STRUKTUR KURIKULUM PROGRAM STUDI TEKNIK ELEKTRO S1

KODE	MATA AJARAN	SUBJECT	SKS
Semester 1		**1st Semester**	
UIGE600002	MPKT B	Integrated Character Building B	6
UIGE600003	Bahasa Inggris	English	3
ENGE600003	Kalkulus	Calculus	4
ENGE600007	Fisika Listrik, MGO	Physics (Electricity, MWO)	3
ENGE600008	Prak. Fisika Listrik, MGO	Physics (Electricity, MWO) Lab	1
ENEE601001	Pengantar Teknik Elektro	Intro to Electrical Engineering	2
		Subtotal	19
Semester 2		**2nd Semester**	
UIGE600001	MPKT A	Integrated Character Building A	6
UIGE600010 - UIGE600015	Agama	Religion	2
UIGE600020 - UIGE600048	Olah Raga/Seni	Sports/Arts	1
ENGE600004	Aljabar Linier	Linear Algebra	4
ENGE600005	Fisika Mekanika dan Panas	Physics (Mechanics and Thermal)	3
ENGE600006	Prak. Fisika Mekanika dan Panas	Physics (Mechanics and Thermal) Lab	1
ENEE602002	Rangkaian Listrik 1	Electric Circuit 1	3
		Subtotal	20
Semester 3		**3rd Semester**	
ENEE603003	Rangkaian Listrik 2	Electric Circuit 2	3
ENEE603004	Praktikum Rangkaian Listrik	Electric Circuit Laboratory	1
ENEE603005	Analisis Vektor dan Peubah Kompleks	Vector Analysis Complex Variable	2
ENEE603006	Probabilitas dan Proses Stokastik	Probability and Stochastic Process	3
ENEE603007	Matematika Teknik	Engineering Mathematics	4
ENEE603008	Divais Semikonduktor	Semiconductor Devices	2
ENEE603009	Dasar Sistem Digital + P	Fund. of Digital System & Lab	3
		Subtotal	18
Semester 4		**4th Semester**	
ENEE604010	Dasar Komputer dan Praktikum	Basic Computer and Laboratory	3
ENEE604011	Rangkaian Elektronika	Electronic Circuits	3
ENEE604012	Praktikum Rangkaian Elektronika	Electronic Circuits Laboratory	1
ENEE604013	Elektromagnetika	Electromagnetics	4
ENEE604014	Sinyal dan Sistem	Signal and Systems	3
ENEE604015	Material Listrik	Electric Materials	2
		Subtotal	16
Semester 5		**5th Semester**	
ENGE600012	K3LL	HSE Protection	2
ENEE605016	Komputasi Numerik	Numerical Computation	2
ENEE605017	Teknik Telekomunikasi	Telecommunication Engineering	3
ENEE605018	Teknik Tenaga Listrik	Electric Power Engineering	3
ENEE605019	Praktikum Teknik Tenaga Listrik	Electric Power Engineering Lab	1
ENEE605020	Teknik Kendali	ControlEngineering	3
ENEE605021	Praktikum Teknik Kendali	ControlEngineering Laboratory	1
ENEE605022	Algoritma dan Pemrograman	Algorithm and Programming	4
		Subtotal	19

FACULTY OF ENGINEERING

	Semester 6	6th Semester	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt. Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik	Electric Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
	Peminatan Kelompok Ilmu	Majoring Courses	9
		Subtotal	22
	Semester 7	7th Semester	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
	Peminatan Kelompok Ilmu	Majoring Courses	6
	Pilihan	Electives	4
		Subtotal	16
	Semester 8	8th Semester	
ENEE608033	Skripsi	Bachelor Theses	4
	Peminatan Kelompok Ilmu	Majoring Courses	6
	Pilihan	Electives	4
		Subtotal	16
		TOTAL	144

STRUKTUR KURIKULUM PEMINATAN TEKNIK TELEKOMUNIKASI

KODE	MATA AJARAN	COURSE	SKS
	Semester 6	6th Semester	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt.Mikroprosesor dan Mikrokontroler	Microprocessor & Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik dan Elektronik	Electric and Electronic Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
ENEE606301	Teknik Pengkodean dan Aplikasi	Coding Technique and Applications	3
ENEE606302	Jaringan Komunikasi	Communication Networks	3
ENEE606303	Komunikasi Multimedia Pita Lebar	Broadband Multimedia Communications	3
		Subtotal	22
Kode	Semester 7	7th Semester	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE607304	Antena dan Propagasi	Antennas and Propagation	3
ENEE607305	Komunikasi Optik	Optical Communications	3
	Pilihan	Electives	4
		Subtotal	16

Kode	Semester 8	8th Semester	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE608307	Komunikasi Bergerak dan Nirkabel	Mobile and Wireless Communications	3
ENEE608308	Divais Sistem Komunikasi	Communication System Devices	3
	Pilihan	Electives	4
		Subtotal	14

STRUKTUR KURIKULUM PEMINATAN TEKNIK TENAGA LISTRIK

KODE	MATA AJARAN	COURSE	SKS
	Semester 6	6th Semester	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt.Mikroprosesor dan Mikrokontroler	Microprocessor & Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik dan Elektronik	Electric and Electronic Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
ENEE606101	Konversi Energi Listrik	Electric Energy Conversion	2
ENEE606102	Elektronika Daya dan Praktikum	Power Electronics and Laboratory	3
ENEE606103	Manajemen dan Ekonomi Teknik	Management and Engineering Economy	3
		Subtotal	21
Kode	Semester 7	7th Semester	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa danKewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE607104	Sistem Tenaga Listrik danPraktikum	Electric Power System and Laboratory	3
ENEE607105	Teknik Tegangan & ArusTinggi +P	High Current & Voltage Eng + Lab	3
ENEE607106	Instalasi Listrik Bangunan	Building Electric Installation	2
	Pilihan	Electives	4
		Subtotal	18
Kode	Semester 8	8th Semester	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE608108	Distribusi & Transmisi Tenaga Listrik	Electric Power Trans. & Distribution	3
ENEE608109	Proteksi Sistem Tenaga Listrik	Electric Power System Protection	2
	Pilihan	Electives	4
		Subtotal	13

FACULTY OF ENGINEERING

STRUKTUR KURIKULUM PEMINATAN TEKNIK ELEKTRONIKA

KODE	MATA AJARAN	COURSE	SKS
	Semester 6	**6th Semester**	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt.Mikroprosesor dan Mikrokontroler	Microprocessor & Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik dan Elektronik	Electric and Electronic Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
ENEE606201	Rangkaian Elektronika Lanjut	Advanced Electronic Circuits	3
ENEE606202	Divais Fotonik	Photonic Devices	3
ENEE606203	Fabrikasi Divais Semikonduktor +P	Semiconductor Device Fabr + Lab	3
		Subtotal	22
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa danKewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE607204	Pengantar Nanoelektronik	Introduction of Nanoelectronics	3
ENEE607205	VLSI	VLSI	3
	Pilihan	Electives	4
		Subtotal	16
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE608207	Sel Surya	Solar Cell	3
ENEE608208	MEMS	MEMS	3
	Pilihan	Electives	4
		Subtotal	14

FACULTY OF ENGINEERING

STRUKTUR KURIKULUM PEMINATAN TEKNIK KENDALI

KODE	MATA AJARAN	COURSE	SKS
	Semester 6	**6th Semester**	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt.Mikroprosesor dan Mikrokontroler	Microprocessor & Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik dan Elektronik	Electric and Electronic Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
ENEE606401	Sistem Kendali Digital	Digital Control System	3
ENEE606402	Sistem Kendali Proses	Process Control System	3
ENEE606403	Sistem Kendali Penggerak Elektrik	Electric Drive Control System	3
		Subtotal	22
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa danKewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE607404	Robotika	Robotics	3
ENEE607405	Sistem Kendali Prediktif & Adaptif	Adaptive & Predictive Control System	3
	Pilihan	Electives	4
		Subtotal	16
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE608407	Mekatronika	Mechatronics	3
ENEE608408	Sistem Berbasis Pengetahuan	Knowledge Based System	3
	Pilihan	Electives	4
		Subtotal	14

MATA KULIAH PILIHAN		
KODE	**MATA AJARAN**	**SKS**
ENEE607306	Topik Khusus Telekomunikasi 1	2
ENEE608309	Topik Khusus Telekomunikasi 2	2
ENEE607107	Topik Khusus Tenaga Listrik 1	2
ENEE608110	Topik Khusus Tenaga Listrik 2	2
ENEE607306	Topik Khusus Elektronika 1	2
ENEE608309	Topik Khusus Elektronika 2	2
ENEE607406	Topik Khusus Kendali 1	2
ENEE608409	Topik Khusus Kendali 2	2
ENEE607506	Topik Khusus Biomedik 1	2
ENEE608509	Topik Khusus Biomedik 2	2

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STRUKTUR KURIKULUM PEMINATAN TEKNIK BIOMEDIK

KODE	MATA AJARAN	COURSE	SKS
	Semester 6	**6th Semester**	
ENEE606023	Kerja Praktik	Internship	2
ENEE606024	Pemodelan dan Simulasi	Modelling and Simulations	2
ENEE606025	Prakt. Teknik Telekomunikasi	Telecommunication Engineering Lab.	1
ENEE606026	Mikroprosesor dan Mikrokontroler	Microprocessor and Microcontroller	4
ENEE606027	Prakt.Mikroprosesor dan Mikrokontroler	Microprocessor & Microcontroller Lab.	1
ENEE606028	Pengukuran Besaran Listrik dan Elektronik	Electric and Electronic Measurements	2
ENEE606029	Praktikum Pengukuran Besaran Listrik	Electric Measurements Laboratory	1
ENEE606501	Biologi dan Anatomi	Biology and Anatomy	3
ENEE606502	Sistem Komunikasi Medik	Medical Communication System	3
ENEE606503	Pengantar Teknologi Biomedik	Introduction to Biomedical Technologies	3
		Subtotal	22
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa danKewirausahaan	Engineering Enterpreneurship	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE607504	Teknologi Pencitraan Medik	Medical Imaging Technology	3
ENEE607505	Pemodelan Sistem Medik	Medical System Modelling	3
	Pilihan	Elective	4
		Subtotal	16
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Final Project	4
ENEE608507	Instrumentasi Biomedik + P	Biomedical Instrumentations + Lab	3
ENEE608508	Informatika Medik	Medical Informatics	3
	Pilihan	Elective	4
		Subtotal	14

KURIKULUM FAST-TRACK (S1 AND S2)

MATA KULIAH FAST TRACK PEMINATAN TEKNIK TELEKOMUNIKASI

KODE	MATA AJARAN	COURSE	SKS
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Rekayasa dan Kewirausahaan	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE603007	Matematika Terapan	Applied Mathematics	3
ENEE606303	Komunikasi Multimedia Pita Lebar	Broadband Multimedia Communications	3
ENET801002	Sistem Radar dan Disain	Radar Systems and Design	3
ENET801003	Pengolahan Sinyal dan Aplikasi	Digital Signal Processing & Apps	3
ENEE607304	Antena dan Propagasi	Antennas and Propagation	3
ENEE607305	Komunikasi Optik	Optical Communications	3
		Subtotal	**24**
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE802002	Metodologi Penelitian	Research Method	3
ENET802004	Teknik Sistem Medis Nirkabel	Wireless Medical System Eng.	3
ENET802005	Disain RF Lanjut	RF Engineering Design	3
ENET802006	Disain Antena Modern	Modern Antenna Design	3
ENMT803007	Komunikasi Multimedia Nirkabel	Multimedia Wireless Communications	3
ENEE608308	Divais Sistem Komunikasi	Communication System Devices	3
		Subtotal	**22**
Kode	**Semester 9**	**9th Semester**	
ENET803007	Tek. Komunikasi Gelombang Cahaya	Lightwave Communication Technology	3
ENET803008	Topik Khusus Telekomunikasi	Special Topic in Telecommunication	2
ENEE803003	Manaj. & Keekonomian Proyek Teknik	Engineering Economy & Project Manag.	3
		Subtotal	**8**
Kode	**Semester 10**	**10th Semester**	
ENEE804005	Publikasi Ilmiah	Publication	2
ENEE804004	Tesis	Thesis	8
		Subtotal	**10**

FACULTY OF ENGINEERING

MATA KULIAH FAST TRACK PEMINATAN TEKNIK ELEKTRONIKA

KODE	MATA AJARAN	COURSE	SKS
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Rekayasa dan Kewirausahaan	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE801001	Matematika Terapan	Applied Mathematics	3
ENEF801001	Disain Rangkaian Terpadu	Integrated Circuit Design	3
ENEF801002	Nanoelektronika	Nanoelectronics	3
ENEF801003	Divais Fotonik Lanjut	Advanced Photonic Devices	3
ENEE606204	Pengantar Nanoelektronik	Introduction of Nanoelectronics	3
ENEE606205	VLSI	VLSI	3
		Subtotal	24
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEF802004	Disain MEMS	MEMS Design	3
ENEF802005	Divais Solid State	Solid State Device	3
ENEF802006	Divais Hetero-struktur	Hetero-structure Devices	3
ENEE802002	Metodologi Penelitian	Research Method	3
ENEE606207	Sel Surya	Solar Cell	3
ENEE606208	MEMS	MEMS	3
		Subtotal	22
Kode	**Semester 9**	**9th Semester**	**SKS**
ENEE803003	Manaj. & Keekonomian Proyek Teknik	Engineering Economy & Project Manag.	3
ENEF803007	Sistem Optik Koheren	Optical Coherent System	2
ENEF803008	Sistem Pengukuran Metode Optik	Optical Method for Measurement	3
		Subtotal	8
Kode	**Semester 10**	**10th Semester**	**SKS**
ENEE804005	Publikasi Ilmiah	Publication	2
ENEE804004	Tesis	Thesis	8
		Subtotal	10

MATA KULIAH FAST TRACK PEMINATAN TEKNIK TENAGA LISTRIK

KODE	MATA AJARAN	COURSE	SKS
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Rekayasa dan Kewirausahaan	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE801001	Matematika Terapan	Applied Mathematics	3
ENEP801001	Operasi & Kendali Pembangkitan TL	Power Generation Ops & Control	3
ENEP801002	Mutu dan Kualitas Daya Sistem TL	Electrical Power System Quality	3
ENEP801003	Energi dan Lingkungan	Energi and Environment	3
ENEE607104	Sistem Tenaga Listrik danPraktikum	Electric Power System and Laboratory	3
ENEE607105	Teknik Tegangan & ArusTinggi +P	High Current & Voltage Eng + Lab	3
		Subtotal	**24**
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Final Project	4
ENEE802002	Metodologi Penelitian	Research Method	3
ENEP802004	Sistem Dinamik dan Pemodelan	Dynamic System and Modeling	3
ENME802004	Manajemen & Ekonomi Energi	Economics Energy and Management	3
ENEP802006	Elektronika Daya Industri	Industrial Power Electronics	3
ENEE608108	Distribusi & Transmisi Tenaga Listrik	Electric Power Trans. & Distribution	3
ENEE608109	Proteksi Sistem Tenaga Listrik	Electric Power System Protection	3
		Subtotal	**22**
Kode	**Semester 9**	**9th Semester**	
ENEE803003	Manaj. & Keekonomian Proyek Teknik	Engineering Economy & Project Manag.	3
ENEP803007	Topsus Ketenagalistrikan & Energi	Topics in Power System and Energy	2
ENEP803008	Perencanaan Sistem Tenaga Listrik	Power System Planning	3
		Subtotal	**8**
Kode	**Semester 8**	**8th Semester**	
ENEE804005	Publikasi Ilmiah	Publication	2
ENEE804004	Tesis	Thesis	8
		Subtotal	**10**

MATA KULIAH FAST TRACK PEMINATAN TEKNIK KENDALI

KODE	MATA AJARAN	COURSE	SKS
Kode	**Semester 7**	**7th Semester**	
ENEE607030	Seminar	Seminar	2
ENEE607031	Rekayasa dan Kewirausahaan	Rekayasa dan Kewirausahaan	2
ENEE607032	Penulisan Ilmiah	Academic Writing	2
ENEE801001	Matematika Terapan	Applied Mathematics	3
ENEC801001	Kendali Analog dan Dijital	Analog and Digital Control	3
ENEC801002	Topik Khusus Riset Terkini	Special Topic on Advance Research	3
ENEC801003	Pemodelan dan Rekayasa Sistem	Modeling and System Engineering	3
ENEE607404	Robotika	Robotics	3
ENEE607405	Sistem Kendali Prediktif & Adaptif	Adaptive & Predictive Control System	3
		Subtotal	**24**
Kode	**Semester 8**	**8th Semester**	
ENEE608033	Skripsi	Bachelor Thesis	4
ENEE802002	Metodologi Penelitian	Research Method	3
ENEC802004	Sistem Kendali Multivariabel	Multivariable Control Systems	3
ENEC802005	Robotika Cerdas	Intelligent Robotics	3
ENEC802006	Kendali Adaptif dan Optimal	Adaptive and Optimal Control	3
ENEE608407	Mekatronika	Mechatronics	3
ENEE608408	Sistem Berbasis Pengetahuan	Knowledge Based System	3
		Subtotal	**22**
Kode	**Semester 9**	**9th Semester**	
ENEC803007	Kendali dan Sistem Cerdas	Intelligent System and Control	3
ENEC803008	Kendali Lanjut Sistem Penggerak Elektrik	Advanced Control on Electric Drive System	2
ENEE803003	Manaj. & Keekonomian Proyek Teknik	Engineering Economy & Project Manag.	3
		Subtotal	**8**
Kode	**Semester 10**	**10th Semester**	
ENEE804005	Publikasi Ilmiah	Publication	2
ENEE804004	Tesis	Thesis	8
		Subtotal	**10**

SILABUS MATA AJAR

KULIAH UNIVERSITAS

UIGE600001
MPKT A
Tujuan Pembelajaran:
Mampu berpikir kritis, kreatif, dan inovatif serta memiliki keingintahuan intelektual untuk memecahkan masalah pada tingkat individual dan kelompok.
Mampu memberikan alteratif pemecahan masalah terhadap beragam masalah yang timbul di lingkungan, masyarakat, bangsa, dan negara.
Topik:
Kekuatan dan keutamaan karakter, dasar-dasar filsafat, dasar-dasar logika, dasar-dasar etika, apakah manusia itu, individu dan kelompok, masyarakat dan kebudayaan
Prasyarat: tidak ada
Buku Ajar:
1. Evita E. Singgih, Miranda D.Z., Ade Solihat, Jossy P. Moeis, "Buku Ajar I Kekuatan dan Keutamaan Karakter, Filsafat, Logika dan Etika", Universitas Indonesia
2. Evita E. Singgih, Miranda D.Z., Ade Solihat, Jossy P. Moeis, "Buku Ajar II Manusia sebagai Individu, Kelompok dan Masyarakat", Universitas Indonesia

UIGE600002
MPKT B
Tujuan Pembelajaran:
Mampu berpikir kritis, kreatif, dan inovatif serta memiliki keingintahuan intelektual untuk memecahkan masalah pada tingkat individual dan kelompok.
Mampu memberikan alteratif pemecahan masalah terhadap beragam masalah yang timbul di lingkungan, masyarakat, bangsa dan negara
Topik:
Prasyarat: tidak ada
Buku Ajar: -

UIGE600003
BAHASA INGGRIS
Tujuan Pembelajaran:
Mampu menggunakan bahasa lisan dan tulisan dalam bahasa Inggris dengan baik untuk kegiatan akademik maupun nonakademik
Topik:
Study skills: active learner, vocabulary building, word formation and using the dictionary, listening strategies, extensive reading
Grammar: Basic grammar of sentences, clause. Reading: reading skill: skimming, scanning, main idea, supporting ideas; Note taking reading populer science article, reading an academic text
Listening: short conversation, lecture and note-taking, news broadcast, short story
Speaking: discussion, giving presentation
Writing: summary of short articles, describing graphs and tables, academic paragraph, essay
Prasyarat: tidak ada
Buku Ajar:

UIGE6000 …
OLAH RAGA/SENI
Lihat Silabus Teknik

UIGE6000
AGAMA
Lihat Silabus Teknik

FACULTY OF ENGINEERING

KULIAH FAKULTAS

ENGE600003
KALKULUS (4 SKS)
Tujuan Pembelajaran:
Mampu menerapkan konsep matematika tingkat lanjut untuk bidang teknik elektro; Mampu menerapkan konsep matematika untuk Fungsi dan Limit, Turunan (single/multivariabel) dan Aplikasi, Integral (single/multifold) dan Aplikasi, Deret Taylor, dan Maclaurin
Topik:
Fungsi dan Limit, Turunan (single/multivariable) dan Aplikasi, Integral (single/multifold) dan Aplikasi, Deret Taylor dan Maclaurin
Prasyarat: tidak ada
Buku Ajar:

ENGE600004
ALJABAR LINEAR (4 SKS)
Tujuan Pembelajaran:
Mampu menerapkan Konsep Sistem Persamaan Linear, Determinan, Ruang Vektor, Ruang Hasil Kali Dalam, Nilai dan Vektor Eigen, serta Transformasi Linear
Topik:
Konsep Sistem Persamaan Linear, Determinan, Ruang Vektor, Ruang Hasil Kali Dalam, Nilai dan Vektor Eigen, Transformasi Linear
Prasyarat: tidak ada
Buku Ajar: -

ENGE600005
FISIKA MEKANIKA DAN PANAS (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep fisika dasar mekanika dan termodinamika dalam memahami fenoma alam dan rekayasa manusia termasuk aplikasi keteknikan.
Topik:
Mekanika gerak, gravitasi, energi potensial partikel dinamik < usaha dan energi, momentum, tumbukkan, gerak rotasi, kinematik dan dinamik, momentum sudut Fisika Panas-Bunyi, temperatur, panas, hukum termodinamika I, dan II, teori kinetik gas I dan II. Fisika Modern-Kuantum
Prasyarat: tidak ada
Buku Ajar:
Haliday, Resnick, dan Walker, *Principles of Physics 9th Edition,* Wiley, 2011.

ENGE600006
PRAKTIKUM FISIKA MEKANIKA DAN PANAS
Lihat Silabus Teknik

ENGE600007
FISIKA LISTRIK, MAGNET, OPTIK, DAN GELOMBANG (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep fisika dasar listrik, magnet, optik, dan gelombang dalam memahami fenoma alam dan rekayasa manusia termasuk aplikasi keteknikan.
Topik:
Listrik statis, muatan, hukum Coulomb, medan listrik, hukum Gauss, potensial listrik, Capasitor dan dielektrik. Listrik dinamis, arus dan tahanan, hukum Ohm, gaya gerak listrik, beda potensial, rangkaian listrik. Magnit medan magnit, gaya gerak magnet dan arus, efek Hall, hukum ampere, Intensitas medan magnet B, hukum Biot-Savart, hukum Faraday, induktansi. electromagnetik, osilasi, persamaan Maxwell.
Prasyarat: tidak ada
Buku Ajar:
Haliday, Resnick, dan Walker, *Principles of Physics 9th Edition,* Wiley, 2011.

