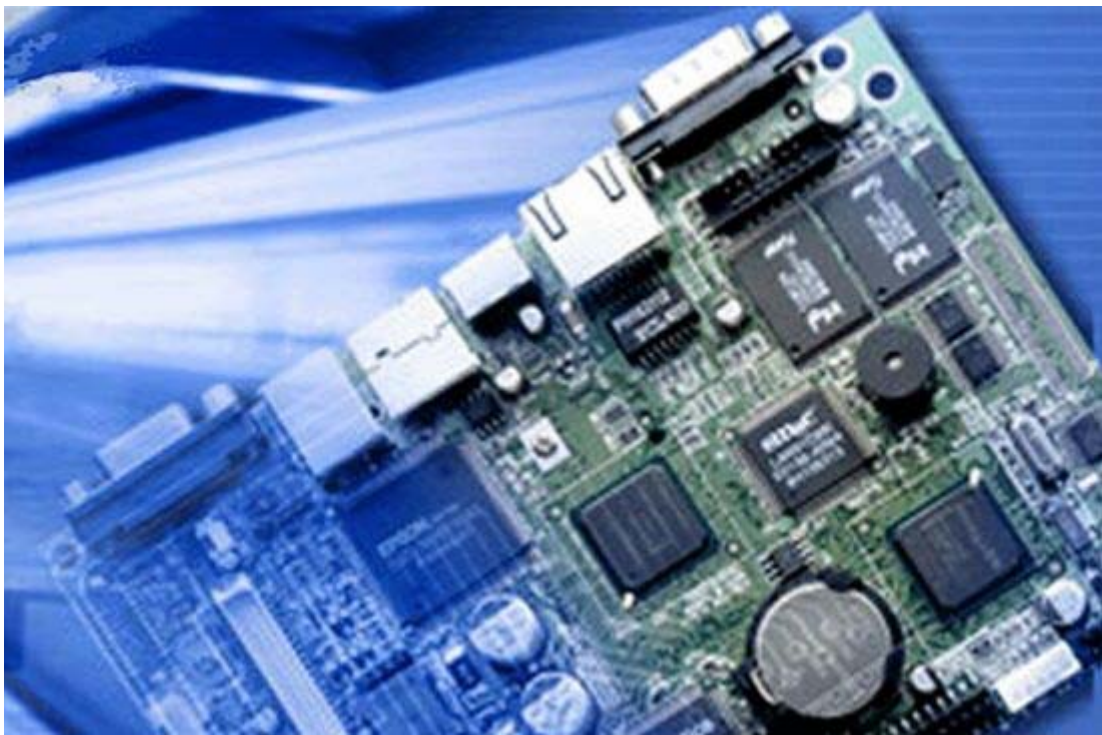


Buku Panduan

**Program Studi Teknik Komputer
Departemen Elektro
Fakultas Teknik Universitas Indonesia**

(DRAFT)



**Departemen Teknik Elektro
Fakultas Teknik Universitas Indonesia
Kampus Depok, Depok 16424**

Agustus 2006

1. Visi, Misi, Sasaran dan Tujuan Program Studi

1.1. Visi

Visi Universitas Indonesia:

Universitas Indonesia memiliki visi untuk “Menjadi Universitas Riset yang mandiri, modern, dan berkualitas internasional”.

Visi Fakultas Teknik UI :

Penjabaran visi UI di Fakultas Teknik adalah “Menjadi lembaga pendidikan tinggi teknik yang berkelas dunia”. Untuk dapat menjadi lembaga pendidikan tinggi yang berkelas dunia, maka kegiatan riset menjadi kegiatan utama disamping kegiatan pendidikan.

Visi Departemen Teknik Elektro:

Departemen Teknik Elektro memiliki visi “Menjadi lembaga pendidikan dan riset yang berstandar tinggi di bidang Teknik Elektro”.

Visi Program Studi Teknik Komputer:

Sesuai dengan Visi dari Universitas, Fakultas dan Departemen Teknik Elektro, maka visi Program Studi Teknik Komputer adalah “**Menjadi lembaga pendidikan dan penelitian bidang Teknik Komputer yang berkualitas dunia**”.

Indikasi awal dari pencapaian visi tersebut sudah mulai tampak. Peminatan Teknik Komputer (sebelum resmi menjadi program studi), telah berhasil mengembangkan program “dual degree” (*Bachelor in Computer Engineering*) dengan nama program (3+1) bekerjasama dengan Universitas Duisburg Essen (UDE). Peserta didik di peminatan Teknik Komputer FTUI, telah diakui kreditnya setara dengan peserta didik di program *Computer Engineering* di UDE. Program serupa juga akan segera dikembangkan bekerjasama dengan Universitas Kebangsaan Malaysia.

