

STRUKTUR KURIKULUM PROGRAM STUDI TEKNIK INDUSTRI S1

KODE	MATA AJARAN	SUBJECT	SKS
Semester 1		1st Semester	
UIGE600002	MPKT B	Integrated Characteristic Building Subject B	6
UIGE600003	Tulisan Akademik	Academic Writing	3
ENGE600001	Kalkulus 1	Calculus 1	3
ENIE601001	Pengantar Teknik Industri	Introduction to Industrial Engineering	2
ENIE601002	Pengantar Ilmu Ekonomi	Introduction to Economics	2
ENIE601003	Pengetahuan Bahan	Material Sciences	2
Sub Total			18
Semester 2		2nd Semester	
	Agama	Religion	2
ENGE600004	Aljabar Linear	Linear Algebra	4
ENGE600005	Fisika Mekanika dan Panas	Mechanics and Thermal Physics	3
ENGE600006	Praktikum Fisika Mekanika dan Panas	Mechanics and Thermal Physics Lab	1
UIGE600001	MPKT A	Integrated Characteristic Building Subject A	6
	Olah Raga/Seni	Sport/Art	1
	Menggambar Teknik	Engineering Drawing	2
Sub Total			18
Semester 3		3rd Semester	
ENGE600007	Fisika Listrik, Optik dan Gelombang	Optics, Electricity and Wave Physics	3
ENGE600008	Praktikum Fisika Listrik, Optik dan Gelombang	Optics, Electricity and Wave Physics Lab	1
ENIE603003	Perancangan Kerja, Metode, dan Standar Kerja	Work Design, Methods, and Standards	3
ENIE603004	Akuntansi Biaya	Cost Accounting	2
ENIE603005	Proses Produksi + Praktikum	Production Process + Lab	3
ENGE600011	Ekonomi Teknik	Engineering Economics	3
ENIE603006	Statistik Dasar	Basic Statistics	3
ENIE603007	Programa Linear	Linear Programming	3
Sub Total			18
Semester 4		4th Semester	
ENIE604008	Pengantar Mekanika dan Elektronika Pabrik	Introduction to Plant Mechanics and Electronics	2
ENIE604009	Faktor Manusia dalam Rekayasa dan Desain + Praktikum	Human Factor in Engineering & Design + Lab	3
ENIE604010	Sistem Pemeliharaan	Maintenance Systems	2
ENIE604011	Statistik Industri + Praktikum	Industrial Statistics + Lab	3
ENIE604012	Perancangan Produksi dan Pengendalian Persediaan + Praktikum	Production Planning and Inventory Control + Lab	3
ENIE604013	Organisasi & Psikologi Industri	Organization & Industrial Psychology	3
ENIE604014	Penelitian Operasi	Operation Research	3
ENIE604015	Praktikum Komputasi	Computation Lab	1
Sub Total			20
Semester 5		5th Semester	
ENIE605016	Perancangan Tata Letak Pabrik	Plant Layout Design	3
ENIE605017	Perancangan Produk + Praktikum	Product Design + Lab	3
ENIE605018	Analisa Kelayakan Industri	Industrial Feasibility Analysis	3
ENIE605019	Sistem Kualitas	Quality Systems	3
ENIE605020	Pemodelan Sistem + Praktikum	System Modeling + Lab	3
ENIE605021	Sistem Produksi + Praktikum	Production Systems + Lab	3

