit (Discrete Event Control System: compulsory, 3 credits)

The definition of discrete event systems, logic level modeling, automata theory, formal languages, state machines, controllability and observability concepts, supervisory control of discrete event systems, discrete event system modeling using queue theory, Markov chains, GSMP, max-min algebras

References:

1. R. Kumar, V.K Garg, Modelling and Control of Logical Discrete Event Systems, Kluwer Academic Publisher, 1995
2. A. Tornambe , Discrete Event Systems Theory : An Introduction, Word Scientific Publishing, 1995
3. Y.C. Ho, X.R. Cao, Discrete-Event Dynamical Systems, Kluwer Academic Pub., 1991
4. J. Carroll and D. Long, Theory of Finite Automata, Prentice Hall, 1989
5. Van der Schaft, Hybrid Systems and Control, 2000

EK6183 Robotika Lanjut (Advanced Robotics: compulsory, 3 credits)

The definitions of robot and manipulator, the model of mechanical articulation system and robot's components; homogeneous transformation; kinematics equations; inversed kinematics and its solutions; manipulator dynamics; trajectories and movement control; object/environment identifications and robot sensors; command system and programming; introduction to industrial robots and intelligence robots

References:

1. Fu, K.S., Gonzales, R.C., Lee, G., Robotics: Control, Sensing and Intelligence, McGraw-Hill, 1982
2. Schilling, R.J., Fundamentals of Robotics: Analysis and Control, Prentice-Hall, 1990
3. Sandler, B.Z., Robotics: Designing the Mechanisms for Automated Machinery, P.Hall, 1991

EK6234 Sistem Kendali Cerdas (Intelligent Control System: compulsory, 3 credits)

Introduction to intelligence systems, fuzzy set: classical and fuzzy set theories, terminologies; basic operations of fuzzy set; membership function formulation and its parameterization; T-norm & S-norm; fuzzy set properties; fuzzy rule: extension principle & fuzzy relation; relation properties; fuzzy relational basic operations; if-then fuzzy rule; fuzzy linguistic description; linguistic variable and value; fuzzy reasoning; fuzzy relational composition; fuzzy inference system: Mamdani fuzzy model; fuzzification; defuzzification; Sugeno fuzzy model; fuzzy control: architectures, components; fuzzy control rule; fuzzy control configuration; case study; Neural network basics: biological neural networks; neuron model; neural network learning methods; neural network characteristics; history of neural network development; pattern classification & non linear approximation using neural network; neural network architectures; feed-forward neural network, activation function; forward computation; back propagation algorithm; neural network for system identification; neural network for control; fuzzy logic applications; neuro-fuzzy in control system.

References:

1. A Course in Fuzzy Systems and Control, L.X. Wang, Prentice-Hall, 1997
2. Fuzzy and Neural Approaches in Engineering, L.H. Tsoukalas and R.E. Uhrig,

<p>John Wiley and Sons, 1997</p> <ol style="list-style-type: none"> 3. Neuro-Fuzzy and Soft Computing, Jang, Sun and Mizutani, Prentice-Hall, 1997 4. Neural Networks : A Comprehensive Foundation, Simon Haykin, IEEE Press, 1998
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EK6011 Kendali Kokoh (Robust Control: elective, 2 credits)
History of robust control development; sensitivity & complementary sensitivity in classical control; signal spaces & norms; uncertainty description; LFT (linear fractional transformation) representation; small gain theorem; robustness analysis of multivariable control system; robust performance; robustness analysis using structured singular values μ ; Youla parameterization; H_∞ control design; industrial applications
References: <ol style="list-style-type: none"> 1. Zhou, K., Doyle, J., Glover, K., Robust and Optimal Control, Prentice Hall, 1996 2. Dailey, R.L., Lecture Notes on Robust Using H_∞ and μ Methods, 1995 3. Maciejowski, J.M., Multivariable Feedback Design, Addison Wesley, 1989 4. Green, M., Limebeer, D.J.N., Linear Robust Control, Prentice Hall, 1995

EK6031 Pemodelan dan Identifikasi Sistem (Modelling & System Identification: elective, 3 credits)
System representations: SISO, MIMO; ARMAX, AR etc; tools : dinger block, bond graphs, estimation theory : MAP – MIV, LSE, parametric identification, nonparametric identification, close loop identification.
References: <ol style="list-style-type: none"> 1. A.P. Sage & J.L. Melsa, System Identification, Academic Press, 1971 2. L. Ljung, System Identification: Theory for the User, Prentice Hall, 1987 3. R. Johanson, System Modelling and Identification, Prentice Hall, 1993 4. I.D. Landau, System Identification and Control Design, Prentice Hall, 1990

EK7031 Otomata (Automata: elective, 2 credits)
Introduction and basic definitions; FAD language characteristics; finite automata minimization; non deterministic finite automata; closure properties; regular expressions; finite state transducers; regular grammars; context free language; pushdown automata.
References: <ol style="list-style-type: none"> 1. J. Carroll and D. Long, Theory of Finite Automata with an Introduction to Formal Languages, Prentice Hall Int., 1989 2. Zamir Bavel, Introduction to the Theory of Automata, Reston Publishing Co., 1983

EK6032 Kendali Adaptif (Adaptive Control: elective, 2 credits)
History and development of adaptive control, parameter estimation methods, prediction and filtering methods, adaptive system design, gain scheduling system, model reference adaptive control, self-tuning adaptive control.
References: <ol style="list-style-type: none"> 1. Astrom, K.J., Wittenmark, B., Adaptive Control, Addison Wisley, 1989.) 2. Goodwin, G.C., Sin, K.S., Adaptive Filtering Prediction and Control, Prentice Hall

3. Roffel,B., Vermeer,P.J., Simulation and Implementation of Self Tuning Controlers, Prentice Hall, 1989.

EK7012 Metode Optimasi (Optimization Methods: elective, 2 credits)

Introduction to optimization; linear programming: problem formulation, characteristics, and simple problem case; simplex method; duality; transportation & network programming; unconstrained non linear programming: characteristics, descent methods, conjugate direction methods, quasi-Newton methods; constrained non linear programming: conditions & characteristics, primal method, Lagrange method, multi-criterion optimization; optimization using genetic algorithm optimization and neural networks

References:

1. D.G. Luenberger, Linear and Nonlinear Programming, Addison Wesley, 1984
2. M.S. Bazaraa, J.J. Jarvis, H.D. Sherali, Linear Programming and Network Flows, John Wiley & Sons, 1990
3. A. Cichoki and R. Unbehauen, Neural Networks for Optimisation and Signal Processing, John Wiley & Sons, 1993
4. Z. Michalewicz, Genetic Algorithms+Data Structures=Evolution Prgrams, 3rd edition, Springer-Verlag, 1996

EK6081 Desain Sistem Otomatik (Automation System Design: elective, 2 credits)

Automation system architecture: basic automation system, process controlled system, plant management, corporate system; DCS, SCADA and Fieldbus concepts: data communication in control network, standards, state of the art, DCS-based system design, PC-based system design, PLC-based system design.

References:

1. Programmable Automation Systems, CITEF, 1998
2. Olsson G, Pinni G, Computer System for Automation and Control, PHI, 1995
3. Pessen David W, Industrial Automation : Circuit Design and Components, John Willey & Son, 1990

EK7032 Intelegensi Artifisial Terdistribusi (Distributed Artificial Intelligence: elective, 2 credits)

Overview of the swarm intelligent field, concept and tools; swarm intelligence and self-organization; flocking and collective moments; exploration, exploitation, and navigation in ants; division of labor and task allocation; aggregation and segregation mechanisms; modeling of distributed robotic systems; (strictly) collaborative robot experiments; adaptive controllers: reinforcement learning methods; collective building and self-assembly in natural & artificial systems; ant colony optimization algorithms (ACO); from organism to super organism: empower a collection of agents; dynamic optimization: routing in telecommunications networks.

References:

1. E. Bonabeau, M. Dorigo, and G. Theraulaz, Swarm Intelligence: From Natural to Artificial Systems, Santa Fe Studies in the Sciences of Complexity, Oxford University Press, 1999
2. Pessen David W, Industrial Automation: Circuit Design and Components, John

Wiley & Sons, 1990

EK7022 Sistem Kendali Hibrid (Hybrid Control System: elective, 2 credits)

Introduction; the development of hybrid control system; hybrid system modeling; hybrid system dynamics; hybrid system properties; stability concept of hybrid system; controllability concept; observability concept; hybrid system analysis; design and implementation.

References:

1. Stefan Petersson, Analysis and Design of Hibrid System, Chalmers Univ. of Technology, Sweden 1999

EK7021 Kendali Digital Lanjut (Advanced Digital Control: elective, 2 credits)

Introduction, digital control system concept; sampling process, signal measurement process; discrete time control analysis using conventional method (Z-transform); discrete-time control analysis using state space model; controller designs: classical and modern approaches; controllability, observability, stability; control implementation: hardware & software; digital controller designs: discrete & continuous time methods.