Untuk memformalisasi penyertaraan kredit ini, UNI Duisburg Essen, UI dan UKM telah memperoleh hibah **Asia Link dari Uni Eropa** selama 3 tahun mulai tahun 2005, dengan judul kegiatan “*Credit Transfer System*”.

Disamping itu, 3 orang staf inti Program Studi Teknik Komputer juga telah berhasil memperoleh hibah dana penelitian RUTI (Riset Unggulan Terpadu Internasional) untuk jangka waktu 3 tahun dibawah Program RUTI-3 dari Kementerian Riset dan Teknologi, bekerjasama dengan UNI Duisburg Essen untuk bidang *Pervasive Computing*, mulai tahun anggaran 2004.

Untuk tahun 2005-2007 Departemen Elektro FTUI juga mendapatkan Hibah Kompetisi Program B, yang sangat kompetitif, karena hanya 5 Departemen diseluruh Indonesia yang mendapatkannya, dan topik utama dari program B Departemen Elektro FTUI adalah Teknologi Informasi dan Komunikasi (*Information and Communication Technology – ICT*).

1.2 Misi

Dalam rangka mendukung misi Universitas Indonesia, Program Studi Teknik Komputer menjabarkan misinya sebagai berikut:

1. Menghasilkan sarjana Teknik Komputer (TK) yang berkualitas internasional yang dapat berkompetisi di pasar internasional.
2. Menghasilkan sarjana TK yang mampu menanggapi perkembangan teknologi yang didukung oleh kemampuan pendekatan multidisiplin.
3. Menghasilkan lulusan unggulan dalam bidang TK yang mampu bersaing secara internasional, khususnya mampu dalam melakukan integrasi berbagai aspek teknologi elektro dan komputer serta pengetahuan manajemen.
4. Mengembangkan pusat riset, bekerjasama dengan universitas yang memiliki reputasi tinggi baik didalam maupun luar negeri serta dunia industri dan bisnis pelayanan dan pengembangan bidang TK.

1.3. Tujuan Umum

Menghasilkan sarjana teknik komputer yang siap untuk menghadapi tantangan dan masalah teknologi komputer di masyarakat, dan mampu mengaplikasikan ketrampilan dan ilmu pengetahuannya untuk membantu memberikan layanan dan produk yang diharapkan masyarakat. Lulusan diharapkan mampu untuk siap latih mengikuti standar sistem komputer, sistem operasi, dan standar-standar lainnya di Industri yang spesifik.

Dalam **bahasa yang lebih teknis**, dengan melihat kebutuhan dan prospek lapangan kerja dalam bidang Teknik Komputer, maka Program Studi Teknik Komputer mengarahkan lulusannya untuk memiliki kompetensi sebagai berikut:

1. Memiliki kemampuan analisis dari aspek *hardware* dan *software* dari sistim komputer modern.
2. Memiliki pengetahuan dasar Teknik Elektro yang kuat, termasuk diantaranya pengetahuan tentang rangkaian elektronika analog dan digital.
3. Memiliki pengetahuan dasar yang kuat dalam bidang ilmu teknik telekomunikasi, Teknik mikroprosesor, jaringan komputer dan rekayasa perangkat lunak.
4. Memiliki pengetahuan dan ketrampilan untuk merancang: *embedded processor systems*, *concurrent systems*, jaringan komputer (termasuk merancang sistim keamanan dan sistim pengelolaannya), sistim-sistim berbasis *logika fuzzy* dan jaringan syaraf tiruan.

2. Sumber Daya

2.1. Staf Pengajar

Staf pengajar inti Program Studi Teknik Komputer terdiri dari 15 orang, 12 diantaranya adalah staf pengajar tetap, sedangkan tiga lainnya adalah calon staf pengajar Departemen Teknik Elektro.

Tiga orang diantara staf pengajar tersebut sedang tugas belajar di dalam dan luar negeri untuk menyelesaikan studi baik pada strata-2 maupun strata-3.

Kualifikasi staf pengajar inti program studi Teknik Komputer adalah sebagai berikut:

- Staf pengajar dengan gelar Profesor, sebanyak orang 3 orang.
- Staf pengajar dengan gelar S3, sebanyak orang 6 orang (diluar Profesor)
- Staf pengajar dengan gelar S2 disertai pengalaman mengajar lebih dari 5 tahun, sebanyak 3 orang.
- Staf pengajar dengan gelar S1 sebanyak 3 orang, yang bertindak sebagai pengajar pendamping/asisten.