ENGE600008
PRAKTIKUM FISIKA LISTRIK, MAGNET, OPTIK, DAN GELOMBANG
Lihat Silabus Teknik

ENGE600012
KEAMANAN, KESELAMATAN, KERJA, DAN LINDUNG LINGKUNGAN (K3LL)
Lihat Silabus Teknik

KULIAH TEKNIK ELEKTRO

ENEE601001
PENGANTAR TEKNIK ELEKTRO (2 SKS)
Capaian Pembelajaran:
Mampu menjelaskan konsep dasar teknik elektro beserta aplikasinya dalam kehidupan sehari-hari.
Topik:
Konsep dasar dan aplikasi dari: Teknik Elektronika, Teknik Telekomunikasi, Teknik Kendali, Teknik Ketenagalistrikan dan Energi, dan Teknik Biomedik
Prasyarat: tidak ada
Buku Ajar:
Diktat Pengantar Teknik Elektro UI

ENEE612008
ENEE602002
RANGKAIAN LISTRIK 1 (3 SKS)
Capaian Pembelajaran:
Mampu menghitung muatan listrik, arus, dan tegangan dalam suatu rangkaian dasar; Mampu menjelaskan sumber tegangan, sumber arus (bebas/terikat), resistor, dan kapasitor; Mampu menghitung peubah rangkaian listrik meng-gunakan teorema superposisi, transformasi sumber, dan Thevenin-Norton; Mampu menghitung peubah rangkaian listrik menggunakan analisis node (rangkaian arus), supernode, mesh (rangkaian tegangan), supermesh; Mampu menganalisis respon waktu rangkaian orde-1 dan orde-2;

Topik:
Konsep: Arus, tegangan, daya, dan energi; Sumber tegangan, sumber arus (bebas/terikat), resistor, dan kapasitor; Rangkaian resistif seri dan paralel; Analisis node, supernode, mesh, supermesh; Teorema superposisi, transformasi sumber, dan Thevenin-Norton; Respon waktu rangkaian orde-1 dan 2
Perlengkapan:
Prasyarat: Kalkulus, Fisika Listrik, Magnet, Optik, dan Gelombang.
Buku Ajar:
1. David E. Johnson, Johnny R. Johnson, John L. Hilburry, Peter D. Scott, "Electric Circuit Analysis", 3rd Edition, Prentice Hall International, Inc., 1997. (Chapter 1-9)
2. James W. Nilsson, Susan A. Riedel, "Electric Circuits", 6th Edition, Prentice Hall International Inc., 2000. (Chapter 1-10)

ENEE613009
ENEE603003
RANGKAIAN LISTRIK 2 (3 SKS)
Capaian Pembelajaran:
Mampu membuat rancangan rangkaian listrik sederhana; Mampu menganalisis rangkaian 3 fasa; Mampu menganali-sis respons frekuensi rangkaian listrik orde-1 dan orde-2; Mampu menganalisis rangkaian dasar induktansi bersama dan trafo ideal; Mampu membuat rancangan rangkaian filter pasif dan aktif dengan memanfaatkan rangkaian dasar; Mampu menganalisis rangkaian 4 kutub.

Topik:

Rangkaian 3 fasa; transformasi laplace; respon frekuensi; rangkaian induktansi bersama dan transformator; rangkaian filter orde 1 pasif dan aktif; rangkaian 4 kutub.

Prasyarat: Rangkaian Listrik 1, Analisis Vektor dan Peubah Kompleks.
Buku Ajar:
1. James W. Nilsson, Susan A. Riedel, "Electric Circuits", 6thEdition, Prentice Hall International Inc., 2000 (Chapter 11-18).
2. David E. Johnson, Johnny R. Johnson, John L. Hilburry, Peter D. Scott, "Electric Circuit Analysis", 3rd Edition, Prentice Hall International, Inc., 1997 (Chapter 10-17).

ENEE603004
PRAKTIKUM RANGKAIAN LISTRIK (1 SKS)
Capaian Pembelajaran:
Mampu menghitung muatan listrik, arus, dan tegangan dalam suatu rangkaian dasar; Mampu menjelaskan sumber tegangan, sumber arus (bebas/terikat), resistor, dan kapasitor; Mampu menghitung peubah rangkaian listrik menggunakan teorema superposisi, transformasi sumber, dan Thevenin-Norton; Mampu menganalisis rangkaian ammeter, voltmeter, ohmmeter, dan jembatan wheatstone; Mampu menghitung peubah rangkaian listrik menggunakan analisis node, supernode, mesh, supermesh;

Topik:
Dasar kelistrikan; linearitas analisismesh dan simpul; analisis superposisi; Thevenin dan Norton; rangkaian empat kutub; rangkaian arus bolak-balik; rangkaian tiga fasa;

Prasyarat: Rangkaian Listrik 1
Buku Ajar: Modul Praktikum Rangkaian Listrik – Laboratorium Tegangan Tinggi dan Pengukuran Listrik.

ENEE613011
ENEE603005
ANALISIS VEKTOR DAN PEUBAH KOMPLEKS (2SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep matematika tingkat lanjut untuk bidang teknik elektro yang mencakup complex variable, Cauchy-Riemann equation, Cauchy Integral; Mampu menerapkan dasar dasar diferensial vektor, integral vektor (garis, permukaan dan volume), Teorema Green, Teorema Divergensi Gauss dan Stokes'; Mampu menerapkan konsep Kalkulus Vektor, bilangan dan fungsi Kompleks
Topik:
Complex variables, complex numbers and functions, polar form, powers and roots, de Moiv're theorem, dot and cross product, limit. Derivative, analytic function. Cauchy-Riemann equations, Laplace equation, exponential, trigonometric and hyperbolic functions, logarithm and general power.Complex integration, line integral in complex plane, Cauchy integral theorem and formula, derivatives of analytic functions.Laurent series, singularities and zeros, infinity, residue integration method and, residue integration of real integrals.Conformal mapping, Complex analysis and potential theory.Vector differential calculus, vector in 2-space and 3-space. Inner (dot) Product and vector (cross) product, vector and scalar functions and fields. Derivatives, gradient of scalar fields. Directional derivative. Divergence and curl of vector field. Line integral, path independence of line integrals. Double integrals, Green's theorem in the plane, Surfaces for surface integrals, Triple integrals. Divergence theorem of Gauss, Stokes's theorem.

Prasyarat: Kalkulus, Aljabar Linear
Buku Ajar:
1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publisher 2010.
2. Glyn James, "Advanced Modern Engineering Mathematics", 2ndEdition, Prentice Hall Publisher 1999.

ENEE603009
ENEE611001
DASAR SISTEM DIGITAL + P (3 SKS)

Capaian Pembelajaran: Dalam kuliah ini, mahasiswa akan mempelajari semua tahapan perancangan dan implementasi dari sebuah sistem dijital. Setelah mengikuti kuliah ini, mahasiswa akan mampu menganalisis rangkaian sistem digital sederhana, dan mampu membuat rancangan sistem digital menggunakan blok kombinasional dan sekuensial sederhana. Kuliah ini juga melibatkan beberapa kegiatan praktikum di laboratorium untuk melakukan desain, implementasi dan verifikasi sistem logika dijital. Beberapa perangkat keras dan perangkat lunak simulasi untuk rangkaian digital akan digunakan

Topik: Prinsip Aljabar Boolean dan aplikasinya; Interface Logic Families; Number System & Data Encoding; Basic Logic Circuits; Basic Modular Design of Combinational Circuits; Basic Modular Design of Sequential Circuits.

Praktikum: Modul 1 - Pengantar dan Pengenalan Dasar Rangkaian Digital, Modul 2 - Aljabar Boolean dan Gerbang Logika Dasar, Modul 3 - Karnaugh Map, Modul 4 - Gerbang Logika Kompleks, Modul 5 - Dekoder dan Enkoder, Modul 6 - Multiplexer dan Demultiplexer, Modul 7 - Rangkaian Aritmatika Digital, Modul 8 - Flip-Flop dan Latch, Modul 9 - Register dan Counter, Modul 10 - Proyek Praktikum Dasar Sistem Digital

Prasyarat: tidak ada.

Buku Ajar:
1.   M. Morris R. Mano, Charles R. Kime, Tom Martin, Logic & Computer Design Fundamentals, 5th ed, Prentice Hall, 2015
2.   Ronald J. Tocci, Neal S. Widmer, and Gregory L. Moss, Digital Systems: Principles and Applications, 11th Ed., Prentice Hall, 2010
3.   Modul Praktikum Dasar Sistem Digital

ENEE613017
ENEE603006
PROBABILITAS DAN PROSES STOKASTIK (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep probabilitas dan proses stokastik pada bidang teknik elektro.
Topik:
Sebaran kemungkinan, fungsi variable acak, distribusi probabilitas diskrit dan kontinu, normal, Poison, gamma, Chi-kuadrat, Beta logaritmis Weibull, transformasi distribusi probabilitas, sebaran sampling Estimasi satu dan dua sampel, uji hipotesa satu dan dua sample, regresi linear dan korelasinya, model stokastik, Autoregressive Moving Average, Model Autoregressive, Model Moving Average, rantai Markov.

Prasyarat: Kalkulus, Aljabar Linear
Buku Ajar:
1. R. D. Yates and D. J. Goodman, "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", 2nd Edition, Wiley, 2004.
2. J. A. Gubner, "Probability and Random Processes for Electrical and Computer Engineers", Cambridge, 2006.
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye, "Probability & Statistics for Engineering & Scientists, 7th Edition", Pearson Education International, USA, 2002

ENEE612007
ENEE603007
MATEMATIKA TEKNIK (4SKS)
Capaian Pembelajaran:
Mampu menerapkan persamaan diferensial dan beberapa transformasi fungsi untuk pemecahan permasalahan di bidang teknik elektro
Topik:
Persamaan Differential Biasa (Koefisien Konstan dan Tidak Konstan), Persamaan Differential Partial, Persamaan Difference, Transformasi Laplace, Deret Fourier, Transformasi Fourier, Transformasi Z
Prasyarat: Kalkulus, Aljabar Linear
Buku ajar:
 1. Erwin Kreyszig, "Advanced Engineering Mathematics," 9th Edition, Wiley Publisher 2006.
 2. Glyn James, "Advanced Modern Engineering Mathematics," Second Edition, Prentice Hall Publisher 1999.

ENEE612006
ENEE603008
DIVAIS SEMIKONDUKTOR (2 SKS)

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Capaian Pembelajaran:
Mahasiswa mampu menerapkan konsep fisik pada Konsep Ikatan Mampu menerapkan konsep fisis dalam Elektronika bahan semikonduktor; Persambungan metal-semikonduktor; Persambungan p-n; Arus pada persambungan p-n; Transistor bipolar: karakteristik dasar; Sistem metal-oxide-semiconductor; Metal-Oxide-Semiconductor Field-Effect Transistor; 8 Perkembangan Divais Elektronika

Topik:
Konsep Ikatan
Elektronika bahan semikonduktor; Persambungan metal-semikonduktor; Persambungan p-n; Arus pada persambungan p-n; Transistor bipolar: karakteristik dasar; Sistem metal-oxide-semiconductor; Metal-Oxide-Semiconductor Field-Effect Transistor; 8 Perkembangan Divais Elektronika

Prasyarat: Tidak ada

Buku Ajar:
1. Howe, R. T., and C. G. Sodini, *"Microelectronics: An Integrated Approach"*. Upper Saddle River, NJ: Prentice Hall, 1996.
2. Fonstad, C. G. *"Microelectronic Devices and Circuits"*, New York, NY: McGraw-Hill, 1994.

ENEE603009
DASAR SISTEM DIGITAL DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis rangkaian sistem digital sederhana; Mampu membuat rancangan sistem digital menggunakan blok kombinasional dan sekuensial sederhana.

Topik:
Prinsip Aljabar Boolean dan aplikasinya; Interface Logic Families; Number System & Data Encoding; Basic Logic Circuits; Basic Modular Design of Combinational Circuits; Basic Modular Design of Sequential Circuits.
Praktikum: Modul 1 - Pengantar dan Pengenalan Dasar Rangkaian Digital, Modul 2 - Aljabar Boolean dan Gerbang Logika Dasar, Modul 3 - Karnaugh Map, Modul 4 - Gerbang Logika Kompleks, Modul 5 - Dekoder dan Enkoder, Modul 6 - Multiplexer dan Demultiplexer, Modul 7 - Rangkaian Aritmatika Digital, Modul 8 - Flip-Flop dan Latch, Modul 9 - Register dan Counter, Modul 10 - Proyek Praktikum Dasar Sistem Digital

Prasyarat: tidak ada.
Buku Ajar:
1. M. Morris R. Mano, Charles R. Kime, Tom Martin, Logic & Computer Design Fundamentals, 5th ed, Prentice Hall, 2015
2. Ronald J. Tocci, Neal S. Widmer, and Gregory L. Moss, Digital Systems: Principles and Applications, 11th Ed., Prentice Hall, 2010
3. Modul Praktikum Dasar Sistem Digital

ENEE612005
ENEE604010
DASAR KOMPUTER DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan jenis dan fungsi perangkat keras komputer; Mampu membuat rancangan algoritma untuk menyelesaikan masalah komputasi dan manipulasi data; Mampu membuat rancangan algoritma: Pseudocode, Flowchart, Perulangan, Seleksi/Pencabangan; Mampu mengimplementasikan algoritma ke dalam bahasa pemrograman tingkat tinggi dan tingkat rendah; Mampu mengimplementasikan Script Matlab; Mampu mengimplementasikan struktur dan pengendalian dalam Bahasa C; Mampu mengimplementasikan pemrograman modular dalam bahasa C.
Topik:
Sejarah computer, Komponen hardware computer, Sistem operasi, Jaringan Komputer; Pseudocode; Flowchart; Perulangan; Seleksi/Pencabangan; Script Matlab; Struktur dan pengendalian dalam bahasa C.

Prasyarat: Dasar Sistem Digital dan Praktikum.
Buku Ajar:
1. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action (TiA)," Second Edition, Prentice-Hall, 2006.
2. Gary B. Shelly and Misty E. Vermaat, "Discovering Computers 2011: Living in a Digital World," Course Technology, Cengage Learning, 2011.
3. Deitel & Deitel, "C How to Program," 5th Edition, Pearson Education, 2007.

ENEE614020
ENEE604011
RANGKAIAN ELEKTRONIKA (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep dasar elektronika; Mampu menganalisis rangkaian elektronika dasar; Mampu menyusun rangkaian elektronika dengan menggunakan divais elektronika

Topik:
Rangkaian dioda rangkaian transistor, konfigurasi rangkaian catu transistor, aplikasi transistor; Frequency Response, rangkaian *amplifier*
Prasyarat: Divais Semikonduktor, Rangkaian Listrik 1, Rangkaian Listrik 2
Buku Ajar:
Boylestad R, Nashhelsky L (2006), Electronic Devices and Circuit Theory 9th Edition, Prentice Hall, New Jersey, USA.

ENEE604012
PRAKTIKUM RANGKAIAN ELEKTRONIKA (1 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep dasar elektronika; Mampu mempraktikkan cara kerja dioda, transistor, konfigurasi rangkaian, tanggapan frekuensi, *amplifier*; Mampu menggunakan alat ukur elektronika
Topik:
Rangkaian dioda rangkaian transistor, konfigurasi rangkaian catu transistor, aplikasi transistor; tanggapan frekuensi, rangkaian *amplifier*.
Prasyarat: Rangkaian Elektronika.
Buku Ajar:
Modul Praktikum Rangkaian Elektronika – Laboratorium Elektronika.

ENEE614022
ENEE604013
ELEKTROMAGNETIKA (4SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep fisis untuk bidang teknik elektro; Mampu menerapkan persamaan Maxwell pada penyelesaian permasalahan variasi waktu dalam bentuk integral dan differensial, penyimpanan energi, dan medan kuasi statik serta analisis gelombang dalam domain waktu.
Topik:
Electrostatic, Magnetostatic, Electromagnetic dynamic, Plane Waves, Hukum Maxwell, Electromagnetic Interference, Saluran Transmisi
Prasyarat: Analisis Vektor dan Peubah Kompleks
Buku Ajar:
   1.   Stuart M. Wentworth, "Fundamentals of Electromagnetics with Engineering Applications", John Wiley, 2005.
   2.   Fawwaz T Ulaby, "Fundamental of Applied Electromagnetics", Prentice Hall Publications, 2001.

ENEE614026
ENEE604014
SINYAL DAN SISTEM (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep fisis untuk bidang teknik elektro; Mampu menerapkan konsep sistem linear untuk pengolahan sinyal dan desain filter digital

Topik:
Jenis-jenis sinyal dan sistem, karakteristik sistem linier waktu tetap (LTI), review transformasi Fourier, discrete time fourier transform, digital fourier transform, Laplace, sampling dan rekonstruksi sinyal waktu diskrit, transformasi Z, disain filter analog.

Prasyarat: Matematika Teknik

Buku Ajar:
1. Simon Haykin & Barry Van Veen, "Signals and System", 2nd Edition John Wiley & Sons Publisher, 2003.
2. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signals and Systems", Prentice Hall; 2nd Edition, 1996.

ENEE611004
ENEE604015
MATERIAL LISTRIK (2 SKS)
Capaian Pembelajaran:
Mampu menjelaskan klasifikasi material listrik; Mampu menganalisis permasalahan material listrik;
Topik:
Deskripsi material listrik, ikatan molekul, susunan atom dalam benda padat, polarisasi dielektrik, klasifikasi material listrik
Prasyarat: -
Buku Ajar:
Rudy Setiabudy, "Material Teknik Listrik", UI Press, 2007
R. E. Hummel, "Electronic Properties of Materials", Third Edition, Springer, 2000

ENEE614025
ENEE605016
KOMPUTASI NUMERIK (2 SKS)
Capaian Pembelajaran:
Mampu menerapkan metode numerik dalam bentuk perancangan algoritma komputasi dan manipulasi data;

Topik:
Perancangan Algoritma untuk: Metode numerik untuk pencarian akar, Metode numerik untuk penyelesaian sistem persamaan linear, Metode numerik pencarian curve fitting, metode numerik untuk integral dan differential, metode numerik untuk persamaan differential biasa; Konsep Interpolasi
Prasyarat: Matematika Teknik, Dasar Komputer

Buku Ajar:
Steven Chapra, Raymond Canale. "Numerical Methods for Engineer 7th Edition", McGraw Hill. 2014.

ENEE613015
ENEE605017
TEKNIK TELEKOMUNIKASI (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep dasar teknik telekomunikasi; Mampu menerapkan konsep sistem komunikasi secara global; Mampu menganalisis modulasi analog dan digital; Mampu menjelaskan sistem telefoni; Mampu mengkalkulasi PCM dan TDM, Digital Line Coding; Mampu menganalisis jaringan telekomunikasi: Telepon dasar, teknik penyambungan, teknik pensinyalan, konsep antrian, jaringan komunikasi radio, *microwave*, dan serat optik
Topik:
Sistem komunikasi secara global; modulasi analog dan digital; sistem telefoni; PCM dan TDM; Digital Line Coding; jaringan telekomunikasi: telepon dasar, teknik penyambungan, pensinyalan, dan konsep antrian; jaringan komunikasi radio, *microwave*, dan serat optik

Prasyarat: Probabilitas dan Proses Stokastik, Matematika Teknik, dan Elektromagnetika
Buku Ajar:
1. Simon Haykin, "Communication Systems", 5th Edition, John Wiley & Sons Inc., 2008.
2. Roger L. Freeman, "Telecommunication Systems Engineering", 4th Edition, John Wiley & Sons Inc., 2004.

ENEE613013
ENEE605018
TEKNIK TENAGA LISTRIK (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan konsep ketenagalistrikan yang mencakup pembangkitan, transmisi dan distribusi; Mampu menghitung parameter mesin-mesin listrik.

Topik:
Dasar Mekanis dan Elektromagnetik, Rangkaian Tiga Fasa, Transformator, Dasar-dasar Mesin Arus Bolak Balik, Mesin Sinkron, Operasi Paralel dari Generator Sinkron, Motor Induksi, Motor Arus Searah, Saluran Transmisi, Persamaan dan Representasi Sistem, Pengenalan Studi Aliran Daya, Gangguan Simetris dan Asimetris

Prasyarat: Rangkaian Listrik.
Buku Ajar:
S. J. Chapman, "Electric Machinery and Power System Fundamentals," McGraw-Hill Science/ Engineering/Math, 2001.

ENEE613014
ENEE605019
PRAKTIKUM TEKNIK TENAGA LISTRIK (1 SKS)
Capaian Pembelajaran:
Mampu menguji karakteristik mesin-mesin listrik; Mampu mengklasifikasikan mesin-mesin listrik

Topik:
Transformator, Mesin Arus Searah, Mesin Sinkron, Mesin Induksi

Prasyarat: Rangkaian Listrik.

Buku Ajar:
Modul Praktikum Teknik Tenaga Listrik- Laboratorium Konversi Energi Tenaga Listrik

ENEE614018
ENEE605020
TEKNIK KENDALI (3 SKS)
Capaian Pembelajaran:
Mampu menerapkan konsep dasar kendali; Mampu menerapkan konsep diagram blok, Time Response, kestabilan sistem dan steady-state error, root locus, respons frekuensi; Mampu mendesain pengendali dengan diagram bode, dan mampu menganalisis state-space, mampu mendesain pengendali state-space, .

Topik:
Diagram blok; Time Response; Kestabilan sistem; Steady-state error; Root locus; Respons frekuensi; Desain pengendali dengan root locus; Desain pengendali dengan diagram bode; Analisis model state-space; Desain pengendali state-space; Desain Observer

Prasyarat: Matematika Teknik
Buku Ajar:
1.   N. Nise, "Control Systems Engineering", 4th Edition, Wiley, 2005.
2.   Katsuhiko Ogata, "Modern Control Engineering" 4th Edition, Prentice Hall, 2002.

ENEE614019
ENEE605021
PRAKTIKUM TEKNIK KENDALI (1 SKS)
Capaian Pembelajaran:
Mampu menggunakan perangkat akuisisi data; Mampu menerapkan tanggapan waktu, kestabilan sistem dan kesalahan tunak, root locus, tanggapan frekuensi, desain pengendali dengan root locus, desain pengendali dengan diagram bode, pengenalan PLC, state-space.