References:

1. C.H. Houpis and G.B. Lamont, Digital Control System; Theory, Hardware, Software, 2nd edition, MCGraw Hill, New York, 1992
2. J.R. Leigh, Applied Digital Control: Theory, Design & Implementation, Prentice Hall, 1992
3. K. Ogata, Discrete-Time Control Systems, 3rd edition, Prentice-Hall, New York, 1978
4. D.V. Douglas, Microprocessors & Interfacing: Programming and Hardware, 2nd edition, McGraw Hill, New York, 1992

EK7023 Mekatronika (Mechatronics: elective, 2 credits)

Introduction: general framework of mechatronics and control systems; sensor concepts, transducers, measurements; performance characteristics of mechatronics; digital sensors; data acquisition; actuators and power amplifiers; actuator components: mechanical, hydraulic, pneumatic and electric actuators; mechatronics system modelling: block diagram & mathematical modeling; translational and rotational mechanics; fluid and thermal systems.

References:

1. W. Bolton, Mechatronics (Electronic Control Systems in Mechanical Engineering)
2. Krause & Wasynczuk, Electromechanical (Motion Devices)
3. C.S. Rangan & G.R. Sharma, Instrumentation, Devices, and Systems, 3rd edition, Tata McGraw Hill, New Delhi, 1992

EK7011 Proses & Kendali Stokastik (Stochastic Process & Control: elective, 2 credits)

Introduction, overview of random variable vectors: random vector, probability axioms & density; probability ...; Gaussian random vector & its properties; random process description: stationary & ergodicity concepts, correlation function, spectral density, white noise; linear systems responses due to random inputs, Wiener filter; estimation theory:

LS, ML; Gaussian-Markovian representation: Gaussian-Markovian process & its properties; continuous representation, generalization, Kalman Filter: continuous system, discrete system, filter asymptotic behavior; separation theorem; LQG optimal control.
References: <ol style="list-style-type: none"> 1. Siouris, An Engineering Approach to Optimal Control and Estimation Theory, J. Wiley & Sons, 1996. 2. Brown and Hwang, Introduction to Random Signals and Kalman Filtering, J. Wiley & Sons, 1992.

EK6013 Kendali Optimal Lanjut (Advanced Optimal Control: elective, 2 credits)
Basics of Optimal regulator: standard regulator problem; tracking system, properties & applications of optimal control: classical interpretation of regulator system, asymptotical behavior, choosing the quadratic weights, weighting optimal control design using state estimator, frequency shaping, controller order reduction.
References: <ol style="list-style-type: none"> 1. Brian D.O. Anderson, John B. Moore, Optimal Control; Linear Quadratic Methods 2. Frank. L. Lewis, Applied Optimal Control and Estimation

EK7013 Sistem Kendali Nonlinear (Nonlinear Control System; elective, 2 credits)
Phase plane analysis; Lyapunov theory; hyperstability (Popov) theory; advanced stability theories (passivity, small gain theorem); describing function analysis; controller design using feedback linearization.
References: <ol style="list-style-type: none"> 1. J.J. Slotine & Weiping Li, Applied Nonlinear Control, Prentice Hall, 1991. (recommended) 2. Van der Schaft, Applied Nonlinear Control, 1995. 3. H.K. Khalil, Nonlinear Systems, Macmillan, New York, 1992

EK7014 Sistem Kendali Parameter Terdistribusi (Distributed Parameter Control System: elective, 2 credits)
Functional analysis basics; representation of distributed parameter system; application examples; functional minimization methods; elliptic, parabolic and hyperbolic systems; numerical solution; optimal quadratic control; state variables estimation; parametric identification.
References: <ol style="list-style-type: none"> 1. S.P Banks, State-Space and Frequency Domain Methods in the Control of Distributed Parameter Systems, P.Peregrinus, London, 1993. 2. Jai, Amouroux, M., Automatique des Systemes Distribues, Hermes, 1990. 3. Lions, Distributed Parameter Control Systems, Gauthier & Villars, Paris, 1967

EK7031 Kendali Jaringan (Networked Control: elective, 2 credits)
Introduction; control networks; distributed control over networks; finite data rate control: single input case; towards data rate reduction; extensions to multiple input case.
References: <ol style="list-style-type: none"> 1. H. Ishii, B.A. Francis, and I.R. Chuesov, Limited Data rate in Control Systems

With Networks, Lecture Notes in Control & Information Sciences No 275,
Springer-Verlag, 2005

KELOMPOK 14

1. EC6001 Advanced Discrete Mathematics (Compulsory, 3 credits)

Syllabus:

This course gives details to logic, sets, functions, algorithm, integer; arithmetical reasoning, counting, relation, graphs, tree-structures, semi-groups, modeling computations.

Related Course:

Prerequisite:

References:

1. Kolman, B., Busby, R.C., *Discrete Mathematical Structure for Computer Science*, 2nd ed., Prentice-Hall, 1988.
2. Johnsonbauch, R., *Discrete Mathematics*, 4th ed., McGraw-Hill, 1985.
3. Liu, C.L., *Elements of Discrete Mathematics*, 2nd ed., McGraw-Hill, 1985.
4. Rosen, K.H.; *Discrete Mathematics and Its Applications*, 4th ed., McGraw-Hill, 1999.

2. EC6002 Software Design (Compulsory, 3 credits)

Syllabus:

This course gives details to topics related software, includes software engineering paradigms, requirements specification, functional design, object oriented design, software verification and maintenance. This course also gives introduction to human – computer interaction and discussion about software user interfaces design.

Related Course:

Prerequisite:

References:

1. Roger Pressman, *Software Engineering: A Practitioner's Approach*, McGraw-Hill, 2001.
2. Stephan Schach, *Classical and Object-Oriented Software Engineering*, Irwin, 1999.

3. EC6003 Automata and Discrete Event System (Optional, 2 credits)

Syllabus:

Part I: Introduction and basic definition; FAD language characteristic; finite automata minimization; non deterministic finite automata; closure properties; regular expressions; finite state transducers; regular grammars; context free language; pushdown automata. Part II: discrete event system definition, logic level modeling; discrete event system controllability and observe ability concept; supervisory control on discrete event system; modeling with queue theory; Markov chain; GSMP; max-min algebra.

Related Course:

Prerequisite:

References:

1. Kumar, R., Garg, V.K., *Modeling and Control of Logical Discrete Event Systems*, Kluwer Academic Publisher, 1995.
2. Tornambe, A., *Discrete event Systems Theory: An Introduction*, Word Scientific Publishing, 1995.

3. Carroll, J., Long, D., *Theory of Finite Automata with Introduction to Formal Languages*, PHI, 1989.
4. Bavel, Z., *Introduction to the Theory of Automata*, Reston Publishing Co., 1983.

4. EC6010 Computer Network Design (Compulsory, 2 credits)

Syllabus:

Computer and communication technology development, communication infrastructure (TDM-switch, frame relay, SMDS, ATM); transportation and transmission technology; wireless and mobile network, communication interface standards; data communication protocol, LAN and high speed LAN technology; TCP/IP protocol (IPv4 and IPv6), multi service protocol, network management, IP-based multi-service network.

Related Course:

Prerequisite:

References:

1. Douglas E. Comer, *Internetworking with TCP/IP, Volume I: Principles, Protocol and Architecture*; Prentice-Hall, 3rd ed., 1995.
2. Douglas E. Comer, *Internetworking with TCP/IP, Volume II*, Prentice-Hall, 3rd ed., 1995.
3. Douglas E. Comer, *Internetworking with TCP/IP, Volume III*, Prentice-Hall, 3rd ed., 1995.
4. Fred Halsal, *Multimedia Communication Network*.

5. EC6020 Advanced Computer Architecture (Compulsory, 3 credits)

Syllabus:

Parallel processing theory, parallel computer models, computer architecture evolution and development; program and network characteristics, parallel processing conditions, program scheduling and partitioning, flow mechanism; scalable performance principles, performance measures, speed up, Amdahl law, Gustafson law, scalability definition and analysis; Hardware technology, types of processors, memory hierarchy, advanced processor technology; CISC, RISC, VLIW architectures; bus, cache, shared memory, pipeline and superscalar design techniques; parallel architectures, multiprocessor, multi-computer, multi-vector computer, SIMD, MIMD; scalable architecture, multithreaded, data flow, software for parallel programming, compiler and programming languages, parallel computer examples.

Related Course:

Prerequisite:

References:

1. Hwang, K., *Advanced Computer Architecture: Parallelism, Scalability, Programmability*, McGraw-Hill, 1993.
2. Hwang, K., *Computer Architecture and Parallel Processing*, McGraw-Hill, 1986.
3. Kain, R.Y., *Advanced Computer Architecture: A System Design Approach*, Prentice Hall Inc., 1996.
4. Sima, D., Fountain, T., Kacsuk, P., *Advanced Computer Architectures: A Design Space Approach*, Pearson Education, 1997.