Daftar **staf pengajar inti** Program Studi Teknik Komputer adalah sebagai berikut :

1. Prof Dr Sardy M.Eng
2. Prof Dr Ir. Bagio Budiardjo M.Sc
3. Prof Dr Ir Harry Sudiby
4. Dr Ir Djamhari Sirat M.Sc
5. Dr –Ing Ir Kalamullah Ramli M.Eng
6. Ir Riri Fitri Sari MM, M.Sc PhD
7. Ir Dodi Suidiana M.Eng, PhD
8. Dr. Ir NR Poespawati M.T
9. Dr Ir Anak Agung Putri Ratna M.Eng
10. Ir Endang Sriningsih, MT
11. Ir Muhammad Salman M.I.T
12. Ir F Astha Ekadiyanto, M.Sc
13. Luhur Bayuaji ST (tugas belajar di Chiba University, S3)
14. Adri Gautama ST (tugas belajar di UI, S2)
15. Natalia Evianti ST (tugas belajar di UI, S2)
16. Adhe Widi Astato ST (S1)

Staf Pengajar Pendukung

Disamping Staf Pengajar yang tersebut pada paragraf sebelumnya, Program Studi Teknik Komputer juga didukung oleh Staf Pengajar Departemen Teknik Elektro lainnya, berasal dari berbagai disiplin ilmu seperti : Telekomunikasi, Elektronika, Kontrol dan Ekonomi Teknik.

Kualifikasi Staf Pengajar pendukung terdiri dari Guru Besar, Doktor dan Master yang telah berpengalaman mengajar di Departemen Teknik Elektro.

2.2. Laboratorium

Program Studi Teknik-Komputer telah mengembangkan beberapa laboratorium yang diperlukan untuk mendukung praktikum mahasiswa. Beberapa diantara laboratorium tersebut merupakan laboratorium pelatihan CCNA (*CISCO Certified Networking Academy*), sebuah bentuk pelatihan internasional yang di dukung oleh perusahaan global CISCO¹. Pelatihan CISCO umumnya dilaksanakan pada sore atau malam hari, sehingga

¹ CISCO adalah produsen peralatan jaringan komputer kelas dunia yang menguasai lebih dari 60% pangsa pasar Asia Pasifik.

di pagi atau siang hari laboratorium tersebut dapat digunakan untuk praktikum mahasiswa reguler Program Studi Teknik Komputer.

Departemen Teknik Elektro juga telah memperoleh bantuan berupa **Laboratorium Multimedia**², sebagai hasil kerjasama pendidikan dan penelitian dengan Universitas Duisburg-Essen di Jerman. Laboratorium ini dapat digunakan untuk praktikum berbagai jenis mata-kuliah, dan dapat juga digunakan untuk sarana akses Internet baik bagi mahasiswa S1 reguler maupun mahasiswa lainnya yang diberi izin khusus. Keterangan ringkas mengenai laboratorium tersebut yang diberikan berikut ini.

a. Laboratorium Jaringan Komputer³

Peralatan yang ada dilaboratorium ini adalah:

22 Komputer Pribadi mutakhir terhubung jaringan lokal. 6 CISCO-2500 routers, 1 CISCO-1700 router, 2 CISCO Catalyst-1900, Protocol Inspector, ADTRANS dan ISDN.



Gambar 4.1. Laboratorium Jaringan Komputer

b. Laboratorium Sistem Komputasi & Rekayasa Perangkat Lunak⁴

12 Komputer Pribadi mutakhir (Pentium IV dengan 256 MBytes memory), fasilitas komunikasi nirkabel, Sistem Operasi *SUN Solaris-2 & Linux*, modul pembelajaran *Linux and JAVA*, peralatan perkabelan jaringan, perangkat lunak simulasi *NS-2*.

² *Gerhard Mercator Multimedia Lab*

³ Berbagi pakai dengan CCNA

⁴ Berbagi pakai dengan CCNA



Gambar 2. Laboratorium Sistem Komputasi & Rekayasa Perangkat Lunak

c. Laboratorium Dijital

13 Komputer Pribadi mutakhir untuk akses Internet, 2 Sun Ultra-5 dan 2 Sun Ultra-60 *stations* untuk perancangan rangkaian dan sistem digital, *modul pelatihan IP-versi-6*, peralatan dasar untuk praktikum digital: *advanced logic analyzer, logic tutor, counters, PAL/GAL trainers.*



Gambar 3. Laboratorium Dijital

d. Laboratorium Multimedia (*UI-Gerhard Mercator Multimedia Lab*)

12 Komputer Pribadi dengan *Network-Camera*, jaringan local, berbagai sistem operasi, perangkat lunak untuk penelitian (*Passenger & FANS*)



Gambar 4. Laboratorium Multimedia

e. Laboratorium *Microprocessors & Embedded System*.

Peralatan dasar praktikum mikroprosesor dengan *Turbo Assembler 8051 IDE*.
Peralatan dasar praktikum antarmuka Teknik Elektroprosesor. *Chip Master 6000 intelligent universal programmer, oscilloscopes, function generators, logic analyzer*.