ENIE605022	Manajemen Proyek Industri	Industrial Project Management	2
		Sub Total	20
	Semester 6	6th Semester	
ENIE606023	Kesehatan, Keselamatan Kerja dan Lindung Lingkungan	Occupational, Health, Safety & Environment	2
ENIE606024	Manajemen Rantai Pasok	Supply Chain Management	3
ENIE606025	Simulasi Industri + Praktikum	Industrial Simulation + Lab	3
ENIE606026	Perancangan Teknik Industri + Praktikum	Industrial Engineering Design + Lab	3
ENIE606027	Sistem Informasi	Information System	3
ENIE606028	Pilihan 1	Elective 1	3
ENIE606029	Pilihan 2	Elective 2	3
		Sub Total	20
	Semester 7	7th Semester	
ENIE607030	Kapita Selekt Industri	Special Topics in Industrial Engineering	2
ENIE600031	Kerja Praktek	Internship	2
	Pilihan 1	Elective 1	3
	Pilihan 2	Elective 2	3
	Pilihan 3	Elective 3	3
	Pilihan 4	Elective 4	3
		Sub Total	16
	Semester 8	8th Semester	
ENIE600032	Skripsi	Final Project in Industrial Engineering	5
ENIE608033	Manajemen Teknologi	Technology Management	2
	Pilihan 5	Elective 5	3
		Sub Total	10
		TOTAL	144

MATA AJAR PILIHAN

KODE	MATA AJARAN PILIHAN SEMESTER GANJIL		SKS
	MATA AJAR	SUBJECT	
ENIE605034	Analisis Multivariat	Multivariate Analysis	3
ENIE605035	Keterampilan Interpersonal	Interpersonal Skills	3
ENIE605036	Manajemen Siklus Hidup Produk	Product Life Cycle Management	3
ENIE605037	Makro Ergonomi	Macro Ergonomics	3
ENIE605038	Sistem Keuangan dan Investasi	Finance and Investments	3
ENIE605039	Manajemen Inovasi	Innovation Management	3
ENIE605040	Manajemen Hubungan Konsumen	Customer Relationship Management	3
ENIE605041	Operasi Ramping	Lean Operations	3
ENIE605042	Konfigurasi Sistem Manufaktur	Reconfigurable Manufacturing System	3
ENIE605043	Programa Linear dan Stokastik	Linear and Stochastic Programming	3
ENIE605044	Teori Antrian	Queuing Theory	3
ENME803196	Propulsi Jet dan Roket	Jet and Rocket Propulsion	4
ENME803174	Manajemen Risiko	Risk Management	4

KODE	MATA AJARAN PILIHAN SEMESTER GENAP		SKS
	MATA AJAR	SUBJECT	
ENIE606045	Data Mining	Data Mining	3
ENIE606046	Rekayasa Sistem	Systems Engineering	3
ENIE606047	Analisis Daya Saing Perusahaan	Enterprise Competitiveness Analysis	3
ENIE606048	Optimasi Lanjut	Advanced Optimization	3
ENIE606049	Manufaktur dan Inovasi Berkelanjutan	Sustainable Manufacturing and Innovation	3
ENIE606050	Simulasi dan Pemodelan Digital Manusia	Human Digital Modeling and Simulation	3
ENIE606051	Keputusan, Ketidakpastian dan Resiko	Decision Uncertainties and Risk	3
ENIE606052	Logistik Maritim	Maritime Logistics	3
ENIE606053	Manajemen Energi	Energy Management	3
ENIE606054	Berpikir Disain	Design Thinking	3
ENIE606055	Teknik dan Aplikasi Numerik	Numerical Methods and Application	3
ENIE606056	Rekayasa Proses Bisnis	Business Process Reengineering	3
ENIE606057	Algoritma dan Pemrograman	Algorithm and Programming	3
ENIE606058	Metode Heuristik dalam Optimasi	Heuristic Methods in Optimization	3
ENIE606059	Programa Kendala	Constraint Programming	3

MPK TERINTEGRASI (6 SKS)

Tujuan Instruksional Umum: Mengembangkan partisipasi mahasiswa untuk meningkatkan kepedulian terhadap masalah-masalah kemasyarakatan, bangsa, negara, dan lingkungan yang dilandasi iman dan taqwa, budi pekerti, serta etika akademik dalam rangka pengembangan IPTEK.