6. EC6021 Advanced Operating Systems (Optional, 2 credits)

Syllabus:

Traditional and modern operating systems; advanced operating system concept; parallel and distributed operating system: communication aspect, synchronization, process and processor, file, security and protection; aspects in real-time system; case studies.

Related Course:**Prerequisite:****References:**

1. Singhal, *Advanced Concept Operating Systems*, McGraw-Hill, 1994.
2. Tanenbaum, *Modern Operating Systems*, Prentice-Hall, 1992.
3. Milenkovic, *Operating Systems: Concept and Design*, McGraw-Hill, 1992.
4. Tanenbaum, *Distributed Operating Systems*, Prentice-Hall, 1995.

7. EC6022 Parallel and Distributed Systems (Optional, 2 credits)**Syllabus:**

Understanding parallel and distributed systems, objective of performance increase of computing systems, modeling, communication aspect; Task scheduling in parallel and distributed systems: classical scheduling parallel tasks, optimal scheduling algorithms, considering communication delay, list-scheduling and advance scheduling heuristic, dynamic task scheduling, loop scheduling on distributed-memory computers, task allocation; Miscellaneous problems and parallel programming approaches.

Related Course:**Prerequisite:****References:**

1. Bertsekas, D.P., Tsitsiklis, J.N., *Parallel and Distributed Computing, Numerical Methods*, Prentice-Hall, 1989.
2. Lewis, T.G., El-Rewini, H., *Introduction to Parallel Computing*, Prentice-Hall, 1992.
3. Bell, D., Grimson, J., *Distributed Database Systems*, Addison Wesley, 1992.
4. El-Rewini, H., Lewis, T.G., Ali, H.H., *Task Scheduling in Parallel and Distributed Systems*, Prentice-Hall, 1994.

8. EC6030 Advanced Logic Design (Compulsory, 3 credits)**Syllabus:**

Truth table, minimization and implementation with several aspects to be concerned; Algorithmic State Machine method for Finite State Machine design, and followed by its synthesis on several devices: FPGA, FPAL, PROM; Hardware modeling with VHDL; synthesis on architecture level and logic, followed by logic optimization for 2 level combinational circuit and multilevel also sequential circuit; technology mapping and its implementation; IC logic design and its implementation on LCA chip as course supplement and assignment.

Related Course:**Prerequisite:** EL2005 Logic Circuit and Digital Engineering**References:**

1. Tinder, R.F., *Digital Engineering Design*, Prentice-Hall, 1991.
2. Micheli, G.D., *Synthesis and Optimization of Digital Circuits*, McGraw-Hill, 1994.

3. Green, D., *Modern Logic Design*, Addison-Wisley Publishing Company, 1986.
4. McCalla, T.R., *Digital Logic and Computer Design*, Macmillan Publishing Company, 1992.

9. EC6040 Advanced Intelligent Systems (Optional, 2 credits)

Syllabus:

Intelligence system definition and concept; control strategy; searching methods; heuristic, decomposition; form matching; knowledge representation; machine inference; artificial intelligence concept; action and perception; simple and complex decision making; learning machine; fuzzy logic; neural network; computation evaluation.

Related Course:

Prerequisite:

References:

1. Russel, Norvig, *Artificial Intelligence: A Modern Approach*, Prentice-Hall, 1995.
2. Rich, E., Knight, K., *Artificial Intelligence*, McGraw-Hill, 1991.
3. Haykin, *Neural Networks*, Macmillan, 1994.
4. Fogel, D.B., *Evolutionary Computation: Toward a New Philosophy of Machine Intelligence*, IEEE Press, 1995.
5. Klir, Folger, *Fuzzy Sets: Uncertainty and Information*, Prentice-Hall, 1993.

10. EC6041 Advanced Image Processing and Pattern Recognition (Optional, 2 credits)

Syllabus:

Part I: discussion on digital image processing up to pattern extraction, including: review of image forming, sampling and quantization, image transformation, image representation with stochastic model, image enhancement, image filtering and restoration, image analysis and pattern extraction, and computer vision. Part II: discussion on pattern recognition including: introduction to pattern recognition, a glimpse of probability theory, statistic and matrix, statistical classifier, Bayes decision theory, non-supervised learning, supervised learning, artificial neural network, linear discriminant function, multilayered perceptron, radial based function, SVM (Support Vector Machine), and HMM (Hidden Markov Model).

Related Course:

Prerequisite:

References:

1. Jain, A.K., *Fundamentals of Digital Image Processing*, Prentice-Hall.
2. Pou, J.T., Gonzalez, R.C., *Pattern Recognition Principles*, Addison Wesley.
3. Haykin, S., *Neural Network: A Comprehensive Foundation*, Macmillan.
4. Duda, R.O., Hart, P.E., Stork, D.G., *Pattern Classification*, John Wiley.
5. MacKay, D.J.C., *Information Theory, Inference and Learning Algorithm*, Cambridge University Press.

11. EC6050 DSP System Design (Optional, 2 credits)

Syllabus:

Basic automata theories; set and logic theory; function, cardinality and induction, recursion, Backus-Naur form, finite state machine (finite automaton), building FSM transducer; deterministic and non deterministic automata; stochastic automata; fuzzy and lattice automata; push down automata, Turing machine, decidability, implementation examples.

Related Course:

Prerequisite:

References: -

12. EC6060 Real-Time Systems & Embedded Processor (Optional, 2 credits)

Syllabus:

Understanding real-time systems; classification: hard and soft real-time; structure, characters and performance of real-time systems; task scheduling algorithms: rate monotonic, EDF, IRIS; real-time programming and the problems; run-time error handling; multitasking; real-time data bases; real-time communication: VTCSMA, token based, etc.; fault tolerance and reliability; processor embedded for real-time systems: examples, design and analysis.

Related Course:

Prerequisite:

References:

1. Krishna, C.M., Shin, K.G., *Real-Time Systems*, McGraw-Hill, 1997.
2. Levi, S.T., Agrawala, A.K., *Real-Time System Design*, McGraw-Hill, 1990.
3. Berger, A.S., *Embedded Systems Design: An Introduction to Processes Tools, & Techniques*, CMP Books, 2002.
4. Son, S.H., *Advances in Real-Time Systems*, Prentice-Hall, 1995.
5. Gomma, H., *Designing Concurrent, Distributed, and Real-Time Application with UML*, Addison Wesley, 2000.

13. EC7001 Research Methodology & Orientation (Compulsory, 2 credits)

Syllabus:

Basic principles and purposes of research; research problems; hypothesis; methods and design of experimental and non-experimental research; data collection technique; survey; inferential statistics are discussed. Methods of quantitative and analytic research; their combination; study orientation in computer engineering and information technology fields. Performance evaluation, general mistakes, measurement methods and instruments, loads and characteristics; monitor, benchmarking; simulation methods and its instruments, experiments and designs; result analysis and presentation.

Related Course:

Prerequisite:

References:

1. John W. Creswell, *Research Design, Qualitative & Quantitative Approaches*, Sage Publications, Inc., 1994.
2. Raj Jain, *The Art of Computer Systems Performance Analysis, Techniques for Experimental Design, Measurement, Simulation and Modeling*, John Wiley & Sons, Inc., 1991.

3. Various research articles from journals, dissertation and thesis, especially in computer engineering field.

14. EC7003 Optical Computation (Optional, 2 credits)

Syllabus:

Introduction; two dimensions Fourier transformation; scalar diffraction theory; Fresnel and Fraunhofer diffraction; coherent optical system; optical imaging system; wave-front modulation; optical analog signal processing; holography.

Related Course:

Prerequisite:

References:

1. Goodman, J.W., *Introduction to Fourier Optics*, 2nd Edition, McGraw-Hill, 1996.
2. Banerjee, P.P., Poon, T-C., *Principles of Applied Optics*, Aksen Associates, 1991.
3. Pedrotti, F.L., Pedrotti, L.S., *Introduction to Optics*, Pearson Education, 1992.

15. EC7010 Advanced Security System (Optional, 2 credits)

Syllabus:

Disturbances and errors of computer system: hardware, software; interference; system's performance; security mechanism; fault detection and correction; system's hierarchy; methods of measuring and evaluating; dead-lock; illegal access; methods of protection; encryption; password; refreshing; worm and virus. Information system overview and its relation with security information network, such as internet; security information system and management; statistics related to security information system; principals of security; secure threats, attacks, viruses, Trojan horse; cryptography and encryption: techniques and algorithms; email security; privacy and security: tools and frameworks.

Related Course:

Prerequisite:

References:

1. Cooper, *Computer and Communication Security Strategies for the 1990s*, McGraw-Hill, 1990.
2. Rhee, *Cryptography and Secure Communications*, McGraw-Hill, 1993.
3. Berson, *Client/Server Architecture*, McGraw-Hill, 1994.
4. Rhee, *Error Correcting Coding Theory*, McGraw-Hill, 1990.