Gambar 4.5. Laboratorium *Microprocessors & Embedded Systems*

Disamping itu, dimanfaatkan pula laboratorium-laboratorium lain dilingkungan Departemen Teknik Elektro untuk mendukung program pendidikan Teknik-komputer.

2.3. Kurikulum Program Studi Teknik Komputer (Kode Mata Kuliahnya sedang disusun)

Semester 1

No	Mata Kuliah	SKS
1	MPK Terpadu	6
2	Bahasa Inggris	3
3	Olahraga & Seni	1
4	Kalkulus	4
5	Dasar Tekonologi Komp.	3
6	Praktikum D.Tek. Komp.	1
	Total	18

Semester 2

No	Mata Kuliah	SKS
1	Agama	2
2	Aljabar Linier	4
3	Fisika LMOG	4
4	Praktikum Fisika LMOG ⁵	1
5	Matematika Diskrit	2
6	Teknik Komputer	4
7	Praktikum Tek. Komputer	1
	Total	18

Semester 3

No	Mata Kuliah	SKS
1	Perancangan Sistim Dijital	3
2	Matematika Lanjut	3
3	Tek. Semikon. & Fabrikasi	3
4	Praktikum Tek Sem & Fab.	1
5	Rangkaian Listrik - 1	4
6	Object Oriented Programm.	3
7	Praktikum OOP	1
	Total	18

Semester 4

No	Mata Kuliah	SKS
1	Perancangan VLSI	3
2	Rangkaian Listrik - 2	4
3	Mikroprosesor	4
4	Praktikum Mikroprosesor	1
5	Dasar Jaringan Komputer	2
6	Praktikum D.Jar. Komp.	1
7	Probability & Proses Acak	3
	Total	18

Semester 5

No	Mata Kuliah	SKS
1	Concurrent System (S.O ⁶)	4
2	High Speed Networks	3
3	Sistim Linier	2
4	Rekayasa Perangkat Lunak	3
5	Teknik Telekomunikasi	4
6	Teknologi Serat Optik	2
	Total	18

Semester 6

No	Mata Kuliah	SKS
1	Embedded Systems	4
2	Teknik Kendali	4
3	Kerja Praktek	2
4	Isyu Profesional di Tek Inf.	3
5	Peranc. & Manaj. Jarkom.	4
6	Praktikum P. & M. Jarkom	1
	Total	18

Semester 7

No	Mata Kuliah	SKS
1	Multimedia Interface Design	2
2	Pengolahan Citra	2
3	Logika Fuzzy	3
4	Network Security	2
5	Signal Processing	3
6/7	Mk Pilihan - 1 & 2	4
8	Seminar	2
	Total	18

Semester 8

No	Mata Kuliah	SKS
1	Teknik Optimasi	3
2	Tek. Koding & Kompresi	2
3	Manajemen Proy. Tek..Inf.	3
4	Komputasi Pervasif	2
5	Mk Pilihan - 3	2
6	Mk Pilihan - 4	2
7	Skripsi	4
	Total	18

⁵ Listrik, Magnit, Optik dan Gelombang

⁶ Sistim Operasi

2.4. Silabus

Pada paragraf berikut ini diuraikan tentang silabus (rincian isi mata kuliah) dari beberapa mata kuliah yang dikelola Program Studi Teknik Komputer. Silabus mata kuliah yang dikelola oleh Fakultas ataupun Departemen Teknik Elektro dapat dilihat pada buku panduan Fakultas Teknik 2005.

Seluruh uraian silabus diberikan dalam bahasa Inggris.

VLSI Design (Perancangan Sistem VLSI, 4 credits)

MOS circuit fundamentals, Transistor p-type, transistor n-type, transistor as complementary switch. MOS transistor theory, transistor component in VLSI, polysilicon, diffusion, metal aluminum (zinc), CMOS process technology, Design Rule, lambda scale, estimation of characterization and performance of the circuit, transistor gain. Design of CMOS logic circuits, logic gates design, inverter, NAND, NOR. Layout design, structured design and testing, full custom design, semi custom design, symbolic placement system, programmable logic array, design of CMOS subsystems, counter, shift register, comparator, multiplier, case studies, some functional circuit design, switchbox routing, etc.