Topik:
Tanggapan waktu, kestabilan sistem dan kesalahan tunak, root locus, tanggapan frekuensi, desain pengendali dengan root locus, desain pengendali dengan diagram bode, pengenalan PLC, state-space

Prasyarat: Teknik Kendali
Buku Ajar:

FACULTY OF ENGINEERING

Laboratory Workbook–Control Systems Laboratory.

ENEE613010
ENEE605022
ALGORITMA DAN PEMROGRAMAN (4 SKS)
Capaian Pembelajaran:
Mampu membuat rancangan algoritma untuk menyelesaikan masalah komputasi dan manipulasi data; Mampu men-erapkan konsep: Modular; Iterasi dan Rekursi; Sorting; Searching; Array; Pointers; Linked List
Topik:
Modular; Iterasi dan Rekursi; Sorting; Searching; Array; Pointers; Linked List; Struktur data statik dan dinamik dalam bahasa C
Prasyarat: Dasar Komputer.
Buku Ajar:
1. Thomas H. Cormen, "Introduction to Algorithms", 3rd Edition, MIT Press, 2009
2. Robert Sedgewick & Kevin Wayne, "Algorithms", 4th Ed., Addison-Wesley Professional, 2011

ENEE616033
ENEE606024
PEMODELAN DAN SIMULASI (3 SKS)
Capaian Pembelajaran:
Mampu membangun model matematika sistem, mampu melakukan analisis model matematik sistem, mampu membangun simulasi berdasarkan model matematik,
mampu menganalisis simulasi sistem.

Topik:
dasar pemodelan dan simulasi, metode pemodelan sistem fisik, analisis model sistem dinamik non-linear, simulasi model dinamik dengan Matlab/Simulink,
pemodelan data, identifikasi sistem, metode ekplorasi data, metode optimasi kuadrat terkecil, validasi model, pemodelan data dengan Matlab/Simulink.

Prasyarat: Komputasi Numerik
Buku Ajar:
1. Harold Klee, Randal Allen," Simulation of Dynamic Systems with MATLAB and Simulink", CRC Press, 2011
2. William J. Palm III, "System Dynamics", 2nd Edition", McGraw-Hill, 2005.
3. John A. Sokolowski, Catherine M. Banks, "Modeling And Simulation Fundamentals ", John Wiley & Sons, 2010

ENEE613016
ENEE606025
PRAKTIKUM TEKNIK TELEKOMUNIKASI (1 SKS)
Capaian Pembelajaran:
Mampu mempraktikkan konsep dasar teknik telekomunikasi; Mampu mempraktikkan distem komunikasi secara global; modulasi analog dan digital; sistem telefoni; PCM dan TDM; Digital Line Coding; jaringan telekomunikasi: jaringan telekomunikasi: Telepon dasar, teknik penyambungan, teknik pensinyalan, konsep antrian, jaringan komu-nikasi radio, *microwave*, dan serat optic; Mampu menggunakan alat ukur telekomunikasi.

Topik:
Sistem komunikasi secara global; modulasi analog dan digital; Sistem telefoni; PCM dan TDM; Digital Line Coding; FIR Filter; parameter antena dan simulasi kanal komunikasi nirkabel dan menggunakan perangkat lunak radio mo-bile; sistem komunikasi optik.

Prasyarat: Teknik Telekomunikasi
Buku Ajar:
Laboratory Workbook–Telecommunication Engineering Laboratory.

ENEE615027
ENEE606026
MIKROPROSESOR DAN MIKROKONTROLER (4 SKS)
Capaian Pembelajaran:

Mampu mengimplementasikan algoritma ke dalam bahasa pemrograman tingkat tinggi dan tingkat rendah; Mampu mengimplementasikan mode pengalamatan Mikroprosessor dan pemrograman dalam bahasa Assembly untuk Mikroprosesor.

Topik:

Mode Pengalamatan Mikroprosesor; Pemrograman Bahasa Assembly untuk Mikroprosesor

Prasyarat: Dasar Komputer

Buku Ajar:

1. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV Architecture, Programming, and Interfacing, Seventh Edition, Brey, Barry, B., PHI Inc, USA, 2006.

2. The 8051 Microcontroller and Embedded Systems, Second Edition, Muhammad Ali Mazidi, Prentice Hall, 2006

ENEE615028
ENEE606027
PRAKTIKUM MIKROPROSESOR AND MIKROKONTROLER (1 SKS)
Capaian Pembelajaran:
Mampu mengimplementasikan algoritma ke dalam bahasa pemrograman tingkat tinggi dan tingkat rendah; Mampu mempraktikkan mode pengalamatan Mikroprosessor dan pemrograman dalam bahasa Assembly untuk Microprosessor.
Topik:
Mode Pengalamatan Mikroprosesor; Pemrograman Bahasa Assembly untuk Mikroprosesor.
Prasyarat: Mikroprosesor dan Mikrokontroler
Buku Ajar:
1. Modul Praktikum Mikroprosesor dan Mikrokontroler, Laboratorium Digital Departemen Teknik Elektro.
2. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV Architecture, Programming, and Interfacing,"7th Edition, PHI Inc, USA, 2006.
3. Muhammad Ali Mazidi, "The 8051 Microcontroller and Embedded Systems," Second Edition, Prentice Hall, 2006.

ENEE614023
ENEE606028
PENGUKURAN BESARAN LISTRIK (2 SKS)
Capaian Pembelajaran:
Mampu menjelaskan filosofi pengukuran besaran listrik; Mampu menghitung ambang batas besaran listrik yang aman; Mampu menganalisis rangkaian pengukuran
Topik:
Pengenalan Instrumen Pengukuran, Kesalahan/error dalam pengukuran, Keamanan dan Keselamatan Kerja dalam Pengukuran Listrik, Alat Ukur Besaran Listrik secara Umum, Pengukuran Tahanan Pentanahan (Grounding Resistance), Oscilloscope, Alat ukur Digital
Prasyarat: Rangkaian Elektronika.
Buku Ajar:
1. Rudy Setiabudy, "Pengukuran Besaran Listrik," LP-FEUI, 2007.
2. Klaas B. Klaassen, "Electronic Measurement and Instrumentation," Cambridge University Press, 1996.

ENEE606029
PRAKTIKUM PENGUKURAN BESARAN LISTRIK (1 SKS)
Capaian Pembelajaran:
Mampu mengukur besaran-besaran listrik utama; Mampu memilih alat ukur yang sesuai dengan kebutuhan pengukuran Topik:

Topik:
Alat ukur 1 fasa, alat ukur 3 fasa, alat ukur energi dan daya, alat ukur pentanahan

Prasyarat:
Pengukuran Besaran Listrik
Buku Ajar:

Modul Praktikum Pengukuran Besaran Listrik - Laboratorium Tegangan Tinggi dan Pengukuran Listrik.

ENEE617037
ENEE607031
REKAYASA DAN KEWIRAUSAHAAN (2 SKS)
Capaian Pembelajaran:
Mampu mengimplementasikan konsep dan keterampilan kewirausahaan dalam bidang teknik elektro; Mampu melakukan analisis dan membuat rencana bisnis dalam inovasi expertise/product yang sesuai dengan perkembangan teknologi informasi; Mampu mengimplementasikan konsep dan keterampilan kewirausahaan dalam bidang teknik elektro
Topik:
Charging for Expertise, Think, Plan, Act Like Entrepreneur, Making a Business Successful, Taking the Initiative, Enabling an E-Business, Providing Outsource Services & Building a Contracting Business, kuliah tamu

Prasyarat: Tidak ada
Buku Ajar:
1. New Venture Creation – Entrepreneurship for the 21st Century, 6th Edition, J.A. Timmons and S. Spinelli, McGraw-Hill Irvin, 2004.
2. Materi kuliah yang diberikan oleh praktisi wirausaha

ENEE611002
ENEE607032
PENULISAN ILMIAH (3 SKS)
Capaian Pembelajaran:
Mampu menulis karya ilmiah dengan struktur yang baik
Mampu menuliskan langkah-langkah penelitian dengan rinci dan terstruktur; mampu mengolah data penelitian dengan tools statistic
Topik:
sistematika penulisan ilmiah; experimental variables and set up; statistical analysis tools, Penggunaan bahasa Indonesia yang baik dalam karya ilmiah; Penggunaan bahasa Inggris dalam karya ilmiah, word processing software; styling; referencing tools
Prasyarat: Tidak ada
Buku Ajar:

PEMINATAN
TEKNIK TELEKOMUNIKASI

ENEE606301
TEKNIK PENGKODEAN DAN APLIKASI (3 SKS)
Capaian Pembelajaran:
Mampu menjabarkan jenis-jenis pengkodean; Mampu menganalisis teknik pengkodean digunakan pada kompresi data dan komunikasi yang handal.
Topik:
Information measures, source and channel models, various source coding schemes including Huffman coding, run-length coding, linear predictive coding, transform coding, and various channel coding schemes including cyclic codes, BCH codes, and convolutional codes. Trellis Coded Modulation. Application for Speech Coding, Image and Video Coding.
Prasyarat: Probabilitas dan Proses Stokastik
Buku Ajar:
1. Andre Neubauer, "Coding Theory: Algorithms, Architectures and Applications", Wiley-Interscience, 2007.
2. Thomas M. Cover & Joy A. Thomas, "Elements of Information Theory", Wiley-Interscience, 2006.
3. Jorge Castineira Moreira & Patric Guy Farrel, "Essentials of Error Control Coding", John Wiley & Son Pub., 2006.

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ENEE615030
ENEE606302
JARINGAN KOMUNIKASI (3 SKS)
Capaian Pembelajaran:
Mampu menjabarkan konsep matematika dengan kaitannya dengan konsep jariingan komunikasi; Mampu menjelaskan konsep circuit switching dan packet switching serta konsep-konsep terkait dengan trafik komunikasi; Mampu menjelaskan konsep antrian dan teori-teori antrian untuk jaringan komunikasi; Mampu menjelaskan konsep dan mekanisme QoS pada jaringan komunikasi
Topik:
Matematika untuk jaringan, Konsep jaringan komunikasi (layerisasi); Circuit Switched and Packet Switched, konsep trafik komunikasi (Erlang B, Erlang C, Engset, Bernoulli, dll); Berbagai teori antrian (M/M/1, M/M/c, M/G/1, M/G/c, dll); Konseprantai Markov untuk jaringan komunikasi, konsep dan mekanisme penjaminan QoS jaringan komunikasi.
Prasyarat: Teknik Telekomunikasi.
Buku Ajar:
1. James R. Boucher, "Traffic System Design Handbook," IEEE Press,1993
2. Piet Van Mieghem, "Performance Analysis of Communication Networks and Systems," Cambridge University Press, 2006, USA
3. Jean Walrand, "An Introduction to Queueing Networks," Prentice-Hall Int'l, USA, 1988

ENEE606303
KOMUNIKASI MULTIMEDIA PITA LEBAR (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis konsep multimedia pita lebar.
Topik:
Konsep multimedia, teknologi TCP/IP, protokol jaringan, ATM, Frame Relay, MPLS, broadband wireless access technologies, metro ethernet, NGN and IMS, Konsep QoS, Resource management, QoS, mekanisme kerja dan cara penjaminannya, model jaringan multimedia, komponen kinerja throughput, kapasitas.
Prasyarat: Teknik Telekomunikasi.
Buku ajar:
1. Guojun Lu, "Communication and Computing for Distributed Multimedia Systems," John Wiley and Sons
2. Luis Correia, "Mobile Broadband Multimedia Networks," Elsevier, UK, 2006

ENEE607304
ANTENA DAN PROPAGASI (3 SKS)
Capaian Pembelajaran:
Mampu menjabarkankan propagasi gelombang dan sistem transmisi serta implikasinya pada kinerja sistem komunikasi; Mampu menjelaskan berbagai mekanisme propagasi gelombang elektromagnetik; Mampu menjelaskan prinsip kerja antenna dan parameter kinerja antenna; Mampu menjabarkan berbagai jenis antena sebagai alat untuk mentransmisikan sinyal; Mampu menghitung kinerja sistem antena sederhan baik secara teori maupun aplikasi; Mampu menghitung kinerja antenna elemen tunggal seperti dipol, loop, yagi, antenna corong, antenna slot dan antenna mikrostrip; Mampu merancang antenna sederhana dan mengukurnya; Mampu menganalisis jenis propagasi gelombang dan memilih antena yang tepat untuk system komunikasi wireless.
Topik:
Prinsip kerja antena, parameter dasar antena, teknik pengukuran antena, beberapa jenis antena: antena dipole, monopole, antena susun, aperture antena dan antena dengan reflector. Propagasi gelombang radio (ground wave, surface wave, sky wave, space wave, microwave and millimeter wave);
Prasyarat: Elektromagnetika
Buku ajar:
1. Constantine A. Balanis, "Antenna Theory, Analysis and Design," Third Edition, John Willey and Son, Inc., 2005.
2. Saunders R. Simon, "Antennas and Propagation for Wireless Communication Systems," First Edition, John Wiley and Son, Inc., 1999.
3. Jurnal IEEE transaction Antenna and Propagation

ENEE607305
KOMUNIKASI OPTIK (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan media transmisi wired/fiber optik serta prinsip kerjanya; Mampu menjelaskan komponen

23

sistem komunikasi optic; Mampu menganalisis sistem komunikasi optik

Topik:
Struktur dan fiber optik waveguide, degradasi sinyal dalam fiber optik, sumber optik, Komponen-komponen optik, Komunikasi fiber optik koheren; Teknik-teknik sistem modern; Teknik dan teori pengkodean; Analisis kinerja sistem komunikasi optikal
Prasyarat: Elektromagnetika danTeknik Telekomunikasi.
Buku Ajar:
   1. Govind P. Agrawal, "Fiber-Optic Communication Systems", 3rd Edition, Wiley Interscience, 2002.
   2. G. Keiser, "Optical Fiber Communications", 3rd Edition, McGraw Hill, 2000.

ENEE608308
KOMUNIKASI BERGERAK DAN NIRKABEL (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan berbagai jenis komunikasi wireless, konsep seluler, komponen komunikasi wireless; Mampu menjelaskan konsep, teknik dan komponen-komponen komunikasi nirkabel dan bergerak; Mampu menganalisis kinerja sistem komunikasi wireless bergerak.
Topik:
Overview of Wireless Communications, Cellular Concept/Fundamentals, Large Scale Fading/Path Loss, Small Scale Fading, Modulation Techniques, Equalization, Diversity, Channel Coding / Error Control Coding Overview, Multiple Access, Emerging Wireless Technologies: WLAN, 3G and WCDMA, 4G and LTE, Mobile Adhoc Networks, Body Area Networks and Mobile Health, Future Wireless System.

Prasyarat: Teknik Telekomunikasi
Buku ajar:
1. T. S. Rappaport, "Wireless Communications: Principles and Practice", Upper Saddle River, New Jersey: Prentice Hall, 2nd Ed., 2002.
2. A. Goldsmith, "Wireless Communications," Cambridge University Press, 2005.
3. W. Stallings, "Wireless Communications and Networks", Prentice Hall, 2nd Ed., 2005.

ENEE616035
ENEE608307
DIVAIS SISTEM KOMUNIKASI (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis berbagai subsistem perangkat komunikasi; Mampu menganalisis saluran transmisi, rangkaian penyesuai, resonantor, filter, amplifier, LNA, osilator, mixer; Mampu merancang subsistem perangkat sistem komunikasi gelombang radio berbasis komponen aktif; Mampu menganalisis, amplifier, LNA, osilator, mixer.
Topik:
Komponen pasif gelombang radio sederhana, komponen aktif gelombang radio sederhana
Prasyarat: Elektromagnetika, Rangkaian Elektronika, Teknik Telekomunikasi.
Buku ajar:
   1. D. M. Pozar, "Microwave Engineering", Addison-Wesley, 1998.
   2. Gonzalez, "Microwave Transistor Amplifiers: Analysis and Design", 2nd Edition, Prentice Hall, 1997.

ENEE607306
TOPIK KHUSUS TELEKOMUNIKASI 1 (3 SKS)
Capaian Pembelajaran:
Mampu mengikuti perkembangan industri telekomunikasi dan menerapkannya; Mampu mengikuti perkembangan aspek teknologi terkini bidang telekomunikasi;
Topik:
Isu-isu terkini tentang aspek-aspek teknologi telekomunikasi
Prasyarat: Tidak ada
Buku Ajar: Tidak ada

ENEE608309
TOPIK KHUSUS TELEKOMUNIKASI 2 (3 SKS)
Capaian Pembelajaran:
Mampu mengikuti perkembangan industri telekomunikasi dan menerapkannya; Mampu mengikuti perkembangan terkini bisnis dan regulasi telekomunikasi.
Topik:
Isu-isu terkini tentang bisnis dan regulasi telekomunikasi.
Prasyarat: Tidak ada
Buku Ajar: Tidak ada

PEMINATAN
TEKNIK TENAGA LISTRIK

ENEE615031
ENEE606102
ELEKTRONIKA DAYA DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu merancang aplikasi sederhana bidang tenaga listrik; Mampu menjelaskan filosofi peralatan elektronika daya; Mampu menghitung parameter pada rangkaian elektronika daya; Mampu merancang rangkaian sederhana menggunakan peralatan elektronika daya

Topik:
Pengenalan elektronika daya, komponen elektronika daya, konvertor AC-AC, konvertor AC-DC, konvertor DC-DC, konvertor DC-AC, aplikasi elektronika daya

Prasyarat: Teknik Tenaga Listrik, Rangkaian Elektronika
Listrik.
Buku Ajar:
1. Muhammad H. Rashid, "Power Electronics Circuit, Devices and Applications," Prentice Hall Fourth Edition, 2013.
2.   Modul Praktikum Elektronika Daya - Laboratorium Konversi Energi Listrik

ENEE606103
MANAJEMEN DAN EKONOMI TEKNIK (3 SKS)
Capaian Pembelajaran:
Mampu mengklasifikasikan bidang energi; Mampu menjelaskan dasar-dasar manajemen dan bisnis; Mampu menghitung keekonomian dalam ketenagalistrikan; Mampu menganalisis perbandingan alternatif teknologi; Mampu menganalisis alternatif penggantian; Mampu menganalisis teknologi terkini di bidang konversi energi; Mampu menghitung keekonomian sumber energi; Mampu menganalisis potensi sumber energi.
Topik:
Konsep dasar manajemen, jenis organisasi, sumber daya organisasi, konsep ekonomi, korelasi nilai uang dan waktu, studi perbandingan, analisis penggantian, dasar-dasar manajemen energi, biaya energi, perhitungan potensi energi
Prasyarat: Tidak ada.
Buku Ajar:
1. William G. Sullivan, Elin M. Wicks, James T. Luxhoj, "Engineering Economy," 13th Edition, Pearson Education International, 2006.
2. Andrew C. Paine, John V. Chelsom, Lawrence R.P. Reavill, "Management for Engineers," John Wiley and Sons, 1996.

ENEE617038
ENEE607104
SISTEM TENAGA LISTRIK DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis medan listrik dan magnet tinggi pada sistem tenaga listrik; Mampu menjelaskan filosofi sistem tenaga listrik; Mampu menghitung parameter-parameter jaringan tenaga listrik; Mampu menganalisis sistem jaringan tenaga listrik; Mampu menemukan solusi permasalahan kualitas daya listrik; Mampu menganalisis sumber gangguan pada pembangkitan, transmisi, dan distribusi listrik; Mampu meminimalkan efek gangguan pada sistem tenaga

listrik

Topik:
Fenomena medan listrik dan medan magnet pada sistem tenaga listrik, efek medan magnet dan medan listrik pada sistem tenaga listrik, mitigasi efek medan magnet dan medan listrik
Sumber-sumber gangguan pada sistem tenaga listrik, efek-efek gangguan pada sistem tenaga listrik Mitigasi efek gangguan pada sistem tenaga listrik

Prasyarat: Matematika Teknik, Teknik Tenaga Listrik
Buku Ajar: B.M. Weedy, B.J. Cory, "Electric Power Systems," 4th Edition, John Wiley and Sons, 2001.

ENEE606101
KONVERSI ENERGI LISTRIK (3 SKS)
Capaian Pembelajaran:
Mampu mengklasifikasikan bidang energi; Mampu menguraikan berbagai macam jenis energi sebagai pembangkit listrik; Mampu mengkalkulasi berbagai macam potensi energi sebagai pembangkit listrik; Mampu menganalisis proses konversi energi listrik;
Mampu menerapkan prinsip konversi energi listrik; Mampu menganalisis teknologi terkini di bidang konversi energi.
Topik:
Dasar konversi energi, Sumber-sumber Energi, Energi baru dan terbarukan, Teknologi Konversi Pembangkit Tenaga Listrik, Pembangkit Listrik Termal, Pembangkit Listrik non-termal.
Prasyarat: Teknik Tenaga Listrik.
Buku Ajar:
1. Djiteng Marsudi, "Pembangkitan Energi Listrik," Penerbit Erlangga, 2005.
2. Abdul Kadir, "Pembangkitan Tenaga Listrik," Penerbit UI, 1996.
3. D. Yogi Goswami, □Frank Kreith, "Energy Conversion," Penerbit CRC Press, 2007.
4. Bent Sørensen, "Renewable Energy Conversion, Transmission and Storage," Penerbit Elsevier, 2007.

ENEE607106
Instalasi Listrik Bangunan
Capaian Pembelajaran:
Mampu membuat perencanaan instalasi listrik bangunan; Mampu menghitung besaran parameter instalasi listrik pada bangunan; Mampu merinci bagian-bagian instalasi listrik bangunan

Topik:
Dasar instalasi listrik, komponen instalasi listrik, persyaratan instalasi listrik, pengamanan instalasi listrik, teknologi tata cahaya, teknologi keamanan dan keselamatan, serta tata cara instalasi listrik bangunan
Prasyarat: Teknik Tenaga Listrik
Buku Ajar:
1. William K Y Tao, Richard R Janis, "Mechanical and Electrical System in Building," Prentice Hall 1997.
2. Brian Scaddan, "Electrical Installation Work". Elsevier Publishing, 2005.

ENEE607105
TEKNIK TEGANGAN DAN ARUS TINGGI DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis medan listrik dan magnet tinggi pada sistem tenaga listrik; Mampu menjelaskan fenomena medan listrik dan medan magnet tinggi; Mampu menguji peralatan tenaga listrik; Mampu menganalisis tentang terjadinya interference akibat fenomena medan tinggi.