16. EC60Z1 Thesis I (Compulsory, 2 credits)

Syllabus:

Under direction of counselor/s, in Thesis I student does a self-organizing learning activity for a research, including: literature study, determining research topic for Thesis II, getting hypothesis, building the research framework, selecting methods, doing preliminary research study to have a thesis proposal presented before a jury team or reviewer for evaluation.

Related Course:

Prerequisite:

References: -

17. EC70Z2 Thesis II (Compulsory, 6 credits)

Syllabus:

Under direction of counselor/s, in Thesis II student does self-organizing activities of learning and research to continue and realize his/her research proposal submitted by integrating the knowledge from courses and other results gathered before. The student learns to makes use relevant research results from experts from their publications, makes simulations or experiments proving his/her hypothesis, analyses results, and makes conclusion. At the end of the study, student must have a manuscript of thesis and presents it before a team of jury for evaluation. If qualified, it is suggested that student publish the results of thesis on a seminar or journal.

Related Course:**Prerequisite:**

References: -

18. EC7011 Network Management System Engineering (Optional, 2 credits)**Syllabus:**

Area of study: space problem and motivation of network system management (NSM); NSM functions, such as fault management, performance, accounting, security, documentation, network development; NSM architecture; NSM standard and protocols; NSM technology; network management application requirement analysis; review on system & software engineering; NSM planning & design; network case study.

Related Course:**Prerequisite:****References:**

1. Simony, *Simple Network Management Protocol*.
2. Zamir, S., *Web-based System and Network Management*.
3. Terplan, K., *Communication Network Management*, Prentice-Hall.
4. *Benchmarking for Effective Network Management*.

19. EC7012 Information System Security Auditing (Optional, 2 credits)**Syllabus:**

Understanding to information system security and auditing for this system. Analysis and discussion for evaluation and auditing of malicious program, cryptography, key management, network and internet security, firewall, network denial-of-service attacks and defenses, authentication, network server and mobile application, host and network intrusion.

Related Course:**Prerequisite:****References:**

1. Stallings, W., *Network and Inter-network Security: Principles and Practice*, IEEE Press, 1995.

20. EC7020 Fault Tolerant Systems (Optional, 2 credits)**Syllabus:**

Definition of fault tolerant system; architecture, hardware; language and tools, network; concept and measurement; mutual exclusion; choosing algorithm; deadlock and termination; reliability, fault models; test generating, fault simulation; self checking and self testing circuit; testability; fault diagnosis in dynamic systems, detection method and fault isolation; functional redundancy; fault tolerant system design techniques; fault tolerant in real-time systems; examples/case study.

Related Course:

Prerequisite: EC6001 Advanced Discrete Mathematics

References:

1. Ramakumar, R., *Engineering Reliability*, Prentice-Hall, 1993.
2. Sweeney, P., *Error Control Coding*, Prentice-Hall, 1991.
3. Rao, Fujiwara, E., *Error Control Coding for Computer System*, PHI, 1989.
4. Levi, S-T., Agrawala, A.K., *Fault Tolerant System Design*, McGraw-Hill, 1994.

21. EC7030 Formal Method (Optional, 2 credits)

Syllabus:

Lectures and discussions on computer and telecommunication system's complexity increment, which some are on exponential order: the increasing gate count on a single digital IC, processor's word length increase - up to 128 bit, software complexity – e.g. Windows 2000 containing 30 million line of code (LOC). Also a study on complex hardware – software system test including: a more rigorous mathematical methods, formal specifications, binary decision diagrams (BDD), higher order logic (HOL), formal verification. Exploration on tools, such as SPIN, BDD, HOL, and theorem proving are also given.

Related Course:

Prerequisite:

References: -

22. EC7050 Data Compression and Multimedia (Optional, 2 credits)

Syllabus:

Understanding characteristics of various input and output media, introducing coding concept/method and data compression; handling problems of operating system on multimedia system; introduction of various saving technology, input and output hardware for audio and video, hard drive, CD ROM, DVD, VCD, etc.; network hardware; applying and using the methods of coding and compression.

Related Course:

Prerequisite:

References:

1. Andleigh, P., *Multimedia System Design*, Kiran Thakrar Publisher, 1995.
2. Nelson, M., Gailly, J-L., *The Data Compression Book*, M&T Books, 1996.
3. Operating Systems Books, like UNIX.

KELOMPOK 16

EI 6101 Architecture and Management of Information Technology, 2 Credits

Silabus :

Organisation and IT, Concept and Management of IT, Strategic Information System, Business Process Reengineering and IT, Network Computing, E-Commerce, IT Impacts on Organisation, IT Applications in Organisations : Transaction Processing, Decision, Data and Knowledge Management, Intelligent Support System, IT System Planning, Economic Aspect of IT, System Development, Managing Information Source and System Security.

TIU :

Student understand about the changing of organization towards the digital economy, organization pressures, respon organization dan the using of information technology to respon the pressure. Student understand the component and information architecture in organization, including IT component development. Describe the application of IT in organization, business, government till ERP. Understanding the IT control in organization and IT security governance, such as COBIT and ISO.

EI 6130 Multimedia Database, 2 Credits

Silabus :

Introduction to Relational Database; Multimedia Database; Introduction to Object-Oriented Database, Media representation and characterisation; Multidimensional Data Structure: K-d.tree, Point Quad Tree, MX-QuadTree, R-tree; Image Database; Document Database; Video database, Audio database; multimedia database; multimedia storage system; MM presentation; distributed media servers.

TIU :

Student understand the difference between conventional database and multimedia database, spatial data structure in general, and basic problem, common solution, data structure and indexing scheme for each media in multimedia database as well as integration of all media.

EI 6211 Object Oriented Modeling and Software Engineering, 2 Credits

Silabus :

Software Engineering Concept, Software Development Project Management, Conventional Method / Structured Analisis, Object Oriented Method, Software Testing, Unified Modelling Language in Object Oriented Analysis & Design.

TIU :

Student understand the basic principle of Object Oriented Modeling and can apply it in modeling real world problem using UML (Unified Modeling Language). Also understand how to develop application software using Object Oriented approach and produce models using UML in detail.

EI 6212 Internet/Web Programming and Application, 2 Credits

Silabus :

Basic concept of WWW, Hypertext Mark Up Language, Client Side Interactivity, Java Script Programming, PHP Server side programming, Web Based Dynamic Mobile Application with PHP, XML Overview. Mobile Internet.

TIU :

Students should be able to explain the concept of Internet and WWW
Students should be able to apply various mark up languages
Students should be able to program web server
Students should be able to apply client programming using some mark up languages
Students should be able to explain the concept of mobile Internet

EI 7021 Wireless and Mobile Network Technology, 2 Credits

Silabus :

Introduction, Fundamentals of Wireless Network Technology (WNT). Development of WNT, 1G System, 2G, 2,5 G, 3G and beyond, UMTS, CDMA2000, Design Principles.

TIU :

Students should be able to explain the underlying concepts and technical principles of various wireless technologies in the past, existing and currently in use, and in the future.
Students should be able to apply the grasped concepts to solve the problems at hand
Students should realize the accompanying risks, advantages and disadvantages of different wireless technologies.

EI 7050 Electronic Business, 2 Credits

Silabus :

E-Business, Electronic Commerce, Retailing in EC, Internet Consumers and Market Research, Advertisement in EC, EC Case Studies, Business to Business EC, Affiliate Programs, E-Customer Relationship Management, Constructing an e-Business, Electronic Payment Systems, Cryptography, Internet Security and Protocols, SET, EC Platform : Internet, Hardware, Software, Wireless Internet and m-Business, Public Policy. E-Government.

TIU :

Student understand the concept of E-Business and E-Commerce, also all aspect related to its application, from business and non-technological view, also technological view, such as: product distribution and marketing, legal aspect, internet and web technology, e-money, data data security, wireless technology and application, also e-business plan

EI 7051 Information Technology Strategies and Development, 2 Credits

Silabus :

Strategic Planning for Information Technology; Business Model and Information Technology, Strategic Thinking, IT Strategy Methodology. Managing IT for Competitive Advantage; Understanding IT Architectures, Understanding Data warehousing Strategically, Information Technology Substitution and Diffusion, Commitment in IT Strategy, IT Strategy as structure Assessment, Business Scope and Alignment , Internal Business/IT Economy. Strategy : Strategy Statement, Objective and Goal, Strategic Moves, Change Management Plan. Execution, Quality Control, Administration, IT Measurement

TIU :

The provide understanding that IT is a tool to deal with competitive nature of business and to sustain competitive advantage for the enterprises, not only a matter of cost reduction, faster decision making or improved productivity.

To be able to use IT strategic method and concept in real world problem, especially given the situation and condition of Indonesia.