Tujuan Pembelajaran: Setelah mengikuti kegiatan MPK Terintegrasi, mahasiswa mampu:

1. Memahami, menjelaskan, dan menganalisa filsafat ilmu dan logika, akhlak dan budi pekerti, masyarakat dan kebudayaan di Indonesia.
2. Memahami nilai-nilai akademik dan nilai-nilai yang dianut bangsanya dari berbagai kemajemukan manusia dan budayanya di Indonesia.
3. Membahas permasalahan dengan menerapkan langkah-langkah belajar secara aktif, dan menggunakan teknologi informasi.
4. Mampu menggunakan bahasa Indonesia yang baik dan benar dalam diskusi maupun tulisan akademik

Silabus: Pemicu/topik sesuai dengan sasaran pembelajaran dengan metoda pembelajaran, problem based learning (PBL), Collaborative Learning (CL) dan Computer mediated learning (CML)

Prasyarat: -

Buku Ajar: Disesuaikan dengan Topik

BAHASA INGGRIS (3SKS)

Tujuan Instruksional Umum: Sesudah mengikuti kuliah ini mahasiswa diharapkan mampu menggunakan bahasa Inggris untuk menunjang studi di Universitas dan melanjutkan pembelajaran bahasa secara mandiri.

Silabus: Study Skills: (Becoming an active learner, Vocabulary Building: word formation and using the dictionary Listening strategies Extensive reading) Grammar: (Revision of Basic grammar Types of sentences Adjective clauses, Adverb clauses Noun clauses, Reduced clauses) Reading: (Reading skills: skimming, scanning, main idea, supporting ideas, Note-taking Reading popular science article, Reading an academic text) Listening: (Listening to short conversations, Listening to a lecture and note-taking, Listening to a news broadcast, Listening to a short story) Speaking: (Participating in discussions and meetings, Giving a presentation) Writing: (Writing a summary of a short article Describing graphs and tables, Writing an academic paragraph, Writing a basic academic essay (5 paragraphs))

Prasyarat: -

Buku Ajar: Poerwoto, C. et.al. Reading Comprehension for Engineering Students

AGAMA (2 SKS)

Tujuan Instruksional Umum: Terbinanya mahasiswa yang memiliki kepedulian terhadap masalah-masalah kemasyarakatan, bangsa dan negara yang dilandasi oleh nilai-nilai ajaran Agama yang diaplikasikan dalam pengembangan ilmu pengetahuan melalui keterampilan intelektual.

Sasaran Pembelajaran: Setelah mengikuti kegiatan Agama, maka apabila mahasiswa diberikan suatu tugas/permasalahan, mahasiswa mampu:

1. Menganalisisnya berdasarkan nilai-nilai ajaran agama yang dianutnya.
2. Menganalisisnya dengan menerapkan langkah-langkah belajar secara aktif
3. Membahas dan mengemukakan pendapatnya dengan menggunakan bahasa Indonesia yang baik dan benar dalam diskusi dan dalam bentuk tulisan ilmiah.

Silabus: Disesuaikan dengan agama masing-masing

Prasyarat: -

Buku Ajar: Disesuaikan dengan Pokok bahasan.

KALKULUS (4 SKS)

Tujuan Pembelajaran: Setelah mengikuti mata ajaran ini: mahasiswa dapat memahami konsep dasar kalkulus dan terampil memecahkan masalah terapan kalkulus. Mahasiswa memahami konsep dasar fungsi 2 peubah, turunan total dari fungsi 2 peubah atau lebih serta aplikasinya. Selain itu juga memahami konsep dasar barisan dan deret serta konsep dasar vektor dan analitik geometri.

Silabus: Sistem bilangan riil, ketidak samaan, sistem koordinasi cartesius, induksi matematik. Fungsi dan limit, kekontinuan fungsi. Turunan meliputi aturan rantai, turunan fungsi implisit dan turunan fungsi tingkat tinggi. Fungsi transeden dan turunan. Aplikasi turunan. Integral, rumus dasar integral, teknik integrasi. Aplikasi integral pada koordinat cartesius dan koordinat polar, bentuk tak tentu. Barisan dan deret tak hingga. Deret suku positif dan deret ganti tanda, deret Taylor dan McLaurin. Fungsi peubah banyak dan turunannya. Maksimum & minimum. Metode pengali Lagrange. Integral lipat. Aplikasi integral lipat.