Lab practice:

NOR, NAND gates, inverter, design full adder, 8 bit memory unit

Assignments: Multiplier, shift registers, designing 4/8 bit butterfly processor

Reference:

1. N. Weiste & Kamran Eshraghian, "Principles of CMOS VLSI Design: A perspective", 2nd Eds, Addison Wesley 2002

Concurrent Systems (4 credits)

The hardware and software concepts: concurrent processes and concurrent programming, concurrent programming and its roots, concurrent programming: definition and reasons, threads, processes vs threads, concurrent programming with threads, interrupt, CPU and context switching. The Java programming language: sequential features, objects, command line arguments passing, inheritance and interface, packages. Concurrent programming: JAVA threads: implement runnable, extend thread, implementing runnable vs extending threads, debugging techniques, race and synchronization, mutex problem, software solutions for two threads, software solutions for more than two threads, hardware solutions, blocking solutions. Monitor. Definition and Implementations, monitors in JAVA, Signal-and-exit, signal-and-wait, signal-and-continue. Binary counting and semaphore monitors. locks, modification objects. Semaphore: definition and implementation, binary counting semaphore, bounded buffer producer consumer, sleeping barber, dining philosopher, readers and writers. Message passing and Rendezvous. Definition and implementation, message passing and remote procedure call, message passing in JAVA environment, synchronization using message passing, distributed mutual exclusion, conditional message passing, distributed dining philosopher, rendezvous, remote methods invocation.

Reference:

1. Hartley, Stephen J., "Concurrent Programming: The JAVA Programming Language", Oxford Univ. Press, 1998
2. Magec, Jeff., and Kramer, Jeff., "concurrency: State Models and JAVA Program", John Wiley and Sons, 1999

Other materials could be obtained from the Internet:

<http://www.mcs.drexel.edu/~shartley/ConcProgJava/Index.html>

<http://www~dse.doc.ic.ac.uk/concurrency/>

class info (2002/2003) :

<http://www.fb9dv.uni-duisburg.de/members/ramli.php3>

Digital System Design (Perancangan Sistem Digital, 3 credits)

Review of digital concepts and number systems, boolean switching algebra, combinational logic, analysis and design of combinational logic, encoders and multiplexers, flip-flops, simple counters and registers, introduction to sequential circuits, sequential circuit design, merger graph. Maximum compatibility, state assignment, implication graph, map-entered variables, mixed logic combinational circuits, multiple output functions, asynchronous sequential circuits.

Reference:

1. [J.F. Wakerly](#), "Digital Design, Principles & Practices", Prentice Hall, 1997
2. John Yarbrough, "Digital Logic – Applications and Design", PWS Publishing Company, 1997

Image Processing (Pengolahan Citra, 2 credits)

Introduction to theories, algorithms, and practical solutions of digital image/video perception, acquisition, color representation, quantization, transform, enhancement, filtering, multi-spectral processing, restoration, analysis, feature extraction, segmentation, morphological transform, and compression.

Students will gain understanding of algorithm design, mathematical tools, and practical implementations of various digital image applications. Considerations of practical system requirements (e.g., medical, satellite, consumer) will be discussed. Related standards such as JPEG and MPEG will be reviewed.

Reference:

Gonzalez and Woods, Digital Image Processing, 2nd edition, Prentice Hall, 2001.

Additional References

- Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall, 1989.
William K. Pratt, Digital Image Processing, 3rd Edition, John Wiley, 2001.
Kenneth R. Castleman, Digital Image Processing, Prentice Hall, 1996.
Arun N. Netravali, Barry G. Haskell, Digital Pictures, Plenum, 2e, 1995.

Network Security (3 credits)

Introduction to computer networks, basic cryptographic techniques, security in the OSI architecture, security in Internet, security in networked computing (Kerberos, SPX, firewalls etc.), security in mobile computing and communications systems, security applications in electronic commerce and banking, including WWW, EDI, X.400, X.500, EFT, ATM etc.

Reference:

1. Network Security Essentials: Application and Standards William Stallings, Prentice Hall. 2000
2. Fundamental of Network Security John E.Canavan, Artech House, 2001
3. Practical UNIX and Internet Security Simon Garfinkel and Gene Spafford, O'Reilly & Assoc.Inc., 1996

Information Technology Project Management (Manaj. Proyek IT, 3 credits)

Introduction to the principles, tools and techniques of project management in an IT context. The conceptual material presented in lectures is reinforced by practical application in the context of a software development project. The project will be defined against a set process model. A project review phase will be used to analyse and report on project estimates against actual time, cost and resource expenditure.

Reference:

1. Schwalbe, K. 2004. *Information Technology Project Management. 3rd Edition.* Course Technology., 2004.
2. Humphrey, W.S. *Introduction to the Team Software Process*, Addison Wesley 2000.
3. Tavani, Herman T. *Ethics & Technology: Ethical Issues in an Age of Information and Communication Technology.* John Wiley & Sons, 2004.