Topik:
Konsep tegangan tinggi, pengujian tegangan tinggi, pembangkitan tegangan tinggi, pembangkit impuls, pengujian arus searah dan arus bolak balik, pengujian peralatan listrik

Prasyarat: Elektromagnetika, Teknik Tenaga Listrik
Buku Ajar:
1. Artono Arismunandar, "Teknik Tegangan Tinggi," Pradnya Paramita, Jakarta, Cetakan

ke-7, 1994.
2.   E. Kuffel, W.S. Zaengl, "High Voltage Engineering Fundamentals," Pergamon Press, 1984.
3.   Modul Praktikum Teknik Arus dan Tegangan Tinggi - Laboratorium Tegangan Tinggi dan Pengukuran Listrik.

ENEE608109
PROTEKSI SISTEM TENAGA LISTRIK (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan filosofi proteksi sistem tenaga listrik; Mampu menghitung sistem proteksi listrik; Mampu mengevaluasi sistem proteksi tenaga listrik; Mampu merancang sistem proteksi tenaga listrik.
Topik:
Filosofi proteksi listrik, jenis-jenis rele proteksi, prinsip kerja rele proteksi, penyetelan rele proteksi, prinsip koordinasi rele proteksi
Prasyarat: Teknik Tenaga Listrik
Buku Ajar:
   1.   G.E.C. Alsthom, "Protective Relays Application Guide," U.K., 2015

ENEE608108
DISTRIBUSI DAN TRANSMISI TENAGA LISTRIK (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan filosofi distribusi dan transmisi sistem tenaga listrik; Mampu menghitung parameter transmisi dan distribusi; Mampu menganalisis transmisi dan distribusi sistem tenaga listrik.
Topik:
Pengenalan Transmisi dan Distribusi daya Listrik, Sirkuit Tiga Phasa, Induktansi, Kapasitansi dan Resistansi pada Jaringan Transmisi, Karakteristik Kinerja Jaringan Transmisi, Transformator Distribusi, Jaringan Distribusi Tenaga Listrik.

Prasyarat: Teknik Tenaga Listrik
Buku Ajar:
1.   Luces M. Faulkenberry, Walter Coffer, "Electric Power Distribution and Transmission," Prentice Hall, 1996.
2.   Iwa Garniwa, "Perancangan Peralatan Distribusi Tenaga Listrik," Penerbit–Laboratorium Tegangan Tinggi dan Pengukuran Listrik, Departemen Teknik Elektro, FTUI, 2008.
2.   Iwa Garniwa, "Perancangan Peralatan Transmisi Tenaga Listrik," Penerbit–Laboratorium Tegangan Tinggi dan Pengukuran Listrik, Departemen Teknik Elektro, FTUI, 2008.

ENEE607107
TOPIK KHUSUS TENAGA LISTRIK 1 (2 SKS)
Capaian Pembelajaran:
Mampu mengidentifikasi permasalahan bidang energi; Mampu menemukan metode pemecahan masalah di bidang energi.
Topik:
Disesuaikan dengan kebutuhan dan perkembangan teknologi ketenagalistrikan, dan dapat diberikan oleh beberapa pengajar tamu
Prasyarat: Teknik Tenaga Listrik
Buku Ajar: Tidak ada.

ENEE608110
TOPIK KHUSUS TENAGA LISTRIK 2 (2 SKS)
Capaian Pembelajaran:
Mampu merancang aplikasi sederhana pada bidang energi dan ketenagalistrikan.
Topik: Disesuaikan dengan kebutuhan dan perkembangan teknologi ketenagalistrikan, dan dapat diberikan oleh beberapa pengajar tamu
Prasyarat: Teknik Tenaga Listrik
Buku Ajar: Tidak ada.

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TEKNIK ELEKTRONIKA

ENEE617040
ENEE606202
DIVAIS FOTONIK (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan prinsip kerja fotonika pasif dan aktif
Mampu menerapkan prinsip matematika dan fisika untuk menghitung peubah divais fotonika
Mampu menentukan peubah divais fotonika
Mampu menjelaskan divais fotonika pasif: serta optik, kisi (grating), polarisator; dan divais fotonika aktif: laser, LED, dan photodetector
Mampu menghitung peubah divais fotonik menggunakan teori cahaya: hukum Snellius, hukum Fresnel, persamaan Fermat, polarisasi
Mampu menentukan peubah NA, atenuasi, pengertian moda, dispersi, dispersif power, resolving power, free spectral range, koherensi, vektor dan matrix Jones
Topik:
Teori cahaya: hukum Snellius, hukum Fresnel, hukum Maxwell, persamaan Fermat, polarisasi, difraksi, NA, atenuasi, pengertian moda, dispersi, dispersif power, resolving power, free spectral range, koherensi, vektor, matrix Jones, Divais fotonika pasif: serta optik, kisi (grating), polarisator; Divais fotonika aktif: laser diode, LED dan photodetector.
Prasyarat: Divais semikonduktor
Buku ajar:
1. B.E.A. Saleh and M.C. Teich, "Fundamentals of Photonics," New York, NY: John Wiley and Sons, 1991. ISBN: 0471839655.
2. D. Griffiths, "Introduction to Quantum Mechanics," Second Edition, Upper Saddle River, NJ: Prentice Hall, 1995, ISBN: 0131118927.
3. Modul Praktikum Pilihan - Laboratorium Elektronika

ENEE607205
VLSI (3 SKS)
Capaian Pembelajaran:
Mampu membuat rancangan rangkaian VLSI
Topik:
Review fabrikasi divais semikonduktor pada CMOS, Aturan perancangan, Scale of Lambda, Asynchrony, Perancangan Gerbang Logika, Inverter, NAND, NOR, Full custom design, Semi custom design, Validasi, Packaging/IO, Desain untuk fabrikasi, pemodelan kesalahan dan desain pengetesan, Pengkodean untuk sintesis, Perkiraan karakteristik dan kinerja rangkaian, Optimisasi desain level tinggi, Programmable logic array, Design subsystem CMOS, Properties of Logic: Area, Power, Delay, Optimisasi waktu, Mesin sekuensial, dan Struktur VLSI regular.
Prasyarat: Rangkaian Elektronika, Fabrikasi divais semikonduktor
Buku ajar:
N. Weiste & Kamran Eshraghian, "Principles of CMOS VLSI Design: A perspective," Second Edition, Addison Wesley 2002.

ENEE606201
RANGKAIAN ELEKTRONIKA LANJUT (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis: rangkaian terintegrasi, rangkaian digital dengan MOSFET, rangkaian digital bipolar, power amplifier, filter aktif orde tinggi, oscillator, rangkaian Schmidt Trigger, voltage regulator; Mampu mendesain: rangkaian terintegrasi, rangkaian digital dengan MOSFET, rangkaian digital bipolar, power amplifier, filter aktif orde tinggi, oscillator, rangkaian Schmidt Trigger, voltage regulator.
Topik:
Rangkaian terintegrasi, rangkaian digital dengan MOSFET, rangkaian digital bipolar, power amplifier, filter aktif orde tinggi, oscillator, rangkaian Schmidt Trigger, voltage regulator
Prasyarat: Rangkaian Elektronika
Buku ajar:
Boylestad R, Nashhelsky L, "Electronic Devices and Circuit Theory 9th Edition," Prentice Hall, New Jersey, USA,

2006.

ENEE616034
ENEE607204
PENGANTAR NANOELEKTRONIK (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis perkembangan terkini di bidang elektronikadan fotonika; Mampu menganalisis cara kerja divais nanoelektronika dan nanofotonika.
Topik:
Teknologi nano dan aplikasinya di bidang elektronika, dari mikro ke nano, miniaturisasi divais elektronika, scaling dimensi transistor, cara kerja single electron transistor, cara kerja elektronika molekular, fabrikasi dan karakterisasi divais nano, teknologi nano dan aplikasinya di bidang fotonika, cara kerja single-photon detector, cara kerja OLED
Prasyarat: Divais Semikonduktor, Fabrikasi Divais Semikonduktor
Buku ajar:
1. Massimiliano Di Ventra, et al. Introduction to NST ch.11 Kluwer Acad. Publisher 2004.
2. Vladimir V. Mitin, Viatcheslav A. Kochelap, Michael A. Stroscio, "Introduction to Nanoelectronics", Cambridge University Press, 2008

ENEE606203
FABRIKASI DIVAIS SEMIKONDUKTOR DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Mampu menjelaskan proses fabrikasi divais semikonduktor; Mampu membuat rancangan proses fabrikasi semikonduktor pada divais mikroelektronika; Mampu menggunakan perangkat perancangan proses fabrikasi.
Topik:
Sejarah industri semikonduktor, bahan semikonduktor, penumbuhan Kristal dan preparasi wafer, pengendalian kontaminasi, oksidasi, lithography, diffusion, ion implantation, etching, deposition, penggunaan aplikasi Supreme ver.4.

Prasyarat: Divais Elektronika.
Buku Ajar:
1. Peter Van Zant, "Microchip Fabrication," 8th Edition, International Edition, McGraw-Hill, 2004.
2. Modul Praktikum Fabrikasi divais semikonduktor - Laboratorium Elektronika

ENEE608207
SEL SURYA (3 SKS)
Capaian Pembelajaran:
Mampu mengidentifikasi daerah kerja suatu divais sel surya; Mampu menghitung parameter batas efisiensi, rugi-rugi daya dalam sebuah rancangan divais sel surya; Mampu menganalisis cara kerja dan unjuk kerja sel surya, desain dan fabrikasi sel surya silicon.

Topik:
Cara kerja sel surya, Parameter batas efisiensi, rugi-rugi daya dalam sebuah rancangan divais sel surya, daerah kerja divais sel surya, desain solar sel silikon, dan fabrikasi solar sel silikon

Prasyarat: Rangkaian Elektronika, Fabrikasi Divais Semikonduktor
Buku ajar:
Marten A. Green, "Solar Cells Operating Principles, Technology and System Applications", UNSW, 1998.

ENEE608309
MEMS (3 SKS)
Capaian Pembelajaran:
Mampu membuat rancangan rangkaian MEMS;
Topik:
Latar belakang perkembangan MEMS, bahan-bahan elektronika dan pemrosesannya, bahan-bahan MEMS dan persiapannya, teknologi mikroelektronika standar, buk silicon micromachining, surface silicon micromachining, mik-

rostereolithografi MEMS, mikrosensor, devais SAW, SAW pada benda padat, pengukuran parameter mikrosensor IDT, Fabrikasi mikrosensor IDT, Mikrosensor IDT, smart sensor dan MEMS.

Prasyarat: Rangkaian Elektronika, Fabrikasi Divais Semikonduktor

Buku Ajar:

Julian W. Gardner, Vijay K. Varadan, and Osama O. Awadelkarim, "Microsensors, MEMS and Smart Devices," Wiley; 1 edition (December 15, 2001), ISBN-10: 047186109X, ISBN-13: 978-0471861096.

ENEE607306

TOPIK KHUSUS ELEKTRONIKA 1 (2 SKS)

Capaian Pembelajaran:

Mampu menganalisis perkembangan teknologi divais dan sistem fotonika; Mampu menganalisis sistem fotonika dasar untuk fungsi tertentu

Topik:

Topik-topik terkini perkembangan teknologi divais dan sistem fotonika

Prasyarat: Rangkaian Elektronika

Buku Ajar:

ENEE607309

TOPIK KHUSUS ELEKTRONIKA 2 (2 SKS)

Capaian Pembelajaran:

Mampu menganalisis perkembangan terkini di bidang elektronika;

Topik:

Topik-topik terkini perkembangan teknologi divais dan sistem elektronika

Prasyarat: Rangkaian Elektronika

Buku Ajar: -

PEMINATAN

TEKNIK KENDALI

ENEE607405

SISTEM KENDALI PREDIKTIF DAN ADAPTIF (3 SKS)

Capaian Pembelajaran:

Mampu mengidentifikasi model dan penerapan adaptif dan prediktif; Mampu menganalisis sistem kendali diskrit, kestabilan sistem non-linier menggunakan metode Lyapunov; Mampu merancang pengendali diskrit adaptif dan prediktif; Mampu mengevaluasi kinerja sistem kendali adaptif dan prediktif.

Topik:

Konsep dasar kendali adaptif dan prediktif, estimasi parameter rekursif, metode penempatan kutub, metode variansi minimum, dynamic matrix control, model algorithmic control, generalized predictive control, kendali prediktif ruang keadaan.

Prasyarat: Teknik Kendali

Buku ajar:

1.   P.E. Wellstead and M.B. Zarrop, "Self-tuning Systems: Control and Signal Processing", John Wiley and Sons, 1991.

2.   J.M. Maciejowski, "Predictive control with constraints", Prentice Hall, 2000

ENEE615029

ENEE606401

SISTEM KENDALI DIGITAL (3 SKS)

Capaian Pembelajaran:
Mampu menganalisis sistem kendali diskrit; Mampu menjelaskan karakteristik sistem diskrit; Mampu menganalisis kestabilan sistem diskrit; Mampu merancang pengendali diskrit sederhana; Mampu membuat rancangan pengendali diskrit dengan metode: root locus, dan pole placement; Mampu membuat rancangan state observer diskrit Full order observer, dan Reduced order observer

Topik:
Konsep dasar sistem kendali digital, review transformasi-z, discrete time transfer functions, metode realisasi sistem kendali diskrit, Transient and steady state response, analisis kestabilan sistem diskrit, metode tempat kedudukan akar diskrit, desain pengendali metode tempat kedudukan akar diskrit, model ruang keadaan diskrit, bentuk kanonik, analisis model ruang keadaan diskrit (nilai eigen, controllability, observability), metode pole-placement diskrit, desain observer diskrit.

Prasyarat: Teknik Kendali.
Buku ajar:
Ogata, K. "Discrete Time Control Systems", Prentice Hall, 2002.

ENEE617039
ENEE606402
SISTEM KENDALI PROSES (3 SKS)
Capaian Pembelajaran:
Mampu mengidentifikasi model sistem dinamik proses industri; Mampu menjelaskan teknik pengukuran sistem dinamik proses industri; Mampu menjelaskan karakteristik proses industri; Mampu menggambarkan sistem proses industri; Mampu mengidentifikasi metode pemodelan proses industri

Topik:
Karakteristik proses dan permasalahannya, metode pengukuran proses, sensor dan transmitter, pengkondisian sinyal dan instalasinya, pemodelan proses industri, pengendali PID, penalaan pengendali PID, cascade control, feedforward control, smith predictor, variasi pengendali lain.

Prasyarat: Teknik Kendali
Buku Ajar:
1. Curtis D. Johnson, "Process Control and Instrumentations", 8th Edition, Prentice Hall Inc. 2005.
2. Carlos A.Smith and Armando B.Corripio, "Principles and Practice of Automatic Process Control", 3rd Edition, John Wiley & Sons, Inc. 2005.

ENEE607404
ROBOTIKA (3 SKS)
Capaian Pembelajaran:
Mampu mengidentifikasi kebutuhan komponen robotika; Mampu menganalisis kinematika robot; Mampu mengevaluasi sistem penggerak robotika; Mampu merancang sistem kendali terintegrasi pada sistem robotika sederhana; Mampu merancang kinematika robotika.

Topik:
komponen sistem otomasi robotika (aktuator, sensor, pengendali), prinsip kerja sistem robotika, kinematika robot, sistem kontrol robotika (position control) berbasis kinematika robot, interkoneksi komponen sistem robotika, teknik perancangan robot, pemrograman robot, simulasi dengan OpenGL, pengenalan robot tingkat tinggi.

Prasyarat: Teknik Kendali, Algoritma dan Pemrograman.
Buku ajar:
1.	Robotika: desain, kontrol, dan kecerdasan buatan, penerbit Andi, karangan Endra Pitowarno, 2006.
2.	Introduction to Robotics: mechanics and control, 3rd Edition, John Craig, Pearson, 2009.

ENEE606403
SISTEM KENDALI PENGGERAK ELEKTRIK (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis komponen pengendali dan komponen sistem penggerak listrik; Mampu mengevaluasi performa

sistem penggerak elektrik dengan simulasi; Mampu mengevaluasi sistem penggerak motor sederhana.
Topik:
Sistem penggerak elektrik, pemodelan motor listrik (DC, PMSM, IM), sirkuit transfer daya (PWM inverter 3 fasa), servo motor DC brushless, pengendali kecepatan dan posisi, konsep reference frame, pengendali vektor, simulasi sistem penggerak elektrik.

Prasyarat: Teknik Kendali.
Buku ajar:
1. Peter Vas, "Electrical Machines and Drives: A Space-Vector Theory Approach", Oxford University Press UK, 1993.
2. Peter Vas, "Sensorless Vector and Direct Torque Control", Oxford University Press, 1998.

ENEE608407
MEKATRONIKA (3 SKS)
Capaian Pembelajaran:
Mampu menganalisis komponen pengendali; Mampu menganalisis keterbatasan komponen sistem mekatronika; Mampu merancang sistem kendali terintegrasi pada sistem mekatronika sederhana; Mampu merancang sistem meka-tronika untuk aplikasi robotika dengan mengakomodir keterbatasan komponen.

Topik:
Pengenalan sistem mekatronika, karakteristik dan keterbatasan sistem mekatronika
Metode peningkatan kehandalan komponen sistem mekatronika, desain sistem mekatronika, pemodelan sistem elektromekanik, desain dan pengembangan perangkat lunak aplikasi, kontrol compliant, telerobotik, kontrol bilat-eral.
Prasyarat: Robotika
Buku ajar:
Robert Bishop, "Mechatronics and Introduction", 2006.

ENEE608408
SISTEM BERBASIS PENGETAHUAN (3 SKS)
Capaian Pembelajaran:
Mampu mengidentifikasi model sistem dinamik berbasis pengetahuan; Mampu menganalisis performa jaringan saraf tiruan; Mampu menerapkan algoritma dalam bahasa pemrograman untuk sistem berbasis pengetahuan.

Topics:
sel neuron, sistem kerja, arsitektur jaringan saraf tiruan (JST); metoda pembelajaran JST; back propagation neu-ral networks (BPNN); algoritma dan analisis fungsi error, pemrograman BPNN dalam matlab; optimasi parameter; aplikasi program bpnn sebagai sistem pengenal pola, sistem kendali berbasis jaringan syaraf tiruan: analisis peng-gunaan metoda BPNN sebagai sistem kendali, identifikasi sistem berbasis jaringan syaraf tiruan: representasi data dan penggunaan BPNN sebagai sistem identifikasi, pengembangan program sistem identifikasi menggunakan BPNN, pengembangan sistem kendali berbasis BPNN dan analisis teori dan aplikasinya, pengembangan program sistem ken-dali menggunakan BPNN, integrasi sistem kendali berbasis BPNN.

Prasyarat: Teknik Kendali, Algoritma dan Pemrograman
Buku ajar:
1.	Lefteri H.,Tsoukalas and Robert E. Uhrig, "Fuzzy and Neural Approaches in Engineering", John Wiley & Sons, Inc., Singapore, 1997.
2.	John Yen and Reza Langari, "Fuzzy Logic, Intelligence, Control and Information", Prentice Hall, Inc. New Jersey, 1999.

ENEE607406
TOPIK KHUSUS KENDALI 1 (2 SKS)
Capaian Pembelajaran:
Mampu mengikuti perkembangan teknologi kendali dan penerapannya; Mampu mengikuti perkembangan aspek teknologi kendali terkini.
Topik:
Isu-isu terkini tentang aspek-aspek teknologi kendali

Prasyarat: Tidak ada
Buku Ajar: Tidak ada

ENEE608409
TOPIK KHUSUS KENDALI 2 (2 SKS)
Capaian Pembelajaran:
Mampu mengikuti perkembangan teknologi kendali dan penerapannya; Mampu mengikuti perkembangan terkini bisnis teknologi kendali.
Topik:
Isu-isu terkini tentang bisnis teknologi kendali.
Prasyarat: Tidak ada
Buku Ajar: Tidak ada

PEMINATAN
TEKNIK BIOMEDIK

ENEE606502
SISTEM KOMUNIKASI MEDIK (3 SKS)
Capaian Pembelajaran:
- Mampu menjelaskan konsep beberapa teknologi sistem komunikasi untuk aplikasi medis
- Mampu menjelaskan sistem e-healthcare dan telemedicine
- Mampu menjelaskan proses perancangan sistem komunikasi medis kabel/nirkabel
Mampu membuat rancangan melalui simulasi perancangan perangkat medis

Topik:
Introduction to medical communication system, e-healthcare and telemedicine. Several special topics will be delivered include body-centric wireless communications, electromagnetic properties and modeling of the human body, portable wearable devices, medical implant communication systems, e-healthcare infrastructure, wireless body area network, mobile-based telemedicine system, and wireless power technology in medical devices.
Sistem komunikasi off, on dan in body dan cara memodelkan melalui simulasi
Prasyarat: -
Buku Ajar:
1. E-Healthcare Systems and Wireless Communications: Current and Future Challenges, Mohamed K. Watfa, Publisher: IGI Global, 2012.
2. Antennas and Propagation for Body Centric Wireless Communications, P.S. Hall, Publisher: Artech House, 2006.

ENEE607504
TEKNOLOGI PENCITRAAN MEDIK (3 SKS)
Capaian Pembelajaran:
Setelah mendapatkan mata kuliah ini diharapkan mahasiswa:
1. Mampu memahami beberapa konsep dasar di dalam teknologi pencitraan medis
2. Mampu menjelaskan dan menganalisis metode dasar pemrosesan citra medis dalam merekonstruksi, memperbaiki kualitas citra, membuat segmentasi citra, analisis citra, visualisasi citra, dan mengelola data citra medis dalam rangka mendukung proses pencitraan/imaging medis di bidang kesehatan
Mampu menerapkan metode di ilmu dasar biologi dan keteknikan untuk sistem aplikasi medis
Mampu mengintegrasikan rangkaian dan divais elektronika untuk perangkat/instrumen biomedik
Mampu membuat simulasi metode pencitraan pada perangkat medis
Mampu membuat laporan hasil simulasi dari proyek kecil
Mampu menganalisis sinyal informasi di dalam sistem medis untuk mengolah sinyal medis dengan teknik pengolahan sinyal
Topik:
Introduction to Medical Imaging Technologies (X-Ray and CT, MRI, Ultrasound, PET and SPECT, Electrical Impedance Tomography), Image formation and Reconstruction (Acquisition, Digitization, Image Reconstruction Methods), Image Enhancement (Fundamentals of enhancement techniques, Image enhancement with linear, nonlinear, fixed, adaptive, and pixel-based methods), Image Segmentation and Analysis (Fundamentals of Medical Image Segmentation,

Image preprocessing and acquisition artifacts, Thresholding, Edge-based techniques, Region-based segmentation, Classification, Morphological Methods for Biomedical Image Analysis), Image Visualization (2-dimensional visualization, 3-dimensional visualization methods: surface rendering, volume rendering, Algorithm for 3-D visualization), Image Management (Fundamentals of Standards Compression Storage and Communication, Image archive and retrieval, three-dimensional compression).