EI 7052 Information Technology and Society, 2 Credits

Silabus :

- Overview of IT
- IT in Technology, Economic, Law, Social, and Human Resources
- Case Study

EI 60Z1 Thesis I, 2 Credits

Silabus :

Thesis Definition, Research Methodology, Research Writing, Presentation Technique, Thesis I Writing, Thesis I Seminar

TIU :

The students can perform scientific research, write the results in journal paper and present them ia a seminar

EI70Z2 Thesis II, 2 Credits

Silabus :

Consultation with Supervisor Thesis II, Seminar (Final Seminar of Thesis).

TIU :

The students can perform research independently with direction from their supervisor. Write the results in a Master thesis format and present them in a seminar.

KELOMPOK 17

Kelompok 17

IF6001, Independent Study I (2 Credits)

Short Description

Each student choose their own area of study in the field of informatics according to their interest and relevant with their choice of future professional career. Each student has their own supervisor appointed by the study program. This independent study consists of choosing the knowledge area, defining the problem scope, writing the learned materials, formulating and solving the case study, and finally presenting the results orally.

Related Courses

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Bibliography

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IF6002, Independent Study II (2 Credits)

Short Description

This course is the extension of Independent Study I course. The students are encouraged to do independent study in the same area but more indepth or broader. This independent study consists of choosing the knowledge area, defining the problem scope, writing the learned materials, formulating and solving the case study, and finally presenting the results orally.

Related Courses

1. IF6001 Independent Study I, Prerequisites.

Bibliography

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IF6111, Information Management A (2 Credits)

Short Description

The course gives basic concept of data and information management in computer system, data modeling of relational data model according to data semantics and access requirements. The course includes concept of relational data model, types of query (concept and application), normalization, and database system management supports (security, recovery, and concurrency).

Related Courses

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Bibliography

1. Atzeni, P. and V.D. Antonelles, 1993, *Relational Database Theory*, Edisi ke-- , The Benjamin/Cummings Publishing Company Inc.

IF6112, Information Management B (2 Credits)

Short Description

The course gives basic knowledge of data management and structure of archive, analysis and design methodology of database scheme, and analysis and design methodology of queries for relational model. The course includes archiving structure, data model analysis (Entity-Relationship Diagram), design of relational model database scheme, transformation (E-R Diagram to Relational scheme), query (SQL), and normalization.

Related Courses

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Bibliography

1. Tsichritzis, Dyonisios C., and Frederick., 1992, *Data Models*, Edisi ke-- , Prentice Hall
2. Date, C.J., 2000, *An Introduction to Database Systems*, Edisi ke-7, Addison Wesley
3. Korth, H.F., and A. Silberschatz, 1996, *Database System Concepts*, Edisi ke-- , McGraw Hill

IF6113, Data Management (2 Credits)

Short Description

The course gives general insight of data processing aspects, data usage for good advantage aspects, and trend of data technologies. The course includes understanding of system and data, storage media, data structures, archiving, data modeling, technologies of database management system, integrity, security, recovery, concurrency, and another database concepts and technologies.

Related Courses

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Bibliography

1. Date, C.J., 2000, *An Introduction to Database Systems*, Edisi ke-7, Addison Wesley

IF6151, Informatical Mathematics (3 Credits)

Short Description

Permutation, Combination, Permutation Invers, graph theory, Traveling Salesman Problem (TSP), Chinese Postman Problem (CPP), graph coloring, finite automaton (FA), Deterministik FA, Non-Deterministik FA, equivalence DFA and NFA, Regular Expression (RE), and properties of RE.

Related Courses

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Bibliography

1. Brualdi, R.A., 1977, *Introductory Combinatorics*, Edisi ke-- , North Holland
2. Hopcroft, J.E., and J.D. Ulmann, 2001, *Introduction to Automata Theory, Languages and Computation*, Edisi ke-- , Addison-Wesley
3. Liu, C.L., 1986, *Elements of Discrete Mathematics*, Edisi ke-- , McGraw-Hill

IF6181, Algorithm & Programming A (3 Credits)

Short Description

This graduate prepare graduate computer science students with knowledge and skill needed for their thesis. Students will learn and put into practice standards algorithm in Cormen's text book, that has been used at MIT and many other top universities. Topics in the reference will be covered with bread first approach, then students may choose some topics to be explored in depth. Course will be focused on algorithm analysis and complexity.

Related Courses

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Bibliography

1. Cormen, T.H. et al., 2003, *Introduction to Algorithm*, Edisi ke-2, MIT Press
2. Bentley, J., 2000, *Programming Pearls*, Edisi ke-- , Addison Wesley

IF6182, Algorithm & Programming B (3 Credits)

Short Description

This course prepare graduate students for acquiring experience in programming practices & standards for medium scale software product implementation. Students will be able to develop a medium scale software product at least in two different languages, one of them should include integrated development environment and library. Topics : Procedural programming (review of C language, modular program implementation using C, Abstract Data Type (array, matrix, list, tree), and case study. Object Oriented Programming using Java (OOP concept, class & object, object life cycle, inheritance & polymorphism, JAVA library and API.

Related Courses

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Bibliography

1. Brassard, G. and P. Bratley, 1995, *Fundamentals of Algorithmics*, Edisi ke-- , Prentice Hall

2. Skiena, S.S., 1997, *The Algorithm Design Manual*, Edisi ke-- , Springer-Verlag
3. Bateman, A. et al, 2002, *DSP Handbook, The: Algorithms, Applications and Design Techniques*, Edisi ke-- , Prentice Hall

IF6183, Algorithm & Programming C (2 Credits)

Short Description

This course prepare information system graduate program students to implement a prototype using RAD methodology. Topics covered: introduction to environment and tools, GUI object and programming, event handling, web based software prototype implementation. Students will be able to design and implement prototype related to business application (e-business, e-government, e-commerce, business application).

Related Courses

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Bibliography

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IF6191, Computer Systems A (2 Credits)

Short Description

This course deals with principles of the Computer System. It is intended for the students who already attended the Computer Architecture and Operating Systems classes. This course covers basic concepts and implementation of the architecture and computer organization, computer operating systems, distributed systems, parallel computer and principles of parallel programming.

Related Courses

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Bibliography

1. Malvino, A.P., and J.A. Brown, 1992, *Digital Computer Electronics*, Edisi ke--., McGraw-Hill
2. Silberschatz, A., P.B. Galvin and G. Gagne, 2003, *Operating System Concepts*, Edisi ke-6, John Wiley & Sons, Inc.
3. Wilkinson, B., and W. Allen, 2004, *Parallel Programming: Techniques and Application Using Networked Workstations and Parallel Computers*, Edisi ke-2, Prentice-Hall Inc

IF6192, Computer Systems B (2 Credits)

Short Description

This course deals with principles of the Computer System. It is intended for the students who already attended the Computer Architecture and Operating Systems classes. This course covers basic concepts and implementation of the architecture and computer organization, computer operating systems, distributed systems, parallel computer and principles of parallel programming.

Related Courses

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Bibliography

1. Malvino, A.P., and J.A. Brown, 1992, *Digital Computer Electronics*, Edisi ke--., McGraw-Hill
2. Silberschatz, A., P.B. Galvin and G. Gagne, 2003, *Operating System Concepts*, Edisi ke-6, John Wiley & Sons, Inc.

IF6193, Corporate Information Technology (2 Credits)

Short Description

This course discusses the uses of information technology at corporates environment. The course materials are: business pressure, technology pressure, organizational responses, information sytem's structure, information technology, networking for coprporate, e-Business, e-Commerce, e-Banking, Decision Support System roles, management for organization, data warehousing for organization, and social issues and ethics.

Related Courses

1. IF3171 Information Systems, Prerequisites.

Bibliography

1. Turban, E., McLean, E., and Wetherbe, J., 2004, *Information Technology for Management : Transforming Organizations in the Digital Economy*, Edisi ke--., John Wiley & Sons

IF60Z1, Thesis I (4 Credits)

Short Description

In its last stage of study, students must solve a problem and defend it formally. The activity is done in two semesters under two courses which is Thesis I and Thesis II. In this theses, students apply a research methodology in solving the problem. Thesis I is ended with a seminar to make sure the research scope is minimally in accordance with Informatics standard.

Related Courses

1. IF6001 Independent Study I, Prerequisites.
2. IF6002 Independent Study II, Co-requisites.

Bibliography

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IF70Z1, Thesis II (6 Credits)

Short Description

This course is the extension of Thesis I course in applying research methodology to solve a scientific problem. Theses II is ended with a theses defence to make sure the overall theses is totally finished and in accordance with Informatics standard.

Related Courses

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Bibliography

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IF7001, Special Topics I (2 Credits)

Short Description

This course discusses special topic which is quite new in Information Technology, ie Information Retrieval. In this course the students learn about various techniques and search engines which are used in the research world and also in popular websites.