Coding and Compression Technique (Teknik Koding & Kompresi, 3 credits)

The need to efficiently store, manipulate, and transmit large masses of information is growing more rapidly than the capacity of systems to handle it. A solid understanding of compression is needed in order to work with the burgeoning variety of data types and increasingly data-intensive applications. This course explains the fundamental theories and techniques of data compression, with the most complete coverage available of both lossy and lossless methods to image, speech, text, audio, and video compression; official compression standards for video, audio, text, and facsimile are discussed in order to illustrate the techniques: includes JPEG, MPEG, G.728, H.261, and Group 3 and 4 fax standards.

Reference:

- [Khalid Sayood](#), Introduction to Data Compression Morgan Kaufmann; 2nd edition, 2000

Software Engineering (Rekayasa Perangkat Lunak, 3 credits)

Software Process: The need for software engineering, software process models including the waterfall approach, prototyping, incremental and evolutionary development and alternatives. Project Management: scheduling, cost estimation, configuration management, use of metrics. Requirements Engineering and Software Design: analysis, definition and specification of requirements, designing for reusability, adaptability and maintainability, object oriented analysis and design using the Unified Modelling Language (UML), software architecture. Implementation: moving from design to code, verification methods, test plans, the testing process.

Reference:

1. Software Engineering 6th Ed, Ian Sommerville, Addison Wesley, 2000
2. Software Engineering: a Practitioner's Approach 5th ed., Roger Pressman, McGraw-Hill, 2000

Discrete Mathematics (Matematika Diskrit, 2 credits)

The Foundations: logic and proofs, sets and functions. Fundamentals: algorithms, the integers and matrices, mathematical reasoning, induction and recursion, counting, discrete probability, advanced counting techniques, relations, graphs, trees, boolean algebra and modeling computation.

Reference:

1. Rosen, "Discrete Mathematics and its Applications", Mc Graw Hill Book, 5th Eds, 2003.

Fundamental of Computer Technology (Dasar Teknologi Komputer, 4 credits)

The technology revolutions, IT illustrated the history of computing, the software part of a computer, going online and surfing on the Internet, inside the computer: computer on a single chip, storing and retrieving data, information/data input and output, networks and networking: we are not alone on this earth, IT ethics and healthy computing, exploring in depth the cyber world, the notion of information systems, developing business information systems, technology and society

Reference:

1. L. Long and N. Long, "Computers: Information Technology in Perspective", Prentice Hall 11th Eds, 2003
2. H.M Deitel and P.J. Deitel, "How to Program in C", Prentice Hall, 4th Eds, 2002

Fundamental of Computer Technology Lab (1 credit):

Computer setting (hardware) and software install. Surfing the Internet. Information retrieval, storage and management. Ethics in data/information utilization from the Internet. Program development using C language, covering program control, functions, arrays and pointers.

Reference:

1. See Fundamental of Computer Technology
2. Handbooks on PC hardware setting and OS install

Fundamental of Networking (Dasar Jaringan Komputer, 2 credits)

Introduction to networking, networking fundamentals, networking media, LANs and WANs, from basic theory to cabling, Ethernet fundamentals and technology, TCP/IP protocol suite & IP addressing, routing fundamentals, TCP/IP transport and application layers, variable-length subnet masking (VLSM)/ classless inter domain routing (CIDR), point to point protocols (PPP), integrated services digital network (ISDN), Frame Relay, introduction to network operating systems, advanced NOS administration.

Reference:

1. A. Tanenbaum, "Computer Networks", Prentice Hall, Fourth Eds, 2003
2. "CISCO Networking Academy Program CCNA 1-4 Curriculum, version 3
3. CISCO sponsored Curriculum IT Essential II, version 2

Fundamental of Networking Lab (1 credit):

Cabling procedures, LAN and WAN cabling, NOS hands-on, Windows 2000 professionals, Linux fundamentals

Literature:

1. See Fundamental of Computer Networking

High Speed Networks (3 credits)

Networking History: from Arpanet thru WWW, the need for Quality of Service, the current internet protocols : TCP/IP, strength and weaknesses, OSI model overview, TCP and its variants (Reno, Vegas, Tahoe) SCTP and IP v6, integrated services and differentiated services architectures, ATM technology, frame relay, Gigabit LAN, MPLS: high speed network protocols. High speed infrastructures: optical fiber technology, wave guiding, signal degradation, optical sources, optical receivers, digital transmission, WDM and DWDM concepts and components, optical networks : basic networks, SONET/SDH, broadcast and select WDM networks, wavelength routed networks, performance of WDM and other systems. Measurements : measuring standard and test procedures, attenuation procedures, dispersion measurements, application of optical spectrum analyzer

Reference:

1. Stallings, "High Speed Networks and Internets : Performance and Quality of Service", Prentice Hall, Second Eds, 2002
2. Gerd Keiser, "Optical Fiber Communications", Mc Graw Hill Inc, third Eds, 2000
3. Uyles Black, "MPLS and Label Switching Networks", Prentice Hall Series in Advanced Communication Technologies, 2001.