Pemrosesan citra medis, akuisisi artifak, thresholding, Edge-based techniques, Region-based segmentation, Classification,

Metode-metode proses pembentukan citra dan analisisnya

Pembentukan citra, alat-alat pencitraan medik

Formasi citra dari sinyal medis, visualisasi citra dan analisis

Prasyarat: -

Buku Ajar:
1. Handbook of Medical Imaging: Processing and Analysis Management, Isaac Bankman, Academic Press 2000, CA, USA.
2. Handbook of Medical Imaging, Vol. 2: Medical Image Processing and Analysis, M. Sonka & J.M. Fitzpatrick, SPIE Press, 2009, Washington, USA.

ENEE606501
BIOLOGI DAN ANATOMI (3 SKS)
Capaian Pembelajaran:
Memberikan Pengetahuan dasar mengenai mekanisme Biologi dan Anatomi dari sisi perekayasa.
Tujuan Instruksional:
a. Mampu menjelaskan konsep dasar tentang sel, biologi molecular, biokimia dan rekayasa genetika
b. Memiliki pengetahuan comprehensive mengenai komponen penting, dan berbagai macam fungsi dari sistem molecular sel.
c. Memiliki pengetahuan tentang teknik-teknik dan pendekatan-pendekatan yang sering digunakan dalam sel biologi molecular.
d. Menerapkan pengetahuan Biologi untuk Teknik Biomedik dan Ilmu kesehatan.
Mampu menjelaskan fenomena dalam dunia medis dengan pendekatan Biologi dan Anatomi organ manusia
Mampu membuat laporan makalah
Mampu menjelaskan fenomena dalam dunia medis dengan pendekatan Biologi dan Anatomi organ manusia

Topik:Molekul-molekul penyusun sel, struktur dan fungsi protein, metabolisme di dalam sel, perubahan pada sel; Desain Molekul penyusun kehidupan, biokimia dan revolusi genetik, DNA, keterkaitan biokimia dengan biodiversitas, sintesis protein dari asam nukleat menjadi sekuen asam amino-.2, RNA polymerase hingga ribosom untuk sintesis protein, perbedaan prokariotik dan eukariotik; Reaksi Katalisis pada sel: protease, nucleoside monophosphate kinases; Kimia Mekanik pada sel: how protein motors convert chemical energy into mechanical work.
Pengertian anatomi manusia, Sitologi dan Histologi, Osteologi, Arthrologi, Miologi, Sistem Pencernaan, Sistem Pernafasan, Sistem Peredaran darah.
Molekul-molekul penyusun sel dan Anatomi organ tubuh manusia

Prasyarat: -
Buku Ajar:
1. Alberts, 2003, Molecular Biology of the cell.
2. Lodish, 2004, Molecular cell biology.
3. G.W. Jenkins, C.P. Kemnitz, G.J. Tortora, Anatomy and Physiology: From Science to Life, John Wiley & Sons: 2nd Ed. 2010.

ENEE607505
PEMODELAN SISTEM MEDIK (3 SKS)
Capaian Pembelajaran:
Mahasiswa memahami komponen-komponen sistem medis, memahami model matematik sistem medis, memahami metode pemodelan sistem medis, mampu melakukan pemodelan sistem medis sederhana dan mampu mensimulasikan.
Mampu menerapkan algoritma untuk perangkat/instrumen biomedik
Mampu membuat laporan hasil coding program

Topik: Pengenalan model sistem dan sinyal medis, model matematika umum sistem dan sinyal, pemodelan analitik

sistem medis, analisis model analitik, metode identifikasi sistem medis, metode estimasi parameter model, simulasi model sistem medis.

Pemodelan analitik sistem medis

Analisis model analitik, metode identifikasi sistem medis, metode estimasi parameter model, simulasi model sistem medis.

Prasyarat: -

Buku Ajar:
1. David T. Westwick, Robert E. Kearney, "Identification of Nonlinear Physiological Systems," John Wiley & Sons 2003.
2. Willem van Meurs, "Modeling and Simulation in Biomedical Engineering: Applications in Cardiorespiratory Physiology," 1st ed., McGraw-Hill Education, 2011

ENEE608508
INFORMATIKA MEDIK (3 SKS)
Capaian Pembelajaran:
Setelah mendapatkan mata kuliah ini diharapkan mahasiswa:
1. Mampu memahami konsep dasar teknologi informasi untuk diaplikasikan di bidang kesehatan
2. Mampu menerapkan metode dasar informatika dengan menggunakan pengetahuan dasar pemrograman untuk mengakuisisi, mengorganisasi, menggabungkan, dan menganalisis sumber-sumber data kesehatan

Mampu menerapkan algoritma untuk perangkat/instrumen biomedik

Mampu menerapkan prinsip dasar di biologi dalam konsep teknologi medis

Mampu menjelaskan ilmu dasar teknik biomedik

Mampu menerapkan konsep ilmu dasar ke dalam prinsip-prinsip di biomedik

Topik: Introduction to Medical Informatics, Controlled Medical Terminology, The Electronic Health Record (EHR), Health Information Systems in Clinical Settings, Health Information Systems in Public Health, Informatics Issues in Virtual Healthcare, Telemedicine, and Expert Systems, Medical Informatics and Clinical Decision Making, Future Technologies, Fundamental Algorithms & Methods of Medical Informatics, Medical Data Resources: Acquisition, Processing, and Classification.

Pengantar informatika medik dan konsep metodenya

Algoritma dan metode informatika medik

Prasyarat: -

Buku Ajar:
1. Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics) 4th ed. 2014 Edition.
2. Method in Medical Informatics: Fundamentals of Healthcare Programming in Perl, Python, and Ruby, Jules Berman, CRC Press 2010.

ENEE606503
PENGANTAR TEKNOLOGI BIOMEDIK (3 SKS)
Capaian Pembelajaran:
Setelah selesai mengikuti Mata Kuliah ini, mahasiswa mampu:
1. Memahami sistem teknologi biomedik
2. Menjelaskan konsep aplikasi sistem rekayasa untuk masalah-masalah biologi manusia
3. Mengilustrasikan konsep deteksi, pengukuran, dan monitoring sinyal fisiologis manusia
4. Mengemukakan konsep interpreatasi diagnosis melalui teknik pemrosesan sinyal data-data bioelektrik
5. Menjelaskan konsep divais-divais untuk terapi dan rehabilitasi
6. Membuat analisis berdasarkan data komputer dari data pasien dalam rangka pembuatan keputusan secara klinis
7. Menjelaskan konsep divais untuk organ artifisial
8. Menelaah konsep teknik pencitraan medis

Mampu menerapkan prinsip dasar di biologi dalam konsep teknologi medis

Mampu menjelaskan ilmu dasar teknik biomedik

Mampu menerapkan konsep ilmu dasar ke dalam prinsip-prinsip di biomedik

Topik: Physiologic Systems, Bioelectric Phenomena, Introduction to Biomechanics & Biomaterials, Introduction to Biomedical Sensors, Biomedical Signal Analysis, Introduction to Medical Imaging, Medical Instruments and Devices.

Prasyarat: -

Buku Ajar:
1. The Biomedical Engineering Handbook, J.D. Bronzino & D.R. Peterson, 4th Ed., CRC Press, 2015.
2. Standard Handbook of Biomedical Engineering and Design, M. Kutz, McGraw-Hill, 2003.
3. Handbook of Biomedical Engineering, J. Kline, Academic Press, 1988.

ENEE608507
INSTRUMENTASI BIOMEDIK DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran:
Setelah mengikuti dengan sungguh-sungguh Mata Kuliah ini, mahasiswa mampu:
1. Memahami sistem pengukuran biomedis
2. Memahami dan mengaplikasikan beragam jenis pengukuran sistem kardiovaskular
3. Memahami dan mengaplikasikan beragam jenis pengukuran sistem respirasi
4. Memahami dan mengaplikasikan beragam jenis sistem syaraf.
5. Memahami faktor-faktor keselamatan pasien yang harus diperhatikan dalam pengukuran
Mampu menerapkan prinsip dasar di biologi dalam konsep teknologi medis
Mampu menjelaskan ilmu dasar teknik biomedik

Mampu menerapkan konsep ilmu dasar ke dalam prinsip-prinsip di biomedik
Mampu mengoperasikan peralatan medis
Mampu mengintegrasikan rangkaian dan divais elektronika untuk perangkat/instrumen biomedik
Mampu membuat rancangan melalui simulasi perancangan perangkat medis
Topik: Introduction to biomedical instrumentation; basic transducer principle (active and passive transducer, transducer for biomedical application; source of bioelectric potensials; electrodes; the cardiovascular system; cardiovascular measurement; measurement in respiratory system; non invasive diagnostic instrumentation; measurement in nervous system; sensory and behavioural measurements; electrical safety of medical equipment; role of laser in healthcare.

Prasyarat: -

Buku Ajar:
1. Biomedical Instrumentation and Measurement, Leslie Cromwell, Fred J. Weibel and Erich A. Pleiffer, Prentice Hall, New Jersey.
2. Handbook of Biomedical Instrumentation, RS Khanpur, Tata McGraw-Hill Education, 2003.

ENEE608509
TOPIK KHUSUS BIOMEDIK (3 SKS)
Capaian Pembelajaran:
Mata kuliah ini memberikan pemahaman tentang prinsip fisis yang mendasari proses dan mekanisme biologis (pergerakan, desain, struktur, material dan transport).
Pada akhir kuliah, mahasiswa diharapkan mampu:
- Menerapkan prinsip biomekanis untuk menyelesaikan permasalahan dalam pergerakan manusia dan muskoloskletal seperti ergonomis, rehabilitasi dan pelatihan.

- Menggunakan secara efektif dan aman instrumentasi biomekanik dan peralatan untuk mengakuisisi/menilai pergerakan manusia.

- Memahami trend permasalahan di masa mendatang tentang biomekanik.

Mampu menjelaskan fenomena dalam dunia medis dengan pendekatan Biologi dan Anatomi organ manusia

Topik:
Hukum Newton, Mekanika Fluida: Bernoulli, Drag Forces, Reynold Number, Mekanika Sistem Statik dan Sistem Bergerak (Moving), Kinetika dan Gaya pada Tubuh serta Pengaruh pada Gerakan dan Stabilitas, Dasar Matematika pada Gerakan/Movement, Analisis dan instrumentasi pada gerakan (motion) tubuh, Konsep dasar dari mekanika otot tulang tubuh manusia, Ergometry, Konsep dasar energy.
Prasyarat: -
Buku Ajar:

1. N. Ozkaya, and M. Nordin, "Fundamental of Biomechanics: Equilibrium, Motion and Deformation", 2nd Ed., Springer, 1998.
2. E. Okuno, and L. Fratin, "Biomechanics of the Human Body", Springer, 2013.

ENEE618102
REKAYASA PERANGKAT LUNAK (3 SKS)
Capaian Pembelajaran: Pada kuliah ini, mahasiswa akan mempelajari cara merancang perangkat lunak dengan tahapan yang benar dan mampu mendokumentasikannya. Setelah mengikuti kuliah ini, mahasiswa akan mampu membuat rancangan perangkat lunak menggunakan tahapan software life cycle yang benar dengan tingkat risiko yang diinginkan, mampu membuat rancangan perangkat lunak dengan tahapan yang benar; mampu mendokumenta-sikan tahapan rancangan perangkat lunak
Topik: Hardware and software processes; Requirements analysis and elicitation; System specifications; System architectural design and evaluation; Concurrent hardware and software design; System integration,Software testing and validation; Maintainability, sustainability, manufacturability
Prasyarat: Algoritma dan Pemrograman
Buku Acuan:
1. Ian Sommerville, Software Engineering, 10th Ed., Pearson, April 3, 2015
2. Robert C. Martin, Agile Software Development, Principles, Patterns, and Practices, Pearson 2002

ENEE617101
PEMROGRAMAN BERORIENTASI OBJEK DAN PRAKTIKUM (3 SKS)
Capaian Pembelajaran: Pada kuliah ini akan dipelajari cara membuat program dengan konsep berorientasi objek. Setelah mengikuti kuliah ini mahasiswa mengimplementasikan rancangan perangkat lunak ke dalam bahasa pem-rograman berorientasi objek; Mampu mendeklarasikan konsep pemrograman berorientasi objek (class, construc-tor, scope of variables); Mampu menjabarkan objek-objek dasar (array, array list, koleksi objek, iterator); mampu menjabarkan konsep perancangan class (coupling, kohesi, refactroing, inheritance, polymorph, subtitusi); mampu menerapkan pemrograman berbasis GUI, exception handling dan multithreading.
Topik: Java Language Elements; Java Language Operation; Defining and Using Class; System, Strings, StringBuffer, Math & Wrapper Classes; Array; Class & Inheritance; Design Graphical User Interface & Event Driven; Exceptions; Collections; Threads and Javadoc
Prasyarat: Algoritma dan Pemrograman
Buku Ajar:
1. David J. Barnes, "Objects First with Java: A Practical Introduction Using BlueJ", 5th Ed., Pearson, 2011
2. Bart Baesens et.al., "Beginning Java Programming: The Object-Oriented Approach", Wrox, 2015

KULIAH SPESIAL

ENEE616032
ENEE606023
KERJA PRAKTIK (2 SKS)
Capaian Pembelajaran:
Pada mata kuliah ini mahasiswa akan melakukan magang kerja di industri atau lab yang terkait dengan bidang teknik komputer. Pada mata ajar ini diharapkan mahasiswa mampu menerapkan pengetahuan teknis yang telah diperoleh selama kuliah sebelumnya dan yang materi baru yang diberikan oleh pembimbing kerja praktik. Maha-siswa juga diharapkan mampu menunjukkan profesionalisme dalam bekerja antara lain kemampuan untuk bekerja sama dalam tim, perilaku disiplin, tanggung jawab, inisiatif & minat, kepemimpinan, sikap/tingkah laku terpuji, serta potensi untuk berkembang.
Mampu ikut serta dalam tim untuk menyelesaikan pekerjaan
Mampu bekerja dalam tim; mampu menyampaikan hasil pekerjaan dalam sidang Kerja Praktik
Topik: Tidak ada.
Prasyarat:
Telah lulus 90 SKS.Tempat kerja praktik adalah industri atau lab yang terkait dengan bidang teknik komputer den-gan syarat ada pengawas, penanggung jawab dan pembimbing harian di tempat kerja praktik. Pemilihan tempat kerja praktik diawali dengan proses administratif melalui Departemen Teknik Elektro.
Buku Ajar: Tidak ada.

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ENEE617036
ENEE607030
SEMINAR (2 SKS)
Capaian Pembelajaran:
Mampu membuat proposal rancangan sistem, komponen, dan proses; Mampu menulis proposal penelitian; mampu mempresentasikan proposal penelitian.
Silabus: Tidak ada.
Prasyarat: Telah lulus 90 SKS.
Buku Ajar:
1.   Pedoman Teknis Penulisan Tugas Akhir Mahasiswa Universitas Indonesia.
2.   IEEE Citation Reference.
3.   Ivan Stojmenovic, "How To Write Research Articles in Computing and Engineering Disciplines," IEEE Transactions on Parallel And Distributed Systems, Vol. 21, No. 2, February 2010.

ENEE618041
ENEE608033
SKRIPSI (4 SKS)
Capaian Pembelajaran:
Mampu membuat rancangan sistem, komponen, dan proses; Mampu melaksanakan penelitian yang direncanakan; mampu menganalisis hasil penelitian; mampu menyampaikan hasil penelitian dalam sidang skripsi.
Topik: Tidak ada.
Prasyarat: Telah lulus 120 SKS
Buku Ajar:
1. Pedoman Teknis Penulisan Tugas Akhir Mahasiswa Universitas Indonesia.
    IEEE Citation Reference.
2. Ivan Stojmenovic, "How to Write Research Articles in Computing and Engineering Disciplines," IEEE Transactions on Parallel and Distributed Systems, Vol. 21, No. 2, February 2010.

FACULTY OF
ENGINEERING

THE SYLLABUS
UNIVERSITY COURSES

UIGE600001
MPKT A
Learning Outcomes:
Capable of critical thinking, creative, innovative; have the intellectual curiosity to solve problems at the individual and group level.
Able to provide problem-solving alternative against various problems arising in the environment, society, nation, and country.
Topics:
The power and primacy of the character, the basics of philosophy, logic, foundations of ethics, whether it's human, individual and group, society and culture
Prerequisites: none
Textbook:
  1. Evita e. Singgih, Miranda D.Z., Ade Solihat, Jossy p. Moeis, " Buku Ajar I Kekuatan dan Keutamaan Karakter, Filsafat, Logika dan Etika ", University of Indonesia
  2. Evita e. Singgih, Miranda D.Z., Ade Solihat, Jossy p. Moeis, " Buku Ajar II Manusia sebagai Individu, Kelompok dan Masyarakat ", University of Indonesia

UIGE600002
MPKT B
Learning Outcomes:
Capable of critical thinking, creative, innovative; have the intellectual curiosity to solve problems at the individual and group level.
Able to provide problem-solving alternative against various problems arising in the environment, society, nation, and country.
Topics:
The power and primacy of the character, the basics of philosophy, logic, foundations of ethics, whether it's human, individual and group, society and culture
Prerequisites: none
Textbook:-

UIGE600003
ENGLISH
Learning Outcomes:
Able to use spoken and written English well for both academic and non-academics activities.
Topics:
Study skills: active learner, vocabulary building, word formation and using the dictionary, listening strategies, extensive reading
Grammar: Basic grammar of sentences, clause. Reading: reading skills: skimming, scanning, main ideas, supporting ideas; Note taking reading popular science article, reading an academic text
Listening: short conversation, lecture and note-taking, news broadcast, short story
Speaking: discussion, giving presentation
Writing: summary of short articles, self-describing graphs and tables, academic paragraphs, essays
Prerequisites: none
Textbook:

UIGE600020 – UIGE600048
SPORTS/ARTS
See the academic guidebook of Faculty of Engineering

UIGE600010 - UIGE600015
RELIGION
See the academic guidebook of Faculty of Engineering

FACULTY COURSES

ENGE600003
CALCULUS (4 CREDITS)

FACULTY OF
ENGINEERING

Learning Outcomes:
Able to apply advanced mathematical concepts for electrical engineering; Able to apply mathematical concepts of functions and limits, derivative (single/multivariable) and its applications, integrals (single/multifold) and its applications, Taylor series, and Maclaurin series
Topics:
Functions and limits, Derivative (single/multivariable) and applications, integrals (single/multifold) and its applications, Taylor and Maclaurin series
Prerequisites: none
Textbook: none

ENGE600004
LINEAR ALGEBRA (4 CREDITS)
Learning Outcomes:
Able to apply the concept of Linear equations systems, Determinants, vector spaces, the space Results In Time, value and Eigen Vectors, as well as a Linear transformation
Topics:
The concept of Linear equations System, Determinants, vector spaces, the space Results in Time, value and Eigen Vectors, Linear transformation
Prerequisites: none
Textbook: none

ENGE600005
PHYSICS (MECHANICS AND THERMAL) (3 CREDITS)
Learning Outcomes:
Able to apply the concepts of basic physics, mechanics and thermodynamics in understanding nature and engineering phenomena including its applications.
Topics:
Mechanics of motion, gravity, the potential energy of the particle dynamical, works and energy, momentum, rotational motion, collision, kinematics and dynamic, angular momentum Physics Heat-Sound, temperature, heat, laws of thermodynamics I and II, kinetic gas theory I and II, Modern Physics-Quantum
Prerequisites: none
Textbook:
Haliday, Resnick, Walker, and *Principles of Physics 9th Edition,* Wiley, 2011.

ENGE600006
PHYSICS (MECHANICS AND THERMAL) LAB
See the academic guidebook of Faculty of Engineering

ENGE600007
PHYSICS (ELECTRICITY, MWO) (3 CREDITS)
Learning Outcomes:
Able to apply the concepts of basic physics, electricity, magnetism, optics, and waves in understanding nature and engineering phenomena including its applications.
Topics:
A static electric charge, Coulomb, electric field, Gauss law, electric potential, Capacitor and dielectric. Dynamic power, current, and prisoners, Ohm's law, electrical, electrochemical potential difference, the electric circuit. Field magnetism, magnetic motive force and flow, the effects of Hall, law ampere, the intensity of the magnetic field B, Biot-Savart's law, the law of Faraday, inductance, electromagnetics, oscillations, Maxwell's equations.
Prerequisites: none
Textbook:
Haliday, Resnick, Walker, and *Principles of Physics 9th Edition,* Wiley, 2011.

ENGE600008
PHYSICS (ELECTRICITY, MWO) LAB
See the academic guidebook of Faculty of Engineering

ENGE600012
HSE PROTECTION
See the academic guidebook of Faculty of Engineering

ELECTRICAL ENGINEERING COURSES

ENEE611003
ENEE601001
INTRO TO ELECTRICAL ENGINEERING (2 CREDITS)
Learning Outcomes:
Able to explain the basic concepts of electrical engineering and its application in everyday life.
Topics:
Basic concepts and its applications of: Electronics Engineering, telecommunications engineering, Control Engineering, electric engineering and energy, and biomedical engineering.
Prerequisites: none
Textbook:
Diktat Pengantar Teknik Elektro UI

ENEE612008
ENEE602002
ELECTRIC CIRCUITS 1 (3 CREDITS)
Learning Outcomes:
Able to calculate the electric charge, current, and voltage in a series basis; Able to explain voltage source, current source (free/bound), resistors, and capacitors; Being able to compute the independent circuit using the superposition theorem, the transformation of the source, and Thevenin-Norton; Able to calculate the electric circuit analysis using the variables node (current series), mesh, super-node (circuit voltage), super-mesh; Being able to analyze the response time a series order and order-1-2;
Topics:
Concept: current, voltage, power, and energy; Voltage source, current source (free/bound), resistors, and capacitors; Resistive circuit of series and parallel; Analysis of node, super-node, mesh, super-mesh; Superposition theorem, the transformation of the source, and Thevenin-Norton; Response time-order series 1 and 2
Equipment:
Prerequisite: Calculus, Physics (electricity, mwo).
Textbook:
1. David e. Johnson, Johnny r. Johnson, John l. Hilburry, Peter d. Scott, "Electric Circuit Analysis", 3rd Edition, Prentice Hall International, Inc., 1997. (Chapter 1-9)
2. James w. Nilsson, Susan a. Riedel, "Electric Circuits", 6th Edition, Prentice Hall International, Inc., 2000. (Chapter 1-10)

ENEE613009
ENEE603003
ELECTRIC CIRCUITS 2 (3 CREDITS)
Learning Outcomes:
Being able to make a simple electric circuit design; Able to analyze a 3-phase circuit; Able to analyze electric circuit of frequency response order-1 and order-2; Able to analyze basic circuits shared ideal transformer and inductance; Able to make design of passive and active filter circuits by utilizing basic circuits; Able to analyze a 4 poles circuit.
Topics:
3 phase circuits; Laplace transform; frequency response; shared inductance circuits; 1 order filter circuits passive and active; 4 poles circuits.
Prerequisite: Electric Circuits 1, Vector Analysis and Complex Variables.
Textbook:
1. James w. Nilsson, Susan a. Riedel, "Electric Circuits", 6th Edition, Prentice Hall International, Inc., 2000 (Chapter 11-18).
2. David e. Johnson, Johnny r. Johnson, John l. Hilburry, Peter d. Scott, "Electric Circuit Analysis", 3rd Edition, Prentice Hall International, Inc., 1997 (Chapter 10-17).