Prasyarat:

Buku ajar:

1. D.E.Vanberg and E.J, Purcell, Calculus with Analytic Geometry, 7th ed., Applleton-Cen-tury-Crofts, 1996.
2. D.E.Vanberg, E.J Purcell, A.J Tromba, Calculus, 9th. Prentice-Hall, 2007.
3. G.B Thomas & R.L Finney, Calculus & Analytic Geometry 9th ed., 1996, Addison-Wesley

ALJABAR LINIER (4 SKS)

Tujuan pembelajaran: Mahasiswa mampu menjelaskan/ memahami/menggunakan aljabar linier dan dapat mengkaitkan mata pelajaran ini dengan beberapa mata pelajaran lain.

Silabus: Pendahuluan aljabar linier elementer. Matriks. Determinan. Vektor-vektor di R^2 dan R^3 . Ruang vektor Euclidean. Ruang vektor umum. Review ruang vektor. Ruang hasil kali. Nilai dan vektor eigen diagonalisasi. Transformasi linier. Aplikasi pada sistem persamaan diferensial, aplikasi pada permukaan kuadrat. Dekomposisi LU, Least Squares.

Prasyarat: -

Buku ajar:

1. H. Anton, Elementary Linear Algebra, 9th ed, John Wiley& Sons, 2005.
2. G.Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, 2007.

FISIKA DASAR 1 (4 SKS)

Tujuan pembelajaran: Memahami konsep dan hukum dasar fisika mekanika serta menerapkannya secara sistematis dan ilmiah dalam pemecahan persoalan benda yang dipengaruhi oleh gaya, baik benda yang tidak bergerak maupun benda yang bergerak.

Silabus: Besaran, kinematika benda titik, mekanika benda titik, hukum kekekalan momentum linear dan energi, gerak harmonik, gravitasi, kinematika dan dinamika benda tegar, Pendahuluan dan konsep dasar (tekanan, system termodinamika, keadaan system, temperatur), pemuaian, kesetimbangan energi (persamaan keadaan termis), perpindahan kalor, gas ideal, hukum pertama Termodinamika, entalpi dan entropi, aplikasi Hk. Termodinamika pertama untuk sistem terbuka dan tertutup, hukum Termodinamika kedua, teori kinetik gas ideal. Praktikum Mekanika: Pengukuran, Momen Kelembaman, Percepatan Gravitasi, Kerapatan Zat Cair, Koefisien Gesek, Tumbukan, Ayunan Puntir, Viskositas Air, Modulus Young, Viskositas Cairan Newton, Tegang Muka Zar Cair, Osilasi, Praktikum Kalor: Koefisien Muai Linier, Daya Hantar Panas, Kalibrasi Termokopel, Kalorimeter, Konstanta Joule, Konstanta Laplace, Kolektor Panas, Menentukan Cp/Cv Udara, Pemuaian Zat Cair dan Anomali Air. Catatan : Untuk Program Studi Arsitektur dan Arsitektur Interior tidak wajib Praktikum.

Prasyarat: -

Buku ajar:

1. Halliday.D, R Resnick, Fisika I, edisi terjema-han P Silaban, Penerbit Erlangga 1986.
2. Ganijanti AS, Mekanika, Penerbit Salemba Teknik, 2000.
3. Tipler PA, Fisika I, ed III, terjemahan Lea Prasetio, Penerbit Erlangga, 1998.
4. Giancoli D.C, General Physics, Prentice Hall Inc, 1984.
5. Sears-Salinger, Thermodynamics, Kinetic theory and statistical thermodynamics, Wesley, 1975.
6. Giancoli, D.C, Physics: principles with aplica-tions, Prentice Hall Inc, 2000

FISIKA DASAR 2 (4 sks)

Tujuan pembelajaran: Memahami konsep dan hukum dasar Fisika Listrik Magnit serta menerapkannya secara sistematis dan ilmiah dalam pemecahan masalah fisika listrik magnet sehari-hari. Mampu memahami konsep dan hukum dasar Fisika Gelombang dan Optik serta menerapkannya secara sistematis dan ilmiah dalam pemecahan persoalan gejala gelombang alami maupun gelombang yang timbul akibat teknis, sifat fisis gelombang cahaya dan optika geometri.