Multimedia Interface Design (2 credits)

Software interface between the computer and the human. Concepts in human factors will be covered, specifically in terms of designing software interfaces. Theories of human-computer interaction, including human cognitive limitations, syntactic versus semantic knowledge, transitionality, and the 'outside-in' design approach. Guidelines for designing computer interfaces of various models, including command interfaces, menus, desktop views, and GUI interfaces.

Reference :

1. Meera M. Blattner, Roger B. Dannenberg (Contributor), "Multimedia Interface Design" , ACM Press Frontier Series
2. Jakob Nielsen, "Usability Engineering", Morgan Kaufman, ISBN:0-12-518406-9

Network Security (2 credits)

Introduction to network security; basic security concepts, threats, vulnerability and attacks, cryptography, public key cryptosystem and digital signature, IP security, SSL and TLS, authentication, email and web security, policy, Intrusion detection and recovery, virtual private networks, firewalls, OS security (Windows & UNIX), wireless network security.

Reference:

1. William Stallings, "Network Security Essentials: Application and Standards" , Prentice Hall. 2000
2. John E.Canavan, " Fundamental of Network Security, Artech House, 2001
3. Simon Garfinkel and Gene Spafford , "Practical UNIX and Internet Security", O'Reilly & Assoc.Inc., 1996

Professional Issues-in IT (Isyu Profesional di Tek. Informasi, 3 credits)

Introduction to the course, its aims, structure and objectives and learning outcomes, problems of ethical decision making. Professional societies and their codes of conduct and practice. Professionals and professional behaviour. Discussion of case studies: describing steps to resolve the current situation. Preparing policies and strategies to prevent recurrence. Introduction to the crawling eye case study, formal laws do not make for ethics, graduate careers in the 21st century, the BCS at work, building the foundations to future career success, concurrent engineering, group working and distributed enterprises, the law and contracts, safety critical systems and legal liability, introduction to the killer robot case study, a business view of contracts, IPR and copyright, IPR and patents, computer misuse and the law in the United Kingdom, computer misuse and fraud, data protection, the act and its implications, introduction to the London ambulance service case study, health and safety issues, introduction to IEC61508, investment broking and information technology, software project management, LAS group presentations, further topics which are being considered for 2001/2002 are:, data transmission and security, computer generated evidence, quality assurance and control BSI 7799, company audit and auditors, reliability and maintainability, environmental issues, risk assessment, industrial relations

Reference:

1. Ayres R., The Essence of Professional Issues in Computing, Prentice Hall 1999
2. Dejoie, R. et al., Ethical Issues in Information Systems, Boyd & Fraser 1991
3. Bott F et al, Professional Issues in Software Engineering, 3rd Edition, Pitman 2000, UCL 1995
4. Deborah G Johnson & Helen Nissenbaum, "Computers, Ethics & Social Values", Prentice Hall, 1995.

Embedded System (3 credits)

Hardware: overview of μ Controllers, μ Controllers Hardware Specification, memory vs. I/O, subsystem decoding, static RAM/EPROM interfacing, memory management, input/output interfacing, device driver development, hardware Interrupts, FPM DRAM Introduction, debugging techniques.

Software: addressing modes, data movement instructions, arithmetic & logic instruction stack operation, program flow control instructions (Call/Jump), programming for embedded systems (paradigm development tools), accessing I/O (assembly), accessing memory (assembly), testing, software interrupts, real-time concepts, debugging techniques.

Reference:

1. Jane Liu, "Real-time Systems" , Prentice Hall, 2000.
2. Phillip A. Laplante, "Real-Time Systems Design and Analysis – An Engineer's Handbook", Second Edition by, IEEE Press, 1997.

Computer Engineering (Teknik Komputer, 4 credits)

Introduction to digital computer, electronic components of digital circuits, Information representation, combinational logic circuit, binary logic, boolean algebra, Standard form, max-min terms, map manipulation, Nand-nor, exclusive-or, integrated circuit, cmos circuit, Combinational logic, analysis procedure, design procedure, decoders, encoders, Multiplexer, adder, multiplier, decimal arithmetic, sequential circuit, latches, Flip-flops, sequential circuit analysis and design, Designing with flip-flops, register & counters, registers and shift register, ripple counter, synchronous binary counters, Memory and PLA's, random access memory, RAM integrated circuit, ERCC, ROM, Register transfer & datapath, register transfer operation, mux-based transfer, bus-based transfer, datapaths, arithmetic and logic units, shifter, control word, pipelined datapath, Sequencing and control, algorithmic state machine, design example: binary multiplier, hardwired and microprogrammed control, A simple computer architecture, single cycle hardwired control, multiple cycle hardwired control, pipelined control, instruction set architecture, Computer architecture concept, operand addressing, instruction set architecture, data transfer and data manipulation instructions, floating-point computations, program control instructions, program interrupt, CPU design, CISC and RISC, clock and timing, instruction execution, measuring instruction execution performance,