ENEE613012
ENEE603004
ELECTRIC CIRCUIT LABORATORY (1 CREDITS)
Learning Outcomes:
Able to calculate the electric charge, current, and voltage in a series basis; Able to explain voltage source, current source (free/bound), resistors, and capacitors; Being able to compute the independent circuit using the superposi-

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tion theorem, the transformation of the source, and Thevenin-Norton; Able to analyze circuit ammeter, voltmeter, ohmmeter, and wheat-stone bridge; Able to calculate the electric circuit analysis using the variables node, super-node, mesh, super-mesh;
Topics:
Basic electricity; linearity analysis-mesh and knot; analysis of superposition; Thevenin and Norton; poles series circuits; alternating current circuits; three phases circuits;
Prerequisite: Electric Circuits 1
Textbook: Modul Praktikum Rangkaian Listrik – Laboratorium Tegangan Tinggi dan Pengukuran Listrik.

ENEE613011
ENEE603005
VECTOR ANALYSIS COMPLEX VARIABLE (2SKS)
Learning Outcomes:
Able to apply advanced mathematical concepts to the field of electrical engineering that includes the complex variable, Cauchy-Riemann equation, Integral Cauchy; Able to apply basic vector differential, integral vector (line, surface and volume), Green's theorem, the Divergence theorem, Gauss and Stokes '; Able to apply the concept of Vector calculus, Complex numbers and functions
Topics:
Complex variables, complex numbers and functions, polar form, powers and roots, de Moiv're theorem, dot and cross products, limit. The derivatives, the analytic function. The Cauchy-Riemann equations, Laplace equation, exponential, trigonometric and hyperbolic functions, logarithm and general power. Complex integration, line integrals in complex plane, the Cauchy integral theorem and formula, derivatives of analytic functions. Laurent series, singularities, zeros and infinity, residue integration method and residue, integration of real integrals. With a conformal mapping, Complex analysis and potential theory. Vector differential calculus, vector in 2-space and 3-space. The inner (dot) Product and vector (cross) product, vector and scalar functions and fields. Derivatives, the gradient of scalar fields. Directional derivatives. The divergence and the curl of the vector field. Line integral, the path independence of line integrals. Double integrals, Green's theorem in the plane, the Surfaces for surface integrals, Triple integrals. Divergence theorem of Gauss, Stokes's theorem.
Prerequisite**:** Calculus, Linear Algebra
Textbook:
 1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publishers.
 2. Glyn James, "Advanced Modern Engineering Mathematics", 2nd Edition, Prentice Hall Publishers, 1999.

ENEE613017
ENEE603006
PROBABILITY AND STOCHASTIC PROCESSES (3 CREDITS)
Learning Outcomes:
Able to apply the concepts of probability and stochastic processes in the field of electrical engineering.
Topics:
The distribution function of a random variable, probability, discrete probability distributions, and continuous, normal, Poison, gamma, Chi-squared, Beta logarithm Weibull, the transformation of the probability distribution, the sampling distribution of one and two sample Estimation, hypothesis tests one and two sample, linear regression and stochastic models, its correlation, Autoregressive Moving Average Model, Autoregressive Moving Average models, Markov chains.
Prerequisite: Calculus, Linear Algebra
Textbook:
1. r. d. Yates and d. j. Goodman, "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", 2nd Edition, Wiley, 2004.
2. j. a. Gubner, "Probability and Random Processes for Electrical and Computer Engineers", Cambridge, 2006.
3. Ronald e. Walpole, Raymond h. Myers, Sharon l. Myers, Keying Ye, and "Probability & Statistics for Engineering & Scientists, 7th Edition, Pearson Education International, USA, 2002

ENEE603009
ENEE611001
Fund. of Digital System & Lab (3 SKS)
Learning Outcomes: In this course, students will learn all design phases and implementations of a digital system. At the end of the course, students will be able to analyze simple digital circuits, and able to design digital systems using combinational and simple sequential building blocks. This lecture also involves several practical work in the laboratory to design, implement and verify digital logic systems using digital circuit simulation software.

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Topics: Boolean Algebra Principles and applications; Interface Logic Families; Number System & Data Encoding; Basic Logic Circuits; Basic Modular Design of Combinational Circuits; Basic Modular Design of Sequential Circuits.
Practical work: Module 1-Introduction and introduction to Digital Circuit Basics, Module 2 - Boolean Algebra and Elementary logic gates, Module 3 – Karnaugh Map, Module 4 – complex logic gate, Module 5 - Decoder and Encoder, Module 6 - Multiplexer and De-multiplexer, Module 7- Digital Arithmetic Circuit, Module 8 - Flip-Flop and Latch, Module 9-Registers and Counters, Module 10 – Group Project
Prerequisite: none.
Textbook:
1. M. Morris Mano, r. Charles r. Kime, Tom Martin, Logic & Computer Design Fundamentals, 5th ed., Prentice Hall, 2000
2. Ronald j. Tocci, Neal s. Widmer, and Gregory l. Moss, Digital Systems: Principles and Applications, 11th ed., Prentice Hall, 2010
3. Basics of Digital System Lab. Practice Modules

ENEE612007
ENEE603007
ENGINEERING MATHEMATICS (4SKS)
Learning Outcomes:
Able to apply differential equations and several transformation functions for solving problems in the field of electrical engineering.
Topics:
Ordinary Differential Equations (and Constant Coefficient is not constant), Partial Differential Equations, Difference Equations, Laplace transform, Fourier series, Fourier transform, Z Transformation
Prerequisites : Calculus, Linear Algebra
Textbook:
 1. Erwin Kreyszig, "Advanced Engineering Mathematics," 9th Edition, Wiley Publishers, 2006.
 2. Glyn James, "Advanced Modern Engineering Mathematics," Second Edition, Prentice Hall Publishers, 1999.

ENEE612006
ENEE603008
SEMICONDUCTOR DEVICES (2 CREDITS)
Learning Outcomes:
The student is able to apply the concept of physical Bonds were able to apply the concept of physical semiconductor material in electronics; An extension of the metal-semiconductor; An extension of p-n; An extension of current in p-n; Bipolar transistor: basic characteristics; The system of metal-oxide-semiconductor; Metal-Oxide-Semiconductor Field-Effect Transistors; 8 the development of the Electronic Device
Topics:
The Concept of Bonding, Electronics semiconductor material; An extension of the metal-semiconductor; An extension of p-n; An extension of current in p-n; Bipolar transistor: basic characteristics; The system of metal-oxide-semiconductor; Metal-Oxide-Semiconductor Field-Effect Transistors; 8 the development of the Electronic Device
Prerequisites : No
Textbook:
 1. Howe, r. t., and c. g. Sodini, " *Microelectronics: An Integrated Approach* ". Upper Saddle River, NJ: Prentice Hall, 1996.
 2. Fonstad, C. G. " *Compatible Devices and Circuits* ", New York, NY: McGraw-Hill, 1994.

ENEE603009
FUND. OF DIGITAL SYSTEM & LAB (3 CREDITS)
Learning Outcomes:
Able to analyze a simple digital system circuit; Able to make digital system design using a simple sequential and combinational block.
Topics:
The principles of Boolean and its application; Interface Logic Families; Number System & Data Encoding; Basic Logic Circuits; Basic Modular Design of Combinational Circuits; Basic Modular Design of Sequential Circuits.
Practical work: module 1-Introduction and basic introduction to Digital Circuit, module 2-Boolean Algebra and Elementary logic gates, module 3 – Karnaugh Map, module 4 – logic gate complex, module 5-Decoder and Encoder, Multiplexer and De-multiplexer 6-module 7-Series Digital Arithmetic Module 8-Flip-Flop and Latch, Module 9-Registers and counters, Module 10-Basic Practical Digital System Project
Prerequisite: none.
Textbook:

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1. M. Morris Mano, r. Charles r. Kime, Tom Martin, Logic & Computer Design Fundamentals, 5th ed., Prentice Hall, 2000
2. Ronald j. Tocci, Neal s. Widmer, and Gregory l. Moss, Digital Systems: Principles and Applications, 11th ed., Prentice Hall, 2010
3. Basic Practical Digital systems Module

ENEE612005
ENEE604010
BASIC COMPUTER AND LABORATORY (3 CREDITS)
Learning Outcomes:
Able to explain types and function of computer hardware; Able to make the draft algorithms to solve the problem of computation and manipulation of data; Able to make the draft algorithms: Pseudocode, Flowcharts, Looping, selection/Branching; Able to implement the algorithm into a high level programming language and low level; Able to implement the Matlab Script; Able to implement the structure and control in the language of C; Able to implement modular programming in C language.
Topics:
The history of the computer, computer hardware Components, operating systems, computer networks; Pseudocode; Flowchart; Looping; Selection/Branching; Matlab Script; Structure and control in the C language.
Prerequisite: Basic System digital and Practical.
Textbook:
1. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action (TiA)," Second Edition, Prentice-Hall, 2006.
2. Gary b. Shelly Misty e. Vermaat and, "Discovering Computers 2011: Living in a Digital World," Course Technology, Cengage Learning, 2011.
3. Deitel & Deitel, "C How to Program," 5th Edition, Pearson Education, 2007.

ENEE614020
ENEE604011
ELECTRONIC CIRCUITS (3 CREDITS)
Learning Outcomes:
Able to apply the basic concepts of electronics; Able to analyze basic electronics circuits; Able to compose electronic circuits by using electronic devices

Topics:
Series diode transistor circuits, the circuit configuration of power supply transistors, transistor applications; Frequency Response, a series of *amplifiers*
Prerequisite: Semiconductor device, Power Series 1, Series 2 Electric
Textbook:
Boylestad R, Nashhelsky L (2006), Electronic Devices and Circuit Theory, 9th Edition, Prentice Hall, New Jersey, USA.

ENEE614021
ENEE604012
ELECTRONIC CIRCUITS LABORATORY (1 CREDITS)
Learning Outcomes:
Able to apply the basic concepts of electronics; Being able to practice the workings of a diode, transistor, circuit configuration, frequency response, *amplifiers*; Able to use electronic measuring instrument
Topics:
Series diode transistor circuits, the circuit configuration of power supply transistors, transistor applications; response frequency, the circuit *amplifier*.
Prerequisites : Electronic Circuit.
Textbook:
Electronic Circuit Teaching Modules – Electronic Laboratory.

ENEE614022
ENEE604013
ELECTROMAGNETICS (4SKS)
Learning Outcomes:
Able to apply physical concept for electrical engineering; Able to apply Maxwell's equations on solving the problem of time variation in the form of an integral and differential, energy storage, and quasi static field and analysis of wave in time domain.

Topics:
Electrostatic, Magneto-static, Electromagnetic dynamic, Plane Waves, Maxwell's Laws, Electromagnetic Interference, transmission line
Prerequisite: Complex Variables and Vector analysis
Textbook:
  1. Stuart m. Wentworth, "Fundamentals of Electromagnetics with Engineering Applications", John Wiley, 2005.
  2. Fawwaz T Ulaby, "Fundamentals of Applied Electromagnetics", Prentice Hall Publications, 2001.

ENEE614026
ENEE604014
SIGNAL AND SYSTEMS (3 CREDITS)
Learning Outcomes:
Able to apply physical concept for electrical engineering; Able to apply the concept of linear systems for signal processing and digital filter design

Topics:
Other types of signals and linear systems, the characteristics of the system time fixed (LTI), review of the Fourier transform, the discrete time Fourier transform, digital Fourier transform, Laplace, sampling and reconstruction of discrete time signals, the transformation of analog filter design, Z.

Prerequisite: Engineering Mathematics
Textbook:
1. Simon Haykin & Barry Van Veen, "Signals and systems", 2nd Edition John Wiley & Sons publishers, 2003.
2. Alan v. Oppenheim, Alan s. Willsky, s. Hamid Nawab, "Signals and Systems", Prentice Hall; 2nd Edition, 1996.

ENEE611004
ENEE604015
ELECTRIC MATERIAL (2 CREDITS)
Learning Outcomes:
Able to explain the classification of electric materials; Being able to analyze the problems of electrical material;
Topics:
Description of the electrical material, bonds of the molecule, the arrangement of atoms in the solid, dielectric polarization, electric material classification
Prerequisites:-
Textbook:
Rudy Setiabudy, "Material Teknik Listrik", UI Press, 2007
R. e. Hummel, "Electronic Properties of Materials", Third Edition, Springer, 2000

ENEE614025
ENEE605016
NUMERICAL COMPUTATION (3 CREDITS)
Learning Outcomes:
Able to apply numerical methods in the form design computing algorithms and data manipulation;
Topics:
The design of algorithms for numerical Methods: a search for roots, numerical methods for the resolution of systems of linear equations, numerical methods a search of curve fitting, numerical methods for differential and integral, numerical methods for ordinary differential equations; The Concept Of Interpolation
Prerequisite: Engineering Mathematics, Basic Computer

Textbook:
Steven Chapra, Canale Raymond. "Numerical Methods for Engineers 7th Edition", McGraw Hill. 2014.

ENEE613015
ENEE605017
TELECOMMUNICATION ENGINEERING (3 CREDITS)
Learning Outcomes:
Able to apply the basic concept of telecommunications engineering; Able to apply the concept of global communication systems; Capable of analyzing analog and digital modulation; Able to explain telephony system; Able to calculate the PCM and TDM, Digital Line Coding; Able to analyze telecommunications network: a basic Phone, the technique of grafting, signaling techniques, the concept of Queuing, a communications network radio, *microwave*,

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and fiber optics
Topics:
Global communication systems; analog and digital modulation; telephony system; PCM and TDM; Digital Line Coding; telecommunications network: a basic phone, connection, signaling, and the concept of the queue; communications network radio, *microwave*, and fiber optics

Prerequisites : Probability and stochastic processes, mathematical techniques, and Electromagnetics
Textbook:
1. Simon Haykin, "Communication Systems", 5th Edition, John Wiley & Sons, Inc., 2008.
2. Roger l. Freeman, "Telecommunication Systems Engineering", 4th Edition, John Wiley & Sons, Inc., 2004.

ENEE605018
ELECTRIC POWER ENGINEERING (3 CREDITS)
Learning Outcomes:
Able to explain the concept of electric that includes generation, transmission and distribution; Being able to compute the parameters of electric machines.

Topics:
The basic Mechanical and electromagnetic, circuit of Three phase transformer, the basics of Machine Flow back and forth, Synchronous Machine, Parallel Operation of Synchronous Generators, Induction Motors, direct current Motors, transmission line, equation and Representation system, introduction of a power Flow Study, disturbance of symmetric and Asymmetric

Prerequisite: Electrical Circuits.
Textbook:
S. j. Chapman, "Electric Machinery and Power System Fundamentals," McGraw-Hill Science/Engineering/Math, 2001.

ENEE605019
ELECTRIC POWER ENGINEERING LAB (1 CREDITS)
Learning Outcomes:
Capable of testing characteristics of electric machines; Being able to classify the electrical machines
Topics:
Direct Current Machines, Transformers, Synchronous Machines, Induction Machines

Prerequisite: Electrical Circuits.
Textbook:
Electric Power Engineering Teaching Modules-Power Energy Conversion Laboratory

ENEE614018
ENEE605020
CONTROL ENGINEERING (3 CREDITS)
Learning Outcomes:
Able to apply the basic concept of control; Able to apply the concept of block diagrams, Time Response, system stability and steady-state error, root locus, frequency response; Capable of designing controllers with the bode diagram, and is able to analyze the state-space, capable of governing designing state-space,.
Topics:
Block diagrams; Time Response; The stability of the system; Steady-state error; Root locus; Frequency response; Design controllers with root locus; Design of controller with bode diagram; The state-space model analysis; Governing state-space design; Design Observer
Prerequisite: Engineering Mathematics
Textbook:
1. Nise, n. "Control Systems Engineering", 4th Edition, Wiley, 2005.
2. Katsuhiko Ogata, "Modern Control Engineering" 4th Edition, Prentice Hall, 2002.

ENEE614019
ENEE605021
CONTROL ENGINEERING LABORATORY (1 CREDITS)

Learning Outcomes:
Able to use the device data acquisition; Able to apply the response time, system stability and steady error, root locus design, frequency response, controllers with root locus, Bode's diagram with controller design, the introduction of PLC, state-space.
Topics:
Response time, system stability and steady error, root locus design, frequency response, controllers with root locus, Bode's diagram with controller design, the introduction of PLC, state-space
Prerequisite: Engineering Control
Textbook:
Laboratory Workbook – Control Systems Laboratory.

ENEE613010
ENEE605022
ALGORITHM AND PROGRAMMING (4 CREDITS)
Learning Outcomes:
Able to make the draft algorithms to solve the problem of computation and manipulation of data; Able to apply the concepts: Modular; Iteration and Recursion; Sorting; Searching; Array; Pointers; Linked List
Topics:
Modular; Iteration and Recursion; Sorting; Searching; Array; Pointers; Linked List; Static and dynamic data structures in C language
Prerequisites : Basic of computer
Textbook:
1. Thomas h. Cormen, "Introduction to Algorithms", 3rd Edition, MIT Press, 2009
2. Robert Sedgewick & Kevin Wayne, "Algorithms", 4th ed., Addison-Wesley Professional, 2011

ENEE616033
ENEE606024
MODELLING AND SIMULATION (3 CREDITS)
Learning Outcomes:
Able to establish mathematical model system, capable of performing the analysis of mathematical models of the system, able to build simulations based on mathematical models,
Capable of analyzing simulation system.
Topics:
Basic modelling and simulation, methods of modeling of physical systems, analysis of the model of non-linear dynamical systems, dynamical models of simulation with Matlab/Simulink,
Data modeling, system identification, data exploration methods, methods of optimization of the smallest squares model, validation, data modeling with Matlab/Simulink.
Prerequisite: Numerical Computing
Textbook:
1. Harold Klee, Randal Allen, "Simulation of Dynamic Systems with MATLAB and Simulink", CRC Press, 2011
2. William j. Palm III, "System Dynamics", 2nd Edition ", McGraw-Hill, 2005.
3. John a. Sokolowski, Catherine m. Banks, "Modeling And Simulation Fundamentals", John Wiley & Sons, 2010

ENEE613016
ENEE606025
TELECOMMUNICATIONS ENGINEERING LAB (1 CREDITS)
Learning Outcomes:
Able to put into practice the basic concept of telecommunications engineering; Being able to practice the communication system globally; analog and digital modulation; telephony system; PCM and TDM; Digital Line Coding; telecommunication network: telecommunications network: a basic Phone, the technique of grafting, signaling techniques, the concept of Queuing, a communications network radio, *microwave*, and fiber optic; Able to use the measure of telecommunications.
Topics:
Global communication systems; analog and digital modulation; Telephony system; PCM and TDM; Digital Line Coding; FIR Filters; the parameters of the antenna and wireless communication and channel simulation using software radio mobile; optical communication systems.
Prerequisite: Telecommunications Engineering
Textbook:
Laboratory Workbook – Telecommunication Engineering Laboratory.

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ENEE615027
ENEE606026
MICROPROCESSOR AND MICROCONTROLLER (4 CREDITS)
Learning Outcomes:
Able to implement the algorithm into a high level programming language and low level; Able to implement Microprocessors and programming addressing mode in Assembly language for Microprocessors.
Topics:
Microprocessor's Addressing Modes; Programming Assembly language for Microprocessors

Prerequisite: Basic Computer

Textbook:
1. The Intel 8086/8088 Microprocessors, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV Architecture, Programming, and Interfacing, Seventh Edition, Brey, Barry, b., PHI Inc., USA, 2006.

2. The 8051 Microcontroller and Embedded Systems, Second Edition, Muhammad Ali Mazidi, Prentice Hall, 2006

ENEE615028
ENEE606027
MICROPROCESSOR AND MICROCONTROLLER LAB (3 CREDITS)
Learning Outcomes:
Able to implement the algorithm into a high level programming language and low level; Capable of practicing Microprocessors and programming addressing mode in Assembly language for Microprocessor.
Topics:
Microprocessor's Addressing Modes; Programming Assembly language for Microprocessors.
Prerequisite: Microprocessor and Microcontroller
Textbook:
1. Practical module Microprocessor and Microcontroller Digital Laboratory, Department of electrical engineering.
2. Barry B. Brey, "The Microprocessors Intel 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium IV Architecture, Programming, and Interfacing," 7th Edition, PHI Inc., USA, 2006.
3. Muhammad Ali Mazidi, "The 8051 Microcontroller and Embedded Systems," Second Edition, Prentice Hall, 2006.

ENEE614023
ENEE606028
ELECTRIC MEASUREMENTS (2 CREDITS)
Learning Outcomes:
Able to explain the philosophy of electric quantity measurement; Able to calculate the threshold quantity of electricity that is safe; able to analyze a series of measurements
Topics:
Introduction of measuring instruments, the fault/error in measurement, the security and safety in Electrical Measurements, Measuring Electrical Quantities in General, measurement of Grounding Prisoners (Grounding Resistance), an Oscilloscope, a Digital gauge
Prerequisite: Electronics Circuits.
Textbook:
1. Rudy Setiabudy, " Pengukuran Besaran Listrik," LP-FEUI, 2007.
2. Klaas b. Klaassen, "Electronic Measurement and Instrumentation," Cambridge University Press, 1996.