Related Courses

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Bibliography

1. Brin, S., and L. Page., 1998, *The Anatomy of a Large-Scale Hypertextual Search Engine*, Edisi ke--., Proceedings of the Seventh International Conferenc
2. Meng, W., C. Yu, and K.L. Liu., 2002, *Building Efficient and Effective metasearch Engines*, Edisi ke--., ACM Computing Surveys
3. Konstan, J.A., 2004, *Introduction to Recommender Systems: Algorithms and*

Evaluation, Edisi ke-- , ACM Transactions on Information Systems

IF7002, Special Topics II (2 Credits)

Short Description

This course offers new topic in Information Technology which is not covered before in other courses. The topic can be different each semester and hopefully will enhanced students knowledge and support their research.

Related Courses

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Bibliography

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IF7021, Applied Computer Graphics (2 Credits)

Short Description

This course discusses the concept and application of computer graphics. Topics included are: the Application world of Computer Graphics, Graphics Database, Graphics Anatomy, Data Form in Graphics, Tools used in Computer Graphics, Graphical Application Packages, Graphical Information Systems, Geography Information Systems, Spatial Information Systems, Visual Information Systems, Computer Graphics for Animation and Game.

Related Courses

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Bibliography

1. Landa, R., 2000, *Graphic Design Solutions*, Edisi ke-- , Delmar Learning
2. Burrough, P.A., and McDonnell R.A., 1998, *Principles of Geographical Information Systems*, Edisi ke-- , Oxford University Press
3. R. Philippe, Michel O. Scholl, Agnes Voisard, 2001, *Spatial Databases: With Application to GIS*, Edisi ke-- , Morgan Kaufmann Publishers

IF7025, 3D Realism & Animation (2 Credits)

Short Description

Students will learn the concepts and application of 3D Realism in this course. Topics discussed are Basic Concept of 3D, Core Components in 3D, 3D Rendering Systems, 3D Transformation, Space Clipping, Shadowing Techniques, Removing Techniques of Hidden Lines, Model and Techniques of Static Animation, Model and Techniques of Dynamic Animation.

Related Courses

1. IF6151 Informatical Mathematics, Prerequisites.
2. IF6181 Algorithm & Programming A, Prerequisites.

Bibliography

1. Foley, vanDam, Feiner, Hughes, 1990, *Computer Graphics Principles and Practice*, Edisi ke-- , Addison Wesley
2. Alan, W., and M. Watt, 1992, *Advanced Animation and Rendering Techniques*, Edisi ke-- , Addison Wesley
3. Glassner, A.S., 1989, *An Introduction to Ray Tracing*, Edisi ke-- , Academic Press Limited

IF7026, Computer Graphic Systems (2 Credits)

Short Description

This course gives the students the concepts and techniques in developing computer graphical systems. Areas of discussion: Graphics Basic Elements, Abstract Model, Coordinates and Transformation Systems, Solid Model, Clipping, Segmentation, Curves, and Topology. Students will be expected to understand the representation and structure of graphical objects, transformation concept and 2D graphics rendering, to be able to identify model, topology and segmentation of graphical objects.

Related Courses

1. IF6151 Informatical Mathematics, Prerequisites.
2. IF6181 Algorithm & Programming A, Prerequisites.

Bibliography

1. Shirley P., *Fundamental of Computer Graphic*, Edisi ke-- , -
2. Hearn and Baker, *Computer Graphics*, Edisi ke-- , Prentice Hall
3. Foley, vanDam, Feiner, Hughes, 1990, *Computer Graphics Principles and Practice*, Edisi ke-- , Addison Wesley

IF7031, Intelligent Systems (2 Credits)

Short Description

This course covers the concept and applications of intelligent systems. Topics include the definition of intelligent system, inference techniques, knowledge base, production system, strategy of search, unification, daemon system, knowledge representation and the applications of intelligent systems such as robot programming, natural language processing, transaltion machine, and expert system.

Related Courses

1. IF6181 Algorithm & Programming A, Prerequisites.

Bibliography

1. Rich, E., *Artificial Intelligence*, Edisi ke--, McGraw-Hill
2. Sammut, Claude, *Knowledge Representation*, Edisi ke--, Paper
3. Russel, Stuart and Peter Norvig, 1995, *Artificial Intellegence: A Modern Approach*, Edisi ke--, Prentice-Hall

IF7032, Fund. of Artificial Intelligence (2 Credits)

Short Description

This course covers various logic systems beyond the classical logics. The topics include: review of boolean logics, propositional logics, predicate logics; non monotonic logics, modal logics, temporal logics and fuzzy logics.

Related Courses

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Bibliography

1. Dov M.G., C.J. Hogger and J.A. Robinson, 1993, *Handbook of Logic in Artificial Intelligence and Logic Programming, Vol I: Logical Foundation*, Edisi ke--, Clarendon Press
2. Dov M.G., C.J. Hogger and J.A. Robinson, 1993, *Handbook of Logic in Artificial Intelligence and Logic Programming, Vol III: Nonmonotonic Reasoning*, Edisi ke--, Clarendon Press
3. Kowalski, 1979, *Logic for Problem Solving*, Edisi ke--, Elsevier

IF7033, Applied Intelligent Systems (2 Credits)

Short Description

This course discusses the concept and application of intelligent system. The topics are roles of intelligent systems in e-business, Application of intelligent systems, Intelligent information systems, and knowledge engineering.

Related Courses

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Bibliography

1. Richardson, J.J., and Marjorie DeFries, 1990, *Intelligent Systems in Business: Improving Management Productivity*, Edisi ke--, Greenwood Publishing Group
2. Forsyth, Graham F., 1995, *Industrial and Engineering Applications of Artificial Intelligence and Expert Systems*, Edisi ke--, Gordon & Breach Publishing
3. Goonatilake Suran, Philip C. Treleaven, 1995, *Intelligent Systems for Finance and Business*, Edisi ke--, Wiley, John & Sons, Incorporated

IF7051, Computational Systems (2 Credits)

Short Description

This course is about problem classification based on how hard the problem is if that problem will be solved by computer and some problems that are hard to be solved by computer. The topics to be discussed including the undecidability, reduction and completeness, P-problem, NP-problem, NP-complete, randomized computation, approximability, logarithmic space, polynomial hierarchy, and polynomial space.

Related Courses

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Bibliography

1. Papadimitriou, C., 1994, *Computational Complexity*, Edisi ke--, Addison-Wesley Publishing
2. Garey, M.R., and D.S. Johnson, 1979, *Computer and Intractability: A guide to the theory of NP-Completeness*, Edisi ke--, W.H. Freeman & Co

IF7052, Formal Language Computation (2 Credits)

Short Description

This course is about some formal frameworks to describe the semantic aspects of a programming language. The topics to be discussed including the IMP language, operational semantic, denotational semantic, axiomatic semantic, lambda calculus, hoare-rule, relative completeness of hoare logic, recursive-type semantic, and functional language semantic.

Related Courses

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Bibliography

1. Gunter, C.A., 1992, *Semantics of Programming Language*, Edisi ke-- , MIT Press
2. Winskel, G., 1993, *The Formal Semantics of Programming Languages*, Edisi ke-- , MIT Press

IF80Z1 Proposal Writing (6 cr)

Students learn how to write a structured proposal for their upcoming research work under guidance of their supervisors. The proposal must be written in a standard format and approved by their supervisors before taking the Qualifying Exam.

IF80Z2 Qualifying Exam (2 cr)

The student has to present their Research Proposal in front of a committee who will ask questions and decide whether the proposal is accepted or not and what kind of revisions to be made. The proposal must be written in the standard format provided by the committee.

IF 80Z3 Method Development 1 (3 cr)

After successfully pass the Qualifying Exam, the students start to explore about the theoretical aspects need for the research as well as existing similar research worldwide, under guidance of their supervisors. At the end of the semester they have to present their work in a seminar attended by advisors and students, open to public.

IF 80Z4 Method Development 2 (3 cr)

As the continuation of the previous course IF 80Z4, the students explore more about the theoretical aspects need for the research as well as existing similar research worldwide, under guidance of their supervisors. At the end of the semester they have to present their work in a seminar attended by advisors and students, open to public.

IF 80Z5 Method Development 3 (3 cr)

As the continuation of the course IF 80Z5, the students explore more about the theoretical aspects need for the research as well as existing similar research worldwide, under guidance of their supervisors and start to do some experiments for the research. At the

end of the semester they have to present their work in a seminar attended by advisors and students, open to public.

IF 80Z6 Experiment & Analysis 1 (6 cr)

The students try their preliminary experiment, analyze and try to find some new evidences which will be useful for their research with collaborations with their peer-group and coordinated by the their supervisors.

IF 80Z7 Experiment & Analysis 2 (6 cr)

The students continue their experiment, analyze and try to find some important new evidences which will be useful for their research with collaborations with their peer-group and coordinated by the their supervisors.

IF80Z8 Paper Writing for National Proceeding (1 cr)

The students must write a decent paper to be submitted in a National Proceeding based on new findings in their research work under their supervisors guidance. It is necessary to present their temporary research result to spread the new findings for the national research community.

IF80Z9 Paper Writing for International Proceeding (2 cr)

The students must write a paper to be submitted in an International Proceeding based on new findings in their research work under their supervisors guidance. It is necessary to present their temporary research result to spread the new findings for the international research community.