I/O and communication, sample peripheral, priority interrupt, direct memory access, I/O interfaces, serial communication memory systems,
Memory hierarchy, cache memory, cache mappings, virtual memory, pipelining concept, pipelining implementation

Reference:

1. Logic and Computer Design Fundamentals, *M. Morris Manno and Charles R. Kime – Prentice Hall 2000*
2. Computer Organization and Architecture, *William Stallings – Sixth Editions, Prentice Hall 2003*

Computer Engineering Lab (1 credit) :

1. Basic Digital Techniques 2. Half Adder/Full Adder. 3. Sequential Circuit. 4. Flip-Flops. 5. Organization and CPU Design 6. Assignments: *Pipelining*

Microprocessors (Mikroprosesor, 4 sks)

Introduction to microprocessors, microprocessor architecture, internal architecture of microprocessors, memory mode addressing, protected memory, paging memory, addressing mode, memory addressing, stack addressing, data transfer instructions, move. Pop/push, load, string manipulation, arithmetic and logic instructions, add, subtract, compare, multiplication, division, BCD and ASCII arithmetic, control instructions, jump instructions, assembly language program control instructions, introduction to interrupt, programming microprocessors, assembly modular programming, usage of keyboard and video device, data conversion, program control example, clock interrupt, using assembly language with C/C++, hardware specification of microprocessors, pin-out and pin functions, clock generator, buffering and latching, bus timing, ready and wait states, minimum vs maximum modes, memory interface, memory unit, address decoding, 8088 and 80188 memory interface, 8086, 80186, 80286 and 80386X memory interface, 80386DX & 80486 memory interface, Pentium & Pentium Pro memory interface, dynamic RAM, basic of I/O interface, address decoding of gates, peripheral interface, programmable peripheral interface, programmable keyboard interface, programmable interval timer, communication interface, ADC, DAC, interrupt, basic interrupt processing, hardware interrupt, extending interrupt structure, programmable interrupt controller, interrupt examples.

Reference:

1. The Intel Microprocessors 8086/88,80186/188,80286,80386,80486,Pentium and Pentium Pro Processor Architecture : Programming & Interfacing, *Barry B Brey, 4th Eds., Prentice Hall 1997.*
2. 8086/88,80186/188,80286,80386 and 80486 Assembly Language Programming, *Barry B Brey, MacMilan Publishing Company, USA, 1994.*

Microprocessor Lab (1 credit) :

1. Pemrograman Bahasa Assembly. 2. Pemrograman Bahasa Assembly dengan instruksi kondisional. 3. Pemrograman Antarmuka I/O. 4. Pengendali mikro 5. Tugas tambahan (optional).

Pervasive Computing (Komputasi Pervasif, 2 credits)

Basic concept of pervasive computing, evolution of pervasive systems, context aware properties, pervasive computing infrastructure, access to pervasive systems, pervasive computing examples, future trends of pervasive computing systems.

Reference:

Collection of papers on pervasive computing systems

Fuzzy Logic (Logika Fuzzy, 2 credits)

Structure and functions of biological neural system, Neural Networks : Concepts and Topology, Neural Networks paradigm, Fuzzy logic and fuzzy logic processing, Fuzzy Neural networks, Applications of Fuzzy Neural Networks in Engineering

Reference:

1. Jacek M Zurada, "Introduction to Artificial Neural Networks", Info Access Distribution, Pte. Ltd. , 1992
2. S. Sardy, "Lecture Notes on Basic Concept of TST and Fuzzy Logics", EE Department FTUI, 1997.

Semiconductor Technology & Fabrication (Teknologi Semikonduktor & Fabrikasi, 3 credits)

Semiconductor fundamentals: carrier modeling, carrier properties, carrier distribution, carrier concentration and carrier action. Metal-semiconductor contacts and Schottky devices, pn-Junction diode, bipolar junction transistor, BJT static characteristics, BJT dynamic performance, MOS Capacitor, MOSFET.

IC development, thermal oxidation of silicon, thin film decomposition, lithography, etching, epitaxy, diffusion, ion implantation. Lab Visit.

Reference:

1. Richard S Muller & Theodore I Kamins, "Device Electronic for Integrate Circuits", John Wiley, NY 1986
2. W.R. Runyan & K.E. Bean, "Semiconductor Integrated Circuit Processing Technology", Addison Wesley, 1990.