ENEE614024
ENEE606029
ELECTRIC MEASUREMENTS LABORATORY (1 CREDITS)
Learning Outcomes:
Capable of measuring electrical quantities; Able to choose the measuring instrument to suit the needs of measurement topics:
Topics:
Gauge 1 phase, 3 phase measurement tool, the tool to measure the energy and power, grounding measuring instrument
Prerequisites:
Measurement of Electrical Quantities

Textbook:
Electric Quantity Measurement lab course modules-high-voltage Laboratory and measurement of electricity.

ENEE617037
ENEE607031
ENGINEERING ENTREPRENEURSHIP (2 CREDITS)
Learning Outcomes:
Able to implement the concepts and skills of entrepreneurship in the field of electrical engineering; Able to perform analysis and make the business plan expertise in innovation/product which corresponds to the development of information technology; Able to implement the concepts and skills of entrepreneurship in the field of electrical engineering
Topics:
Charging for Expertise, Think, Plan, Act Like an Entrepreneur, Making a Business Successful, Taking the Initiative, Enabling an E-Business, Providing Outsourced Services & Building a Contracting Business, guest lectures
Prerequisites : None
Textbook:
 1. New Venture Creation – Entrepreneurship for the 21st Century, 6th Edition, J.A. Timmons and s. Spinelli, Irvin McGraw-Hill, 2004.
 2. The material of the lectures given by practitioners of the entrepreneurial

ENEE611002
ENEE607032
ACADEMIC WRITING (3 CREDITS)
Learning Outcomes:
Able to write scientific papers with good structure
Being able to write down the steps with a detailed and structured research; capable of processing data with research tools statistics
Topics:
Systematics of academic writing; experimental variables and set up; statistical analysis tools, the use of the language of Indonesia is good in scientific works; English usage in scientific papers, word processing software; styling; referencing tools
Prerequisites: none
Textbook: -

MAJORING
TELECOMMUNICATIONS ENGINEERING

ENEE606301
CODING TECHNIQUE AND APPLICATIONS (3 CREDITS)
Learning Outcomes:
Capable of outlining the types of encoding; Being able to analyze the techniques used in data compression coding and reliable communications.
Topics:
Information measures, source and channel models, various source coding schemes including Huffman coding, run-length coding, linear predictive coding, transform coding, and various channel coding schemes including cyclic codes, BCH codes and convolutional codes. Trellis Coded Modulation. Application for Speech Coding, Image and Video Coding.
Prerequisite: Probability and stochastic processes
Textbook:
 1. Andre Evidence, "Coding Theory: Algorithms, Architectures and Applications, Wiley-Interscience, 2007.
 2. Thomas m. Cover & Joy a. Thomas, Elements of Information Theory ", Wiley-Interscience, 2006.
 3. Jorge Castineira Moreira & Patric Guy keeps on, "Essentials of Error Control Coding", John Wiley & Son Pub., 2006.

ENEE615030
ENEE606302
COMMUNICATION NETWORKS (3 CREDITS)
Learning Outcomes:

Able to explain mathematical concepts with regard to the concept of communication networks; Able to explain the concept of circuit switching and packet switching as well as concepts related to communication traffic; Able to explain the concept of queuing and queue theories for communication network; Able to explain concepts and mechanisms of QoS on the network communication
Topics:
Mathematics for the network, the concept of a communication network (layering); Circuit Switched and Packet Switched, the concept of communication traffic (Erlang B, Erlang C, Engset, Bernoulli, etc.); Various theories of the queue (M/M/1, M/M/c, M/G/1, M/G/c, etc.); Markov chain concept for communication networks, QoS assurance mechanism concept and the communication network.
Prerequisite: Telecommunications Engineering.
Textbook:
 1. James r. Boucher, "Traffic System Design Handbook," IEEE Press, 1993
 2. Piet Van Mieghem, "Performance Analysis of Communication Networks and Systems," Cambridge University Press, 2006, USA
 3. Jean Walrand, "An Introduction to Queueing Networks," Prentice-Hall Int'l, USA, 1988

ENEE606303
BROADBAND MULTIMEDIA COMMUNICATIONS (3 CREDITS)
Learning Outcomes:
Being able to analyze the concept of broadband multimedia.
Topics:
The concept of multimedia technologies, TCP/IP, network protocols, ATM, Frame Relay, MPLS, broadband wireless access technologies, metro Ethernet, NGN and IMS, QoS, Resource management, QoS, the mechanisms work and how to guarantee it, a multimedia network model, the component performance throughput capacity.
Prerequisite: Telecommunications Engineering.
Textbook:
 1. Lu Guojun, "Communication and Computing for Distributed Multimedia Systems," John Wiley and Sons
 2. Luis Correia, "Mobile Broadband Multimedia Networks," Elsevier, UK, 2006

ENEE607304
ANTENNAS AND PROPAGATION (3 CREDITS)
Learning Outcomes:
Able to describe wave propagation and transmission system and its implications on the performance of communication systems; Able to explain various mechanisms of propagation of electromagnetic waves; Able to explain the working principle of antenna and antenna performance parameters; Being able to describe the various types of antenna as a means for transmitting signals; Able to calculate the performance of the simple antenna systems which good in theory or application; Able to calculate the performance of a single element antenna such as a dipole, yagi, antenna loop, funnels, slot antenna and micro-strip antenna; Able to design a simple antenna and measure it; Being able to analyze the types of wave propagation and select the correct antenna for wireless communication system.
Topics:
Working principles of the basic parameters of antenna, the antenna measurement techniques, several types of antennas: dipole antenna, monopole, antenna stacking, aperture antenna and antenna with reflector. Radio wave propagation (ground surface wave, wave, wave, space sky wave, and microwave and millimeter wave);
Prerequisite: Electromagnetics
Textbook:
 1. Constantine a. Balanis, "Antenna Theory, Analysis and Design," Third Edition, John Willey and Son, Inc., 2005.
 2. Saunders r. Simon, "Antennas and Propagation for Wireless Communication Systems," First Edition, John Wiley and Son, Inc., 1999.
 3. IEEE journal transaction Antenna and Propagation

ENEE607305
OPTICAL COMMUNICATIONS (3 CREDITS)
Learning Outcomes:
Able to explain wired transmission media/fiber optic as well as their principles; Able to explain the components of the optical communication system; Able to analyze optical communication systems
Topics:
Structure and optical fiber waveguide, signal degradation in on optical fiber, optical sources, optical components, optical coherent fiber communication; the techniques of modern systems; The techniques and coding theory; Performance analysis of optical communication systems

Prerequisite: Electromagnetics and Telecommunications Engineering.
Textbook:
1. Raat p. Agrawal, "Fiber-Optic Communication Systems", 3rd Edition, Wiley Interscience, 2002.
2. g. Keiser, "Optical Fiber Communications", 3rd Edition, McGraw Hill, 2000.

ENEE608308
MOBILE AND WIRELESS COMMUNICATIONS (3 CREDITS)
Learning Outcomes:
Able to explain the different types of wireless communication, concept of cellular, wireless communication components; Able to explain concepts, techniques and components of wireless mobile communication; Able to analyze performance of wireless mobile communications system.
Topics:
Overview of wireless communications, cellular concept/fundamentals, large scale fading/path loss, small scale fading, modulation techniques, equalization, diversity, channel coding/error control coding overview, multiple access, emerging wireless technologies: WLAN, 3G and WCDMA, 4G and LTE, mobile ad hoc networks, body area networks and mobile health, future wireless system.

Prerequisite: Telecommunications Engineering
Textbook:
1. t. s. Rappaport, "Wireless Communications: Principles and Practice", Upper Saddle River, New Jersey: Prentice Hall, 2nd ed., 2002.
2. a. Goldsmith, "Wireless Communications," Cambridge University Press, 2005.
3. w. Stallings, "Wireless Communications and Networks", Prentice Hall, 2nd ed., 2005.

ENEE616035
ENEE608307
COMMUNICATION SYSTEM DEVICES (3 CREDITS)
Learning Outcomes:
Able to analyze various subsystem communication devices; Able to analyze transmission line, adjustment circuit, resonator, filter, amplifier, LNA, oscillator, mixer; Able to design the subsystems communication device based on active component for radio wave.
Topics:
Passive Components simple radio waves, the active component is a simple radio waves
Prerequisite: Electromagnetics, Circuit Electronics, Telecommunications Engineering.
Textbook:
1. d. m. Pozar, "Microwave Engineering", Addison-Wesley, 1998.
2. Gonzalez, "Microwave Transistor Amplifiers: Analysis and Design", 2nd Edition, Prentice Hall, 1997.

ENEE607306
SPECIAL COURSEOF TELECOMMUNICATIONS 1 (3 CREDITS)
Learning Outcomes:
Able to follow the development of the telecommunications industry and apply it; Able to follow the development of the latest telecommunications technology aspects;
Topics:
Current issues about aspects of telecommunication technology
Prerequisites: none
Textbook: no

ENEE608309
SPECIAL COURSEOF TELECOMMUNICATIONS 2 (3 CREDITS)
Learning Outcomes:
Able to follow the development of the telecommunications industry and apply it; Able to follow the latest developments in business and telecommunications regulation.
Topics:
Current issues of business and regulation of telecommunications.
Prerequisites: none
Textbook: no

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ENGINEERING

MAJORING
ELECTRIC POWER ENGINEERING

ENEE606102
POWER ELECTRONICS AND LABORATORY (3 CREDITS)
Learning Outcomes:
Able to design simple application field of electric power; Able to explain the philosophy of power electronics equipment; Capable of calculating parameters on power electronics circuits; Able to design simple circuits using power electronics equipment
Topics:
Introduction to power electronics, electronic components, power converter AC-AC converter, AC-DC, DC-DC converter, DC-AC converter, power electronics applications
Prerequisite: Electric Power Engineering, Electronic Circuit
Electricity.
Textbook:
1. Muhammad h. Rashid, "Power Electronics Circuits, Devices and Applications," Prentice Hall, Fourth Edition, 2013.
2. Power Electronics lab course Modules-Electrical energy conversion Laboratory

ENEE606103
MANAGEMENT AND ENGINEERING ECONOMY (3 CREDITS)
Learning Outcomes:
Being able to classify the energy field; Able to explain the basics of business and management; Able to calculate the economics in electric field; Able to analyses the comparison of alternative technologies; Able to analyze alternative replacement; Being able to analyze the latest technology in the field of energy conversion; Able to calculate the economics source of energy; Being able to analyze the potential source of energy.
Topics:
The basic concept of management, organization type, organization resources, economic concepts, and the correlation value is money and time, comparative studies, analysis of replacement, the basics of energy management, energy costs, and calculation of potential energy
Prerequisite: none
Textbook:
1. William g. Sullivan, Elin M Wicks, James t. Luxhoj, "Engineering Economy," 3rd Edition, Pearson Education International, 2006.
2. Andrew c. Paine, John Chelsom, Lawrence v. R.P. Reavill, "Management for Engineers," John Wiley and Sons, 1996.

ENEE617038
ENEE607104
ELECTRIC POWER SYSTEM AND LABORATORY (3 CREDITS)
Learning Outcomes:
Being able to analyze the magnetic and electric field high on power system; Able to explain the philosophy of power system; Able to calculate the parameters of power network; Capable of analyzing system of electric power network; Being able to find a solution to the problem of the quality of electric power; Being able to analyze the source of disturbance in the generation, transmission, and distribution of electricity; Capable of minimizing the effects of disturbance on electric power systems.
Topics:
The phenomenon of electric field and magnetic field on the electric power system, the effects of magnetic field and electric field on electric power systems, mitigation of effects of magnetic field and electric field.
Sources of disturbance on electric power systems, the effects of disturbance on mitigation of the effects of power system disturbances in electric power systems
Prerequisite: Engineering Mathematics, Electrical Power Engineering
Textbook: B. M. Weedy, B. J. Cory, "Electric Power Systems," 4th Edition, John Wiley and Sons, 2001.

ENEE606101
ELECTRIC ENERGY CONVERSION (3 CREDITS)
Learning Outcomes:
Being able to classify the energy field; Being able to decipher the various types of energy as electric generators; Able to calculate the range of potential energy as electricity generation; Being able to analyze the process of con-

verting electric energy;
Able to apply the principles of electrical energy conversion; Being able to analyze the latest technology in the field of energy conversion.
Topics:
Basic conversion of energy, sources of energy, new energy Conversion Technology, and renewable power plants, Thermal power plants, non-thermal power plant.
Prerequisite: Electric Power Engineering.
Textbook:
1. Djiteng Marsudi, "Pembangkitan Energi Listrik," Penerbit Erlangga, 2005.
2. Abdul Kadir, "Pembangkitan Tenaga Listrik," Penerbit UI, 1996.
3. D. Yogi Goswami, ▢Frank Kreith, "Energy Conversion," Penerbit CRC Press, 2007.
4. Bent Sørensen, "Renewable Energy Conversion, Transmission and Storage," Penerbit Elsevier, 2007

ENEE607106
Building Electric Installation
Learning Outcomes:
Able to make the planning of the electrical installation of the building; Able to calculate the magnitudes of the electrical installation parameters on the building; Able to itemize those parts of the electrical installation of the building
Topics:
Basic electrical installation, the components of the electrical installation, the requirements of the electrical installation, electrical installation technology, security lighting, security and safety, as well as the procedures for electrical installation of buildings
Prerequisite: Electric Power Engineering
Textbook:
1. William K Y Tao R, Richard Janis, "Mechanical and Electrical System in Building," Prentice Hall, 1997.
2. Brian Scaddan, "Electrical Installation Work". Elsevier Publishing, 2005.

ENEE607105
HIGH CURRENT & VOLTAGE ENG + LAB (3 CREDITS)
Learning Outcomes:
Being able to analyze the magnetic and electric field high on power system; Able to explain the phenomenon of electric field and magnetic field is high; Capable of testing electric power equipment; Able to analyze about the occurrence of interference due to the phenomenon of the high terrain.
Topics:
The concept of a high-voltage, high-voltage test, high voltage generation, impulse generators, direct current testing and flow back and forth, testing electrical equipment
Prerequisite: Electromagnetics, Electric Power Engineering
Textbook:
1. Artono Arismunandar, "Teknik Tegangan Tinggi," Pradnya Paramita, Jakarta, Cetakan
ke-7, 1994.
2. E. Kuffel, W.S. Zaengl, "High Voltage Engineering Fundamentals," Pergamon Press, 1984.
3. Modul Praktikum Teknik Arus dan Tegangan Tinggi - Laboratorium Tegangan Tinggi dan Pengukuran Listrik.

ENEE608109
ELECTRIC POWER SYSTEM PROTECTION (3 CREDITS)
Learning Outcomes:
Able to explain the philosophy of electric power system protection; Able to calculate the electrical protection system; Able to evaluate the protection system of electric power; Able to design protection system of electric power.
Topics:
Electrical protection philosophy, types of relay protection, the principle of relay protection, setup relay protection, the coordination principle of protection.
Prerequisite: Electric Power Engineering
Textbook:
1. the G.E.C. Alsthom, "Protective Relays Application Guide," U.K., 2015

ENEE608108
ELECTRIC POWER TRANS. & DISTRIBUTION (3 CREDITS)
Learning Outcomes:
Able to explain the philosophy of the distribution and transmission of electric power systems; Able to calculate the parameters of the transmission and distribution; Being able to analyze the transmission and distribution of electric

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power systems.
Topics:
The introduction of transmission and distribution of electrical power, the circuit of three phase motors, Inductance, Capacitance and Resistance on the transmission network, transmission network performance characteristics, the distribution Transformer, electric power distribution network.
Prerequisite: Electric Power Engineering
Textbook:
1. Luces m. Faulkenberry, Walter Coffer, "Electric Power Distribution and Transmission," Prentice Hall, 1996.
2. Iwa Garniwa, "design of electric power Distribution Equipment," Publisher – high-voltage Laboratory and measurement of electricity, Electrical Engineering Department, FTUI, 2008.
2. Iwa Garniwa, "design of Power transmission equipment," Publisher – high-voltage Laboratory and measurement of electricity, Electrical Engineering Department, FTUI, 2008.

ENEE607107
SPECIAL COURSEOF ELECTRICAL POWER 1 (2 CREDITS)
Learning Outcomes:
Able to design a simple application in the field of energy and power system.
Topics: customized to class' needs about power system technological development, and can be given by several guest lecturers
Prerequisite: Electric Power Engineering
Textbook: None

ENEE608110
SPECIAL COURSEOF ELECTRICAL POWER 2 (2 CREDITS)
Learning Outcomes:
Able to design a simple application in the field of energy and power system.
Topics: customized to class' needs about power system technological development, and can be given by several guest lecturers
Prerequisite: Electric Power Engineering
Textbook: None

MAJORING
ELECTRONICS ENGINEERING

ENEE617040
ENEE606202
PHOTONIC DEVICES (3 CREDITS)
Learning Outcomes:
Able to explain the working principle of passive and active photonic
Able to apply the principles of physics and mathematics to calculate the variable change device photonic
Being able to determine the independent device photonic
Able to explain passive: photonic device and optical, lattice (grating), polarization; and active photonic device: laser, LED, and photodetector
Being able to compute using Photonic device variables theory of light: the law of Snell, Fresnel equation, Fermat's law, polarization
Able to determine variables NA, attenuation, dispersion, mode sense, dispersive power, Registrar, power, free spectral range, coherence, vector and matrix Jones
Topics:
The theory of light: the law of Snell, the law of Fresnel, Maxwell's equation, Fermat's law, polarization, diffraction, NA, attenuation, dispersion, mode sense, dispersive power, Registrar, power, free spectral range, the coherency matrix, vector, Jones,
Photonic passive devices: optical, as well as lattice (grating), polarization; Active photonic device: laser diode, an LED and a photodetector.
Prerequisite: a Semiconductor Device
Textbook:
1. B.E.A. Saleh and M.C. Teich, "Fundamentals of Photonics," New York, NY: John Wiley and Sons, 1991. ISBN: 0471839655.
2. d. Griffiths, "Introduction to Quantum Mechanics," Second Edition, Upper Saddle River, NJ: Prentice Hall, 1995, ISBN: 0131118927.
3. Modul Praktikum Pilihan - Laboratorium Elektronika

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ENGINEERING

ENEE607205
VLSI (3 CREDITS)
Learning Outcomes:
Able to design VLSI circuit
Topics:
Review of CMOS semiconductor device fabrication, the rules of design, Scale of Lambda, Asynchrony, designing logic gates, Inverter, NAND, NOR, Full custom design, Semi-custom design, validation, Packaging/IO, design for manufacturing, testing and design of fault modeling, Coding for synthesis, characteristics and Estimate the performance series, the high level design Optimization, Programmable logic arrays, subsystem Design, Properties of CMOS Logic: Area, Power, Delay, time Optimization Engine, sequential, and the structure of the regular VLSI.
Prerequisite: Electronics Circuit, semiconductor device Fabrication
Textbook:
N. Kamran Eshraghian, & Weiste "Principles of CMOS VLSI Design: A perspective", Second Edition, Addison Wesley, 2002.

ENEE606201
ADVANCED ELECTRONICS CIRCUITS (3 CREDITS)
Learning Outcomes:
Able to analyze: integrated circuits, digital circuits with bipolar digital circuits, MOSFET, power amplifier, high-order active filter, oscillator circuit, Schmidt Trigger, voltage regulators; Able to design: integrated circuits, digital circuits with bipolar digital circuits, MOSFET, power amplifier, high-order active filter, oscillator circuit, Schmidt Trigger, voltage regulators.
Topics:
Integrated circuits, digital circuits with bipolar digital circuits, MOSFET, power amplifier, high-order active filter, oscillator circuit, Schmidt Trigger, voltage regulator
Prerequisite: Electronics Circuits
Textbook:
Boylestad R, Nashhelsky L, "Electronic Devices and Circuit Theory, 9th Edition," Prentice Hall, New Jersey, USA, 2006.

ENEE616034
ENEE607204
INTRODUCTION OF NANOELECTRONICS (3 CREDITS)
Learning Outcomes:
Able to analyze recent developments in the field of electronics and photonic; Being able to analyze the workings of the Nano-electronic and Nano-photonic device.
Topics:
Nano technology and its application in the field of electronics, from the micro to the Nano, the miniaturization of electronics device, scaling the dimensions of transistor, the workings of the single electron transistors, molecular electronics work, fabrication, and characterization of Nano-devices, Nano-technology and its application in the field of photonic, the workings of the single-photon detector, the workings of the OLED
Prerequisite: A Semiconductor Device, Semiconductor Device Fabrication
Textbook:
   1. Massimiliano Di Ventra, et al. Introduction to NST ch. 11 Kluwer ACAD. Publishers, 2004.
   2. Vladimir v. Mitin, Viatcheslav a. Kochelap, Michael a. Stroscio, "Introduction to Nanoelectronics", Cambridge University Press, 2008

ENEE606203
SEMICONDUCTOR DEVICE FABR + LAB (3 CREDITS)
Learning Outcomes:
Able to explain the process of fabricating semiconductor devices; Capable of making a semiconductor fabrication process design on microelectronics devices; Able to use the device fabrication process design.
Topics:
The history of the semiconductor industry, semiconductor, wafer preparation and Crystal growth, contamination control, lithography, oxidation, diffusion, ion implantation, etching, deposition, application usage Supreme ver. 4.
Prerequisite: Device Electronics.

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ENGINEERING

Textbook:
 1. Peter Van Zant, "Microchip Fabrication," 8th Edition, International Edition, McGraw-Hill, 2004.
 2. Practical semiconductor device Fabrication Module-Electronics Laboratory

ENEE608207
SOLAR CELLS (3 CREDITS)
Learning Outcomes:
Able to identify work areas devices to solar cells; Being able to compute the parameter limit efficiency, loss-power loss in a solar cell device; Being able to analyze the way of working and the solar cell performance, design and fabrication of silicon solar cells.
Topics:
The workings of the solar cell, the Parameter limit efficiency, loss-power loss in a device the solar cell, solar cell device work area, the design of silicon solar cells, and fabrication of silicon solar cells
Prerequisite: Electronics Circuit, Semiconductor Device Fabrication
Textbook:
Marten a. Green, "Solar Cells Operating Principles, Technology and System Applications", UNSW, 1998.

ENEE608309
MEMS (3 CREDITS)
Learning Outcomes:
Able to design MEMS circuits;
Topics:
Background the development of MEMS, electronics and materials processing, MEMS and microelectronics technology, preparation of standard silicon micromachining, bulk, and the surface of silicon micromachining, MEMS, micro stereo lithography micro-sensor, the SAW, the SAW on a solid object, the measurement parameter micro-sensor IDT, IDT micro-sensor Fabrication Micro-sensor, IDT, smart sensors and MEMS.
Prerequisite: Electronics Circuit, Semiconductor Device Fabrication
Textbook:
Julian w. Gardner, Vijay k. Varadan, and Osama o. Awadelkarim, "Microsensors, MEMS and Smart Devices," Wiley; 1 edition (December 15, 2001), ISBN-10:047186109X, ISBN-13:978-0471861096.