IF 8004 Independent Study 1 (3 cr)

The students choose a topic of their interest and study the topic in depth. At the end of the semester they must present their work in an open seminar and will be evaluated and graded by their supervisors.

IF 8005 Independent Study 2 (3 cr)

The students choose a topic of their interest and study the topic in depth. At the end of the semester they must present their work in an open seminar and will be evaluated and graded by their supervisors.

IF 90Z1 Experiment & Analysis 3 (6cr)

The students continue their experiment, make some analysis and try to find some important new evidences which will be useful for their research with collaborations with their peer-group and coordinated by the their supervisors.

IF 90Z2 Experiment & Analysis 4 (6cr)

The students continue their experiment, make some analysis and try to find some important new evidences which will be useful for their research with collaborations with their peer-group and coordinated by the their supervisors.

IF 90Z3 Paper Writing for National Journal (3 cr)

The students must write a decent paper to be submitted in a National Journal based on new findings in their research work under their supervisors guidance. It is necessary to present their temporary research result to spread the new findings for the national research community.

IF 90Z4 Paper Writing for International Journal (6 cr)

The students must write a paper to be submitted in an International Proceeding based on new findings in their research work under their supervisors guidance. It is necessary to present their temporary research result to spread the new findings for the international research community.

IF 90Z5 Dissertation Writing 1 (6 cr)

The students start to write their dissertation with guidance from their supervisors in a standard format provided by the Institute.

IF 90Z6 Dissertation Writing 2 (6 cr)

The students finalize to write their dissertation with guidance from their supervisors in a standard format provided by the Institute.

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SE6161, Software Analysis & Design (4 Credits)

Short Description

Deal with Software Development Life Cycle (SDLC), Software Development Methodology and focuses mainly in analysis and design process. The course include capturing the requirements, designing the software, implementation and testing the software.

It is intended to serve mainly on the analysis and design process of software engineering development methods and approaches.

Related Courses

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Bibliography

1. Peter, C. and E. Yourdon, 1991, *Object Oriented Analysis*, Edisi ke-- , Prentice Hall
2. Pressman, S., 2001, *Software Engineering: A Practitionerâ€™s Approaches*, Edisi ke-5th, McGraw Hill

SE6261, Software Development (4 Credits)

Short Description

This course is designed to provide the basic and practical principal of functional and non-functional requirement, Methods and Software Design Techniques : Structured, Object Oriented and Component Software. Also give students hands-on experience with available networking hardware and design tools.

Related Courses

1. IF6112 Information Management B, Prerequisited.
2. SE6161 Software Analysis & Design, Prerequisited.

Bibliography

1. Mike Goodland, et al., 1995, *A Practical Approach*, Edisi ke-- , SSADM
2. Booch Grady , James Rumbaugh, Ivar Jacobson, 1999, *The Unified Modelling Language User Guide*, Edisi ke-- , Massachusetts: Addison-Wesley Longman Inc.
3. Booch Grady , James Rumbaugh, Ivar Jacobson, 1999, *The Unified Software Development Process*, Edisi ke-- , Upple Sadle River, NJ: Addison-Wesley

SE6262, Software Project Management (3 Credits)

Short Description

This course gives knowledge of software project management activities. The course includes initiating, planning, executing, controlling, and closing of the project, also fitted out with case study of simple software development project. The aims are the students understand software project activities, capable to adapt and anticipate each of software project phases, and capable to apply it in software development projects.

Related Courses

1. SE6161 Software Analysis & Design, Prerequisites.

Bibliography

1. McConnell, S., 1998, *Software Project*, Edisi ke--, Microsoft Press
2. McLeod, G., 1996, *Managing Information Technology Project*, Edisi ke--, Course Technology-ITP
3. Fairclough, Jon, 1996, *Software Engineering Guides*, Edisi ke--, Prentice Hall

SE60Z1, Thesis I (2 Credits)

Short Description

In its last stage of study, students must solve a problem and defend it formally. The activity is done in two semesters under two courses which is Theses I and Theses II. In this theses, students apply a software engineering methodology in solving the problem. Theses I is ended with a seminar to make sure the research scope is minimally in accordance with Software Engineering option standard.

Related Courses

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Bibliography

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SE70Z1, Thesis II (6 Credits)

Short Description

This course is the extension of Theses I course in applying software engineering methodology to solve a real problem. Theses II is ended with a theses defence to make sure the overall theses is totally finished and in accordance with Software Engineering option standard.

Related Courses

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Bibliography

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SE7161, Software Quality Management (2 Credits)

Short Description

In this course the students learn about how to manage the development of software to assure their quality. The topics include quality software, quality measurements, quality components, tools to be used for measurement of quality and the strategy of software testing.

Related Courses

1. SE6261 Software Development, Prerequisited.

Bibliography

1. Galin, 2004, *Software Quality Assurance: From theory to Implementation*, Edisi ke--, Addison Wesley
2. Ginac, 1998, *Software Quality Assurance*, Edisi ke--, New Jersey
3. Perry, 1991, *Quality Assurance for Information Systems*, Edisi ke--, QED Information Sciences, Inc.

SE7061, Software Testing (2 Credits)

Short Description

The students learn about the strategy and importance of software testing in Life Cycle and also methods for testing such as black box and white box testing, Object Oriented testing as well as how to use the tools for testing.

Related Courses

1. SE6161 Software Analysis & Design, Prerequisites.

Bibliography

1. Caner, Falk, Nguyen, 1999, *Testing Computer Software*, Edisi ke--, John Wiley & Sons
2. Perry, William, 1995, *Effective Method for Software Testing*, Edisi ke--, John Wiley & Sons
3. Pressman, S, 1997, *Software Engineering :A Practitioner's Approach*, Edisi ke-4th, McGraw Hill

SE7062, Software Maintenance (2 Credits)

Short Description

The objective of this course is introducing and studying the software maintenance concept, strategies and its related methods / techniques. The course materials consists of the objectives and fundamental concepts of software maintenance, s/w maintenance process model, s/w maintenance techniques, s/w maintenance activities, and specific software maintenance guidance. After pursuing this course, the students might understand software maintenance technique and have a basic software maintenance capability.

Related Courses

1. SE6161 Software Analysis & Design, Prerequisites.
2. SE6261 Software Development, Prerequisites.

Bibliography

1. Thomas M. Pigoski, 1997, *Practical Software Maintenance*, Edisi ke--, Wiley Computer Pub., John Wiley and Sons, Inc.
2. Arnold, Robert S., 1993, *Software Reengineering*, Edisi ke--, Addison Wesley
3. Miller, H.W., 1998, *Reengineering Legacy Systems*, Edisi ke--, McGraw Hill

SE7063, Formal Methods (2 Credits)

Short Description

This course provides an introduction to formal methods and the role of formal methods in the software engineering lifecycle. The objective of this course is to create an awareness of the mechanisms and principles involved in the use of formal methods for the specification and design of high-integrity software. Course content: Introduction to formal methods, RAISE method, basic concept of RSL (*Raise Specification Language*) and how to write software specification in RSL. Additionally, the student will learn one of RSL tools, i.e. RSL type checker, in the Laboratory.

Related Courses

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Bibliography

1. RAISE Language Group, 1995, *The RAISE Specification Language*, Edisi ke-- , Prentice-Hall
2. RAISE Method Group, 1995, *The RAISE Development Method*, Edisi ke-- , Prentice-Hall

SE7064, Component-Based Systems (2 Credits)

Short Description

This course is aimed to explore the fundamental concepts and technologies of the Component based Software Engineering. The course materials consist of component terminology, software component development technique, component composition and integration, and Component-based software engineering process. The current component technologies, as COM, DCOM, EJB, .NET are subject of students practical study.

Related Courses

1. SE6161 Software Analysis & Design, Prerequisites.

Bibliography

1. Szypersky, Clemens., 1998, *Component Software: Beyond OO Programming*, Edisi ke-- , Addison-Wesley

SE7065, Real-Time Systems (2 Credits)

Short Description

This course discusses the basic concept and technology related to real-time system development. Topics included are: definition and types of real-time application, hardware architectures, real-time operating systems, task synchronization and communication, memory management, scheduling in a real-time application, real-time application development methods, specification and design techniques, reliability testing, and fault tolerance, optimization, real-time system performance analysis. After taking the course the students are expected to have understanding in real-time system development and to have basic capability in developing a simple real-time system.