Silabus: Muatan listrik dan hukum Coulomb, medan listrik, statik dan hukum Gauss, potensial listrik, kapasitor, arus listrik searah dan dasar analisa rangkaian, medan magnet, induksi dan elektromagnetik, hukum Faraday dan induktansi, sifat kemagnetan material, rangkaian transient, arus bolak balik. Gelombang, bunyi, polarisasi, interferensi, difraksi, optikal geometri, penerangan dan fotometri. Praktikum Listrik: Elektrolisis, Jembatan Wheatstone, Hukum Kirchhoff, Medan Magnet Bumi, Koefisien Temperatur, Karakteristik Rangkaian Seri RLC, Hukum Ohm, Transformator. Praktikum Optik: Polarimeter, Lensa, Fotometri, Indeks Bias Prisma, Spektrometer, Kisi Difraksi, Cincin Newton

Prasyarat: -

Buku ajar:

1. Halliday, D, R. Resnick, Fisika II, edisi terjema-han P. Silaban, Penerbit Erlangga, 1986.
2. Ganijanti AS, Gelombang dan Optik, ed III, Jurusan Fisika FMIPA UI, 1981.

3. Tipler P.A, Fisika II, ed III terjemahan Bam-bang Sugiyono, Penerbit Erlangga, 2001.
4. D.C.Giancoli, General Physics, Prentice Hall Inc, 1984.

STATISTIK DAN PROBABILITAS (3 SKS)

Tujuan Pembelajaran: Kuliah Statistik bermaksud untuk memberikan kemampuan dasar seorang mahasiswa agar mampu melakukan penanganan data/informasi kuantitatif dimulai dari tahapan deskriptif yang meliputi pengumpulan pengorganisasian, dan penyajiannya secara ilmiah sampai dengan tahapan induktif yang meliputi kegiatan peramalan dan penarikan kesimpulan berdasarkan data yang ada dan hubungan antar variable.

Silabus: Statistik Deskriptif; Probabilitas; Distribusi Probabilitas; Variable acak; Beberapa Distribusi Probabilitas Diskrit; Beberapa Distribusi Probabilitas Kontinyu; Distribusi Sampling, Estimasi; Satu dan Dua Uji Sample dari Hipotesis; Regresi Linear Sederhana; Statistik Terapan di bidang Rekayasa.

Prasyarat: -

Buku Ajar:

1. Harinaldi, Prinsip-prinsip Statistik Untuk Teknik dan Sains, Erlangga, 2006.
2. Devore, J.L., Probability and Statistics for Engineering and The Sciences (5th Ed.), Duxbury, 2000
3. Barnes J.W, Statistical Analysis for Engineers and Scientists, a Computer- Based Approach, McGraw-Hill, 1994
4. Donald H.S, Statistics, A First Course (6thEd), McGraw-Hill, 2001
5. Walpole, Ronald E, Probability & Statistics for Engineers & Scientist, 8th Ed, Pearson Prentice Hall, 2007.

KESEHATAN, KESELAMATAN KERJA DAN LINGKUNGAN (2 SKS)

Tujuan Pembelajaran: Mahasiswa diharapkan mampu untuk mengidentifikasi berbagai jenis bahaya, karakterisasi, mengusulkan metode yang cocok untuk pengurangan resiko dan mitigasi dan mendesain sistem manajemen keselamatan kerja. Mahasiswa juga diharapkan dapat meningkatkan awareness mereka terhadap kesehatan dan keselamatan kerja industry, dan mengerti kerangka dan standard peraturan keamanan serta program lingkungan.

Silabus: Introduction to Regulation and Standards; Risk Perception, Assessment and Management; Machinery Hazards; Noise Hazards; Process Safety Hazard; Fire and Explosion Hazard; Electrical Hazard; Toxicology in The Workplace; Environmental Protection; Environmental Protection Control Processes; Hazard Communication to Employees; Personal Protective Equipment (PPE): Types of PPE and Selection of PPE; Safety Audits, Incident and Emergency Planning.