ENEE60730 6
SPECIAL COURSE OF ELECTRONICS 1 (2 CREDITS)
Learning Outcomes:
Being able to analyze the development of technology devices and photonic systems; Able to analyze basic photonic system for certain functions
Topics:
Current topics of development of technology devices and systems photonic
Prerequisite: Electronics Circuits
Textbook: none

ENEE607309
SPECIAL COURSEOF ELECTRONICS 2 (2 CREDITS)
Learning Outcomes:
Able to analyze recent developments in the field of electronics;
Topics:
The topics of the current technological development of electronic systems and devices
Prerequisite: Electronics Circuits
Textbook:-

MAJORING
CONTROL ENGINEERING

ENEE607405
ADAPTIVE & PREDICTIVE CONTROL SYSTEM (3 CREDITS)
Learning Outcomes:
Able to identify the model and application of predictive and Adaptive; Capable of analyzing discrete control system, the stability of non-linear system using Lyapunov method; Capable of designing discrete adaptive and predic-

tive control; Able to evaluate the performance of predictive and adaptive control systems.
Topics:
The basic concept of predictive and adaptive control, recursive parameter estimation, method of pole placement method, minimum variance, dynamic matrix control, model algorithmic control, generalized predictive control, predictive control room situation.
Prerequisite: Control Engineering
Textbook:
1. P.E. Wellstead and M.B. Zarrop, "Self-tuning Systems: Control and Signal Processing", John Wiley and Sons, 1991.
2. J.M. Maciejowski, "Predictive control with constraints", Prentice Hall, 2000

ENEE615029
ENEE606401
DIGITAL CONTROL SYSTEM (3 CREDITS)
Learning Outcomes:
Capable of analyzing discrete control system; Able to explain the characteristics of discrete systems; Capable of analyzing the stability of discrete systems; Able to design a simple discrete controller; Able to make discrete controller design method: root locus, and pole placement; Able to make the design of state observer of discrete Full order observer, and Reduced order observer
Topics:
The basic concept of a digital control system, a review of z-transforms, discrete time transfer functions, methods of realization of discrete control system, Transient and steady state response, analysis of stability of discrete systems, discrete root locus method, design the root locus method control discrete, discrete state space models, canonical forms, discrete state space model analysis (Eigen values, controllability, observability), pole-placement method of discrete, observer design of discrete.
Prerequisite: Control Engineering
Textbook:
Ogata, k. "Discrete Time Control Systems", Prentice Hall, 2002.

ENEE617039
ENEE606402
PROCESS CONTROL SYSTEM (3 CREDITS)
Learning Outcomes:
Able to identify the model of dynamical systems of industrial processes; Able to explain measurement techniques of dynamical systems of industrial processes; Able to explain the characteristics of industrial processes; Able to describe systems of industrial processes; Able to identify industrial process modeling method
Topics:
Process and characteristics of the problem, the process of measurement methods, sensors and transmitters, signal conditioning and installation, industrial process modeling, PID controllers, tuning PID control, cascade control, feedforward control, smith predictor, a variation on another controller.
Prerequisite: Control Engineering
Textbook:
1. Curtis d. Johnson, "Process Control and Instrumentations", 8th Edition, Prentice Hall Inc. 2005.
2. Carlos a. Smith and Armando Corripio, b. "Principles and Practice of Automatic Process Control", 3rd Edition, John Wiley & Sons, Inc. 2005.

ENEE607404
ROBOTICS (3 CREDITS)
Learning Outcomes:
Able to identify the needs of the components of Robotics; Being able to analyze the kinematics of the robot; Able to evaluate the drive systems Robotics; Integrated control system capable of designing on simple robotics systems; Able to design kinematics robotics.
Topics:
Robotics Automation system components (sensors, actuators, controllers), the principle of work of system of robotics, kinematics of robots, robotics control systems (position control) robot kinematics-based interconnection system components, robotics, engineering the design of robots, robot programming, simulation with OpenGL, the introduction of a high level of robots.
Prerequisite: Engineering control, algorithms and programming.
Textbook:
1. Robotics: design, control, and artificial intelligence, Andi Publisher by Endra Pitowarno, 2006.
2. Introduction to Robotics: mechanics and control, 3rd Edition, John Craig, Pearson, 2009.

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ENEE606403
ELECTRIC DRIVE CONTROL SYSTEM (3 CREDITS)
Learning Outcomes:
Being able to analyze the component controller and electric drive system components; Able to evaluate the performance of the electric drive system with simulation; Able to evaluate simple motor drive systems.
Topics:
Electric drive systems, modeling of electric motors (DC, PMSM, IM), power transfer circuit (PWM 3 phase inverter), the servo motor DC brushless speed controller, and position, the concept of reference frame, vector control, simulation of electric drive system.
Prerequisite: Engineering Control.
Textbook:
1. Peter vase, "Electrical Machines and Drives: A Space-Vector Theory Approach", Oxford University Press, UK, 1993.
2. Peter vase, "Sensor-less Vector and Direct Torque Control", Oxford University Press, 1998.

ENEE608407
MECHATRONICS (3 CREDITS)
Learning Outcomes:
Being able to analyze the components of the controller; Capable of analyzing the limitations of Mechatronics system components; integrated control system capable of designing in Mechatronics system is simple; capable of designing system of Mechatronics Robotics with applications to accommodate the limitations of the components.
Topics:
Introduction to Mechatronics systems, characteristics and limitations of Mechatronics system
Method of improvement reliability of Mechatronics system components, Mechatronics system design, electromechanical system modeling, design and development of application software, control compliant, tele-robotic, bilateral control.
Prerequisite: Robotics
Textbook:
Robert Bishop, "Mechatronics and Introduction", 2006.

ENEE608408
KNOWLEDGE BASED SYSTEMS (3 CREDITS)
Learning Outcomes:
Able to identify the model of knowledge-based dynamical systems; Being able to analyze the performance of artificial neural network; Able to implement algorithms in programming language for knowledge-based systems.
Topics:
the working system of neurons, cells, artificial neural network architecture (JST); the learning method is JST; back propagation neural networks (BPNN); algorithms and analysis of programming error, function of BPNN in Matlab; optimization of parameters; application of BPNN program as the system identifier of the pattern, the system control based neural network: an analysis of the use of methods of control, as a system of BPNN identification of neural network-based systems: representation of data and the use of BPNN as identification system, program development system identification using the BPNN full-based system, the development of BPNN and analysis theory and its application, program development system control using the BPNN full system integration based BPNN.
Prerequisite: control Engineering, Algorithms and programming
Textbook:
1. Lefteri h. Tsoukalas, and Robert e. Uhrig, "Fuzzy and Neural Approaches in Engineering", John Wiley & Sons, Inc., Singapore, 1997.
2. John Yen and Reza Langari, "Fuzzy Logic, Intelligence, Control and Information", Prentice Hall, Inc. New Jersey, 1999.

ENEE607406
SPECIAL TOPIC OF CONTROL ENGINEERING 1 (2 CREDITS)
Learning Outcomes:
Able to follow the development of the control technology and its implementation; Able to follow the development of current aspects of control technology.
Topics:
Current issues about control technological aspects
Prerequisites: none
Textbook: none

ENEE608409
SPECIAL TOPIC OF CONTROL ENGINEERING 2 (2 CREDITS)
Learning Outcomes:
Able to follow the development of the control technology and its implementation; Able to follow the latest development of the control technology business.
Topics:
Current issues about control business technology.
Prerequisites: none
Textbook: none

MAJORING
BIOMEDICAL ENGINEERING

ENEE606502
MEDICAL COMMUNICATION SYSTEM (3 CREDITS)
Learning Outcomes:
-Able to explain some of the technology of communication system for medical applications
-Able to explain the system of e-healthcare and telemedicine
-Able to explain the process of designing the system wired/wireless medical communication
Able to make the design through simulation design of medical devices
Topics:
Introduction to medical communication system, e-healthcare and telemedicine. Several special course will be delivered include body-centric wireless communications, electromagnetic properties and modeling of the human body, portable wearable devices, medical implant communication systems, e-healthcare infrastructure, wireless body area network, mobile-based telemedicine system, and wireless power technology in medical devices.
Communication systems on and off, in the body and how to model the via simulation
Prerequisites: none
Textbook:
  1. E-Healthcare Systems and Wireless Communications: Current and Future Challenges, Mohamed k. Watfa, Publisher: IGI Global.
  2. Antennas and Propagation for Wireless Communications Centric Body, P. Hall, Publisher: Artech House, 2006.

ENEE607504
MEDICAL IMAGING TECHNOLOGY (3 CREDITS)
Learning Objective:
After getting the courses the student is expected to:
1. Able to understand some basic concepts in medical imaging technology
2. Able to explain and analyze the basic method of medical image processing in reconstructing, improving the quality of the image, making the image segmentation, image analysis, visualization of image data, and manage medical imagery in order to support the process of imaging/medical imaging in the field of health
Able to apply the methods in environmental biology and basic science to medical applications system
Able to integrate circuit and electronic device to device/instrument of biomedicine
Able to make simulations of imaging methods in medical devices
Being able to make a report of the results of the simulation of a small project
Being able to analyze the signals in the medical system to process the signal with the signal processing technique of medical
Topics:
Introduction to Medical Imaging Technologies (x-ray and Ultrasound, MRI, CT, PET and SPECT, Electrical Impedance Tomography), Image formation and Reconstruction (Acquisition, Digitization, Image Reconstruction Methods), Image Enhancement (Fundamentals of enhancement techniques, Image enhancement with linear, nonlinear, adaptive, and fixed, pixel-based methods), Image Segmentation and Analysis (Fundamentals of Medical Image Segmentation, Image acquisition and preprocessing artefacts, Thresholding, Edge-based techniques, Region-based segmentation, Classification , Morphological Methods for Biomedical Image Analysis), Image Visualization (2-dimensional visualization, 3-dimensional visualization methods: surface rendering, volume rendering, Algorithm for 3-d visualization), Image Management (Fundamentals of Compression Standards, Storage and Communication, Image archive and retrieval, three-dimensional compression).
Medical image processing, artifact acquisition, thresholding, Edge-based techniques, Region-based segmentation, Classification,
The methods of image formation process and its analysis
Image formation, medical imaging tools
Formation of the image of medical signals and image analysis, visualization

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Prerequisites: None.
Textbook:
1.   Handbook of Medical Imaging: Processing and Analysis Management, Isaac Bankman, Academic Press 2000, CA, USA.
2.   Handbook of Medical Imaging, vol. 2: Medical Image Processing and Analysis, M. Sonka & J.M. Fitzpatrick, SPIE Press, 2009, Washington, USA.

ENEE606501
BIOLOGY AND ANATOMY (3 CREDITS)

Learning Objective:
Give the basic knowledge of the mechanisms of biology and anatomy of engineering.
Instructional Objectives:
a. Able to explain the basic concepts of cell biology, molecular, biochemical and genetic engineering
b. Have the knowledge about the essential components and the various functions of the system of molecular cell.
c. Have the knowledge of the techniques and approaches that are commonly used in molecular biology of the cell.
d. Apply the knowledge of biology to biomedical engineering and health sciences.
Able to explain the phenomenon in the medical field with the approach to biology and anatomy of human organs
Able to make reports papers
Able to explain the phenomenon in the medical world with the approach to biology and anatomy of human organs

Topics: constituent molecules of the cell, structure and function of proteins within the cell, metabolism, changes in the cells; Molecular design of biochemical constituents of life, and the genetic revolution, DNA, linkages with biodiversity, biochemical protein synthesis of nucleic acids into a sequence of amino acids-RNA polymerase 2, until the Ribosome for protein synthesis, eukaryotic and prokaryotic differences; Catalytic reactions in cells: nucleoside monophosphate kinases, proteases; Mechanical chemical in cells: how protein motors to convert chemical energy into mechanical work.
Understanding human anatomy, Cytology and Histology, Osteology, Arthrologi, Miologi, digestive system, respiratory system, circulatory system.
Constituent molecules of the cells and organs of human body Anatomy

Prerequisites: None
Textbook:
1.   Alberts, 2003, Molecular Biology of the cell.
2.   Lodish, Molecular cell biology, 2004.
3.   G.W. Jenkins, C.P. Kemnitz, G.J. Tortora, Anatomy and Physiology: From Science to Life, John Wiley & Sons: 2nd Ed. 2010.

ENEE607505
MEDICAL SYSTEM MODELLING (3 CREDITS)

Learning Outcomes:
Learning Objective:
Understand the components of the medical system, understand the mathematical model of the medical system, understand the modeling method of the medical system, Able to perform simple modelling medical systems and able to simulate.
Able to apply the algorithm for a device/instrument of biomedicine
Able to report the results of the coding program

Topic: Introduction to signal and system of medical models, mathematical modeling and signal system in General, analytic modeling of medical system, analysis of analytical models, methods of identification of the medical system, the method of parameter estimation model, the simulation model of the medical system.
Analytic modeling of medical system
Analysis of analytical models, methods of identification of the medical system, the method of parameter estimation model, the simulation model of the medical system.
Prerequisites: None.
Textbook:
1.   David T. Westwick, Robert E. Kearney, "Identification of Nonlinear Physiological Systems," John Wiley & Sons, 2003.
2.   Willem van Meurs, "Modeling and Simulation in Biomedical Engineering: Applications in Cardiorespiratory Physiology," 1st ed., McGraw-Hill Education, 2011

ENEE608508
MEDICAL INFORMATICS (3 CREDITS)
Learning Objective:
After getting the courses the student is expected to:
1.   Able to understand the basic concepts of information technology to be applied in the field of health
2.   Able to apply the basic methods of Informatics with the use of basic knowledge of programming to acquire, organize, combine, and analyze health data sources
Able to apply the algorithm for a device/instrument of biomedical engineering
Able to apply the basic principles in biology in the concept of medical technology
Able to explain the basic biomedical engineering

Able to apply concepts of basic science into principles in biomedicine

Topic: Introduction to Medical Informatics, Controlled Medical Terminology, The Electronic Health Record (EHR), Health Information Systems in Clinical Settings, Health Information Systems in Public Health, Informatics Issues in Virtual Healthcare, Telemedicine, and Expert Systems, Medical Informatics and Clinical Decision Making, Future Technologies, Fundamental Algorithms & Methods of Medical Informatics, Medical Data Resources: Acquisition, Processing, and Classification.
Introduction to medical informatics and its method
Algorithms and methods of medical informatics

Prerequisites: None.
Textbook:
1.   Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics) 4th ed., 2014 Edition.
2.   Method in Medical Informatics: Fundamentals of Healthcare Programming in Perl, Python, and Ruby, Jules Berman, CRC Press.

ENEE606503
INTRODUCTION TO BIOMEDICAL TECHNOLOGIES (3 CREDITS)
Learning Objective:
After completion of the following courses, students are able to:
1. Understand biomedical technology systems
2. Explain the concept of system engineering applications to the problems of human biology
3. Illustrate the concept of detection, measurement, and monitoring of human physiological signal
4. Explain the concept of the diagnosis interpretations through the techniques of signal processing bioelectric data
5. Explain the concept device-device for therapy and rehabilitation
6. Make computer data analysis based on data from patients in the framework of decision making in clinical
7. Explain the concept of device for artificial organs
8. Reviewing the concept of medical imaging techniques
Able to apply the basic principles in biology in the concept of medical technology
Able to explain the basic biomedical engineering
Able to apply concepts of basic science into principles in biomedical engineering
Topics: Physiologic Systems, Bioelectric Phenomena, Introduction to Biomechanics & Biomaterials, Introduction to Biomedical Sensors, Biomedical Signal Analysis, Introduction to Medical Imaging, Medical Instruments and Devices.
Prerequisites: None.
Textbook:
1.   The Biomedical Engineering Handbook, D.R. & Bronzino J.D. Peterson, 4th ed., CRC Press, 2000.
2.   Standard Handbook of Biomedical Engineering and Design, M. Kutz, McGraw-Hill, 2003.
3.   Handbook of Biomedical Engineering, J. Kline, Academic Press, 1988.

ENEE608507
BIOMEDICAL INSTRUMENTATIONS + LAB (3 CREDITS)
Learning Outcome:
After following this course, students are able to:
1. Understand the biomedical measurement system
2. Understand and apply various kinds of cardiovascular system measurement
3. Understand and apply various kinds of respiration system measurement
4. Understand and apply various kinds of nervous system

5. Understand patient safety factors that must be considered in the measurement
Able to apply the basic principles in biology in the concept of medical technology
Able to explain the basic engineering science biomedicine

Able to apply concepts of basic science into the principles of biomedical engineering
Able to operate medical equipment
Able to integrate circuit and electronic device to device/instrument of biomedicine
Able to make the design through simulation design of medical devices
Topic: Introduction to biomedical instrumentation; Basic transducer principle (active and passive transducer, the transducer for biomedical application; the source of bioelectric potensials; electrodes; the cardiovascular system; cardiovascular measurement; measurement in respiratory system; non invasive diagnostic instrumentation; measurement in nervous system; sensory and behavioural measurements; electrical safety of medical equipment; role of laser in healthcare.

Prerequisites: None.
Textbook:
1.   Biomedical Instrumentation and Measurement, Leslie Cromwell, Fred J. Weibel and Erich A. Pleiffer, Prentice Hall, New Jersey.
2.   Handbook of Biomedical Instrumentation, RS Khanpur, Tata McGraw-Hill Education, 2003.

ENEE608509
SPECIAL COURSEOF BIOMEDICAL 1 (3 CREDITS)
Learning Outcome:
This course provides an understanding of physical principles on the biological mechanisms and process (movement, design, structure, materials and transport).
At the end of the study, students are expected to:
-      Apply biomechanical principles to resolve problems in human movement and musculoskeletal such as ergonomic, rehabilitation and training.
-      Use of the effective and safe biomechanics instrumentation and equipment for the acquisition/assessing human movement.
-      Understand the trend of future problems of biomechanics.
Able to explain the phenomenon in the medical with the approach of biology and anatomy human organs
Topics:
Newton's laws, fluid mechanics: Bernoulli, Drag forces, Reynold number, Mechanics of static systems and moving system, Kinetics and force on the body as well as the influence on the movement and stability, Basic mathematic in motion/movement, analysis and instrumentation on the motion of the body, the basic concept of human body bones muscle mechanics, Ergometry, The basic concept of energy.
Prerequisites: None.
Textbook:
1. N. Ozkaya, and M. Nordin, "Fundamentals of Biomechanics: Equilibrium, Motion and Deformation", 2nd ed., Springer, 1998.
2. E. Okuno, and L. Fratin, "Biomechanics of the Human Body", Springer, 2013.

ENEE618102
SOFTWARE ENGINEERING (3 CREDITS)
Learning Outcomes: In this course, students will learn how to design software with correct steps and able to document them. After following this course, students will able to design software using the stage of the software life cycle with the desired risk level, capable of making design software with the correct stages; capable of documenting the stages of design software
Topics: Hardware and software processes; Requirements analysis and elicitation; System specifications; System architectural design and evaluation; Concurrent hardware and software design; System integration, Software testing and validation; Maintainability, manufacturability, sustainability
Prerequisite: Algorithm and Programming
Textbook:
1.   Ian Sommerville, Software Engineering, 10th ed., Pearson, April 3, 2015
2.   Robert c. Martin, Agile Software Development, Principles, Patterns, and Practices, Pearson, 2002

ENEE617101
OBJECT ORIENTED PROGRAMMING + LAB (3 CREDITS)

Learning Outcomes: In this lecture, students will study how to create program with object-oriented concepts. After following this course, students are able to implement a software design into object-oriented programming language; able to establish the concept of object-oriented programming (class, constructor, scope of variables); able to outline the Basic objects (arrays, array list, object collection, iterator); able to describe the concept of design class (coupling, cohesion, refactoring, inheritance, polymorph, substitution); able to implement a GUI-based programming, exception handling and multithreading.

Topics: Java Language Elements; Java Language Operation; Defining and Using Class; System, Strings, String Buffer, Math & Wrapper Classes; Array; Classes & Inheritance; Design Graphical User Interface & Event Driven; Exceptions; Collections; Threads and Javadoc

Prerequisite: Algorithm and Programming

Textbook:
1.   David j. Barnes, "Objects First with Java: A Practical Introduction Using BlueJ", 5th ed., Pearson, 2011
2.   Bart Baesens URet.al., "Beginning Java Programming: The Object-Oriented Approach", Wrox, 2015

SPECIAL COURSES

ENEE616032
ENEE606023
INTERNSHIP (2 CREDITS)
Learning Outcome:
Able to apply technical knowledge that has been acquired during the study; Able to demonstrate work professionalism, work in teams, discipline, responsibility, initiative & interest, leadership, and attitude/behaviour; Able to present the results of the internship in the internship's defense.
Topic: None.
Prerequisite:
Have passed the 90 CREDITS. Internship place are industrial or lab associated with electrical engineering on the condition there is a supervisor in the internship place. The selection of the internship place is started with the administrative process through the Department of electrical engineering.
Textbook: None.

ENEE617036
ENEE607030
SEMINAR (2 CREDITS)
Learning Outcome:
Able to propose system, component, and process of the research; Able to write research proposal; Able to present the research proposals.
Syllabus: Introduction; Literature studies; Research design.
Prerequisite: Passed the 90 CREDITS.
Textbook:
1. Technical guidelines on the writing of Thesis students of the University of Indonesia.
2. IEEE Citation Reference.
3. Ivan Stojmenovic, "How to Write Research Articles in Computing and Engineering Disciplines," IEEE Transactions on Parallel and Distributed Systems, vol. 21, no. 2, February 2010.

ENEE618041
ENEE608033
BACHELOR THESIS (4 CREDITS)
Learning Outcome:
Able to make the design of the system, component, and process; Able to carry out the research plan; Able to analyze the research results; Able to convey the results of the study in the bachelor thesis defense.
Topic: Design and implementation of experimental research; Data analysis; Conclusions.
Prerequisite: Passed 120 CREDITS
Textbook:
1.   Technical guidelines on the writing of bachelor thesis of the Universitas Indonesia.
2.   IEEE Citation Reference.
3.   Ivan Stojmenovic, "How to Write Research Articles in Computing and Engineering Disciplines," IEEE Transactions on Parallel and Distributed Systems, vol. 21, no. 2, February 2010.

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