Related Courses

1. IF6192 Computer Systems B, Prerequisites.
2. SE6161 Software Analysis & Design, Prerequisites.

Bibliography

1. Awad, M., J. Kuusela, and J. Ziegler, 1996, *Object-Oriented Technology for Real-Time Systems: A Practical Approach using OMT and Fusion*, Edisi ke--, Prentice Hall
2. Burns, A. and A. Wellings., 1996, *Real-time Systems: Specification, Verification and Analysis, chapter Advanced Fixed Priority Scheduling*, Edisi ke--, Prentice Hall
3. Burns, A. and A.J. Wellings., 1994, *HRT-HOOD: A Design Method for Hard Real-Time*, Edisi ke--, Real-Time Systems

SE7066, Distributed Systems Engineering (2 Credits)

Short Description

This course discusses the basic concept and technology related to distributed system development. Topics included are: characteristic of distributed system, software development approach in distributed system, autonomous decentralized systems (ADS), architecture-independent software development, and fault tolerance. After taking the course the students are expected to have understanding in distributed application development.

Related Courses

1. IF6192 Computer Systems B, Prerequisites.
2. SE6161 Software Analysis & Design, Prerequisites.

Bibliography

1. Wu, Jie., 1998, *Distributed System Design*, Edisi ke--, CRC Press
2. Mullender, Sape., 1993, *Distributed System*, Edisi ke--, Addison Wesley

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IS6171, Business Process (2 Units)

This course discusses about how to analyze the business process within organization or enterprises. Subjects taught to this course are value chain, added value, and business process. Objectives of the course are give knowledge to the students about the enterprise's value chain and describe the process using the diagram.

Related Course:

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References

1. Scheer, A.W., 1998, *Business Process Engineering*, Edisi ke--, Springer-Verlag

IS6271, Information Engineering (3 Units)

This course describes about plan and development of integrated information system for enterprise wide. Content of this course consists of : strategic perspective of the roles of information system and technology, concept of information engineering, Business System Planning concept and metode, concept and approach to develop enterprise architecture, work system framework, and the development of information resource system.

Related Courses

1. IF6113 Data Management, Prerequisites.
2. IS6273 Information System Management, Co-requisites.

References

1. W. John, P. Griffiths, and P. Whitmore, 2002, *Srategic Planning for Information System*, Edisi ke-4, John Wiley & Sons
2. Martin, James, 1990, *Information Engineering*, Edisi ke--, Prentice-Hall International
3. Alter, Steven, 2002, *Information Systems, The Foundation of E-Business*, Edisi ke--, Prentice-Hall

IS6272, e-Business (2 Units)

The course discusses about the concept, model, and application of e-business in enterprise. Subjects taught to this course are the concept and modelling computer based application system by using the advantage of internet, the infrastructures of e-business, and the wide possibilities of the system's implementation.

Related Courses:

1. IF6113 Data Management, Prerequisites.
2. IS6273 Information System Management, Co-requisites.

References

1. Davis, W.S., 2003, *E-commerce Basics: Technology, Foundation and E-business applications*, Addison Wesley
2. Laudon, Kenneth C., 2002, *E-Commerce: Business, Technology and Society*, Addison Wesley

IS6273, Information System Management (2 Units)

This subject gives an understanding and knowledge of how to manage computer based information system and what should be taken into consideration to ensure that it would run as planned. The subject includes preparation, planning, implementation, organizational operation and maintenance, and effect and ethics on management of information system.

Related Courses

1. IS6171 Business Process, Prerequisites.
2. SE6162 Software Engineering, Prerequisites.

References

1. Martin, E.W., 2002, *Managing Information Technology*, Prentice Hall
2. Laudon, K.C., 2002, *MIS, Managing the Digital Firm*, Prentice Hall
3. Steven, Alter, 2002, *Information System*, Prentice Hall

IS7171, Information System Project Management (2 Units)

This subject gives an understanding and knowledge about project management of information system. The subject includes role of management, system component, definition of information system project, project planning, measurement and quality assurance of the project, the risk and control of a project, change management and configuration management, team personnel project, and closing project.

Related Courses:

1. IS6273 Information System Management, Prerequisites.
2. SE6162 Software Engineering, Prerequisites.

References

1. Joseph Phillips, *IT Project Management, On track from start to finish*, Mc Graw Hill/Osborne, 2002.
2. McLeod, G., *Managing Information Technology Project*, Course Tech-ITP, 1996.
3. Richard Murch, *Project Management : Best Practices for IT Professional*, Prentice

Hall, 2001.

IS7172, **Information System Control & Audit** (2 Units)

The course discusses about concept in managing information technology within enterprise. Subjects taught are information technology governance, information system audit, information system maturity concept. Objectives of the course are give knowledges to the student about the management of information technology with the focus in control and audit information system.

Related Courses:

1. IS6271 Information Engineering, Prerequisites.
2. IS6273 Information Management System, Prerequisites.

References

1. Weber, Ron, 1999, *Information Systems Control and Audit*, Edisi ke--, Prentice-Hall
2. Gallegos, et al., 1987, *Audit and Control of Information Systems*, Edisi ke--, South-Western Publishing Co.

IS70Z1, Thesis (6 Units)

Thesis topic search, proposol writing, presentation technique, and problem analysis.

Related Course:

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References

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IS7071, **Information Technology Strategy & Policy** (2 Units)

This course discusses the strategies to implement information technologies in corporations. Subjects taught are business vision, business's strategy evaluation, strategic planning in information technologym and managing information technology in enterprise. Objectives of the course are give knowledge to the students about strategies to implement information technology by inviting guest speakers to speak in classroom.

Related Course:

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References

1. Boar, Bernard, 2001, *The Art of Strategic Planning for Information Technology*, Edisi ke--, John Wiley & Sons
2. Boar, Bernard, 1994, *Information Technology with Business Strategies*, Edisi ke--, John Wiley & Sons

3. Callon, J.D., 1996, *Competitive Advantage through Information Technology*, Edisi ke--
, McGraw-Hill

IS7072, Strategic Information Planning (2 SKS)

The course discusses about information system's strategic planning within organization. Subjects taught are strategic perspective of information system. Business strategy and the implication in information technology, Developing information system's strategy. Objectives of the course are give knowledge to the students in developing information system's strategic planning.

Related Course:

1. IS6273 Manajemen Sistem Informasi, Prerequisites.

References

1. W. John, P. Griffiths, and P. Whitmore, 1992, *Strategic Planning for Information Systems*, Edisi ke-- , Addison-Wesley
2. Cassidy, A., 1998, *A Practical Guide to Information Systems Strategic Planning*, St. Lucie Press
3. Turban Efraim, Ephraim McLean, James Wethere, 1999, *Information Technology for Management: Making Connections for Strategic Advantage*, Edisi ke-2, John Wiley & Sons

IS7073, Information System Prototype Development (2 SKS)

This course describe about the development of information system for an organization. Course contents are: background and essence of prototype, usability engineering, reuse technique, and methodology for prototyping development. The purpose of the course are to guide the students: to understand the concept and method of development of information system for an organization, and to be able to analyse knowledges related to the importance of prototyping development in certain condition of organization.

Related Courses:

1. IS6271 Information Engineering, Prerequisites.
2. IS6272 e-Business, Prerequisites.

References

1. Bischofberger, W. and G. Pomberger, 1992, *Prototyping-Oriented Software Development, Concept and Tools*, Edisi ke-- , Springer-Verlag
2. McClure, C., 1997, *Software Reuse Techniques*, Edisi ke-- , Prentice Hall
3. Kenneth E. Lantz, 1997, *The Prototyping Methodology*, Edisi ke-- , -

IS7074, Information Technology Entrepreneurship (2 Units)

This course discusses entrepreneurship in information technology from the human side. The course topics include entrepreneurship, entrepreneur, the relationship between entrepreneurship and economy, innovation in entrepreneurship, information technology entrepreneurship, cost and profit estimation, and business plan.

Related Course:

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References

1. Drucker, Peter F., 1985, *Innovation and Entrepreneurship, Practice and Principles*, Edisi ke-- , Heinemann
2. Radin, David, 1994, *Building a Successful Software Business*, Edisi ke-- , O'Reilly &

IS7075, Risk Management (2 Units)

This course discusses the concept of risk from the technology and business perspectives. The course topics include Risk identification, Elements of software risk, software risk factors, software risk metrics, risk analysis, just-in-time method by development phase, applying the model design and mathematical model.

Related Course:

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References

1. Dale Walter Karolak, 1996, *Software Engineering Risk Management*, Edisi ke-- , IEEE
2. David Vose, 2002, *Risk Analysis*, Edisi ke-- , John Wiley and Sons

IS7076, Interaction System Design (2 Units)

This course describes about the know how of the right way to develop interaction system. The contents of the course are: background of the problem of interaction system, Usability Engineering concept, User Centered Design method, analysis of solution prospect, interaction modelling, and case study in development of interaction system.

Related Course:

1. IS6271 Information Engineering, Prerequisites.

References

1. Norman, L., 1989, *Human Information Processing, an Introduction to Psychology*, Edisi ke-2, Academic Press
2. Schneiderman, B., 1998, *Designing the User Interface, Strategies for Effective Human*

Computer Interaction, Edisi ke-3, Adison Wesley

3. Dix, A., Janet Finlay, Gregory Abowd, Russel, B., 1993, *Human Computer Interaction*, Edisi ke--, Prentice Hall