Prasyarat: -

Buku Ajar:

1. Charles A. Wentz, Safety, Health and Environmental Protection, MGH, 1998.
2. Asfahl, C.R., Rieske, D.W., Industrial Safety and Health Management, 6th Ed., Pearson Education, Inc. 2010.
3. Undang-undang dan Peraturan Nasional terkait dengan Sistem Manajemen K3 dan Lingkungan.

MENGGAMBAR TEKNIK (2 SKS)

Tujuan Pembelajaran: Setelah menyelesaikan mata ajar ini, mahasiswa diharapkan mampu mengkomunikasikan geometri komponen melalui gambar sesuai dengan standar penggambaran yang diakui oleh International Standard Organization (ISO). Melalui aktivitas belajar-mengajar, mahasiswa diharapkan:

Memahami teori dan prosedur menggambar teknik sesuai dengan standar ISO

Mampu membaca, memindahkan dan menkomunikasikan gambar geometri 2D/3D dari komponen / konstruksi dan mampu menggambar proyeksi orthogonal sesuai standar ISO.

Silabus: (1)Ilustrasi: Fungsi dan Manfaat Gambar Teknik; SAP; Pengukuran dan Evaluasi; Pengenalan Peralatan Menggambar. (2) Pengertian dasar geometri, format kertas & aturan gambar; garis, bidang, & konfigurasi garis; bentuk-bentuk geometri dasar; test kemampuan awal. (3) Visualisasi Geometri 3D: Proyeksi Miring dan Isometri; Fungsi dan jenis garis, Konfigurasi Bentuk Geometri. (4) Proyeksi Orthogonal: Standar proyeksi; Konsep Pandangan; Prinsip Penyajian Ukuran. (5) Proyeksi Orthogonal Lanjut: Konsep penampang putar; Konsep tampak khusus; Konsep Potongan; Penyajian Ukuran; Pembiasaan.

Prasyarat: -

Buku Ajar:

1. ISO 1101, Technical Drawings, International Organization for Standardization.
2. A.W. Boundy, Engineering Drawing , McGraw- Hill Book Company
3. Colin Simmons & Dennis Maguire, Manual of Engineering Drawing, Edward Arnold
4. Warren J. Luzadder, Fundamentals of Engineering Drawing, Prentice-Hall, Inc.
5. Giesecke-Mitchell-Spencer-Hill-Dygdon-Novak, Technical Drawing, Prentice Hall Inc.

KAPITA SELEKTA (2 SKS)

Tujuan Pembelajaran: Mampu menjelaskan perkembangan industri dan kerekayasaan, peluang-peluang usaha serta

permasalahan yang dihadapinya secara umum.

Silabus: Diadakan dengan mengundang dosen tamu yang kompeten di bidang yang sesuai dengan kebutuhan di masing-masing program studi (bisa berbeda di tiap semester)

Prasyarat:-

Buku Ajar: -

PENGANTAR TEKNIK INDUSTRI (2SKS)

Tujuan Pembelajaran: Memberikan gambaran tentang keilmuan teknik industry dengan menggambarkan tuang lingkup, komponen sistem serta interaksi antar sistem yang membangun sebuah sistem industri dan memahami aplikasi dari keilmuan teknik industri baik di sektor manufaktur maupun jasa

Silabus: Sejarah keilmuan teknik industri, ruang lingkup keilmuan teknik industri, pengenalan singkat dan penjelasan komponen sistem yang membangun teknik industri, penjelasan struktur kurikulum teknik industri, contoh peran per-ekayasa industri di manufaktur dan jasa, perkembangan keilmuan teknik industri di masa yang akan datang. Definisi Profesionalisme dan Etika Perekrayasa, Contoh kasus Etika dan Profesionalisme.

Prasyarat: -

Buku Ajar:

1. Maynard Harold B. (ed.), Maynard's Handbook of Industrial Engineering. McGraw-Hill Professional, 2001.
2. Badiru, Adedeji B., Handbook of Industrial and System Engineering, CRC Taylor-Francis, 2006.

PENGANTAR ILMU EKONOMI (2SKS)

Tujuan Pembelajaran: Memperkenalkan lingkup ilmu ekonomi dan bisnis sebagai bagian yang tak terpisahkan dari kehidupan manusia sehari-hari dalam berusaha mempertahankan hidupnya

Silabus: Konsep Dasar. Penyediaan, Permintaan dan Pasar Produk. Tenaga Kerja, Lahan dan Modal. Perdagangan dan Perpajakan. Kegiatan Ekonomi dan Pendapatan Nasional. Konsumsi dan Investasi Uang, Pasar Uang dan Moneter. Pengangguran, Inflasi dan Kebijakan Ekonomi. Pertumbuhan dan Pembangunan Tujuan Bisnis. Rencana Bisnis. Pengorganisasian. Mengawali Pendanaan. Operasi Bisnis. Pemodal. Prinsip Pemasaran. Mengelola Keuangan. Mengelola Sumberdaya Manusia. Mengelola Pelayanan, Produktivitas dan Informasi

Prasyarat: -

Buku Ajar:

1. Samuelson, Paul E. dan William D. Nordhaus. 2005. Economics. Boston: McGraw-Hill.).
2. Griffin, Ricky W. and Ronald J. Ebert. 2002. Business. Upper Saddle River: Prentice Hall.

PENGETAHUAN BAHAN (2SKS)

Tujuan Pembelajaran: Mahasiswa diharapkan mampu mengetahui keunggulan dan keterbatasan jenis material yang digunakan dalam proses pembuatan, karakteristik, dan penggunaannya.

Silabus: Besi dan baja: menjelaskan perbedaan antara besi dan baja dalam proses pembuatan dan penggunaan. Material bukan besi: mengetahui logam aluminium dan tembaga terutama dalam penggunaan dan sifat umumnya. Material non logam: keramik, polimer dan komposit. Bahan utama keramik, sifat penggunaannya dalam bidang teknik serta keunggulan material.

Prasyarat: -

Buku Ajar:

1. Van Lack, Elements of Materials Sciences, Penerbit Erlangga.
2. Surdia, T. dan S. Saito, Pengetahuan Bahan Teknik, Pradnya Paramita.
3. Musicant S., Ceramics, Marcel Dekker, 1991.
4. Callister, D William, Rethwisch, G David, Material Science and Engineering. An Introduction. 8th Edition. 2009. John Wiley & Sons

PENGANTAR MEKANIKA DAN ELEKTRONIKA PABRIK (2 SKS)

Tujuan Pembelajaran: Memahami konsep dasar dari mekanika teknik serta dapat mengidentifikasi berbagai fasilitas pabrik yang berbasis pada penggerak mula (prime movers) dan tenaga listrik

Silabus: Pengantar Mekanika Teknik. Pengenalan Penggerak Mula. Prinsip Motor Bakar, Ketel. Prinsip Turbin, Pengertian Dasar Sistem Tenaga Listrik. Elemen Sistem Tenaga Listrik (Transformator. Mesin AC. Mesin DC), PLC. Sistem Pneumatik.

Prasyarat: Pengetahuan Bahan

Buku Ajar:

1. Timoshenko, Strength of Material, Prentice Hall, 1976
2. Popov, Mechanics of Materials, MIR Publisher, 1979

AKUNTANSI BIAYA (2SKS)

Tujuan Pembelajaran: Dapat memahami prinsip akuntansi dan menyelesaikan soal perhitungan akuntansi secara sistematis & menyajikan dalam bentuk laporan daftar keuangan. Dapat menganalisa & mengevaluasi kondisi perusahaan berdasarkan

laporan keuangan tsb

Silabus: Persamaan Akunting . Perhitungan Harga Pokok Produksi . Perhitungan Harga Pokok Penjualan. Pembuatan Laporan Rugi Laba. Pembuatan Laporan Neraca. Penilaian Persediaan (Perusahaan Dagang). Depresiasi. Modal Kerja (Working Capital). Perencanaan dan Pengendalian Laba. Alokasi Biaya Overhead. Metode Activity Based Costing. Job Order Cost Accounting. Process Cost Accounting.

Prasyarat : Pengantar Ilmu Ekonomi

Buku Ajar :

1. Lawrence H. Hammer, William K. Carter, Milton F Usry, Cost Accounting, ITP Co., Ohio, 2004
2. Weygrandt, Kieso, Kell, Accounting Principles, John Willey and Sons CO., Canada, 2003

PERANCANGAN KERJA, METODE & STANDAR KERJA + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Memberikan pengetahuan dan keahlian kepada mahasiswa untuk dapat menghitung, menganalisa, merancang dan menaikan efektivitas dan efisiensi kerja manusia melalui perbaikan metode dan penetapan standard kerja

Silabus: Penjelasan Struktur kuliah, *Introduction of Human Factors, History Of Human Factors and Future Trends. Problem Solving Tools. Operation Analysis. Man Machine Chart and Flow Process Chart. Anthropometry. Time Study. Performance Rating & Allowances. Work Sampling. Standard Data. Predetermined Time Study. Wage Design. Training and Learning Curves.*

(Kuliah ini mengandung unsur Praktikum)

Prasyarat: Statistik and Probabilitas

Buku Ajar:

1. Method, Standard and Work Design, 11th edition, Benjamin Niebel & Andris Freivalds, McGraw-Hill International, 2003
2. The Ergonomics Kit for general industry, dan Macleod, Taylor & Francis, 2006
3. Motion and Time Study: Design and Measurement of Work, Barnes, Ralph M., John Wiley and Sons, 1980

PROSES PRODUKSI + PRAKTIKUM (2SKS)

Tujuan Pembelajaran: Mengenal proses dan teknologi produksi untuk memahami bagaimana suatu produk dihasilkan melalui proses produksi di dalam industri manufaktur.

Silabus: Pengantar Proses Produksi. Proses Pengecoran & Analisa Biaya. Proses Pembentukan: Pengerjaan Panas. Proses Pembentukan: Pengerjaan Dingin. Proses Pembentukan: Plastik, Keramik, Komposit. Proses Penempaan & Analisa biayanya. Proses Penekanan & Analisa biayanya. Proses Penarikan & Analisa biayanya. Proses Pembentukan Plat & Analisa biayanya. Proses Pengelasan: Gas Flame Process and Arc Process. Proses Pengelasan: Resistance Welding and Other Welding Process Process. Proses Penyambungan: Joining. Proses Penyambungan: Fastening.

Prasyarat: Pengetahuan Bahan, Menggambar Teknik

Buku Ajar:

1. Kalpakjian, Serope,. Schmid, Steven,. Manufacturing, Engineering and Technology, 5rd edition, Prentice-Hall, 2005

EKONOMI TEKNIK (3SKS)

Tujuan Pembelajaran: Mampu menggunakan dan menerapkan konsep dan analisa biaya dalam melakukan evaluasi suatu usulan teknik/manajemen.

Silabus: Pengantar Ekonomi Teknik. Ekuivalensi. Analisis Nilai Saat ini. Analisis Nilai Tahunan. Analisis Tingkat Pengembalian. Analisis Penggantian. Analisis Manfaat-Biaya. Periode Pengembalian. Depresiasi. Pajak Pendapatan.

Prasyarat: Pengantar Ilmu Ekonomi

Buku Ajar:

1. Blank, Tarquin, Engineering Economy, McGraw-Hill, 2002.

PERENCANAAN PRODUKSI DAN PENGENDALIAN PERSEDIAAN + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Mampu menganalisa, merancang, mengimplementasikan, dan mengevaluasi sistem perencanaan

dan pengendalian produksi secara terintegrasi melalui pengaturan aliran informasi, perencanaan dan penjadwalan sumber daya produksi, serta penataan proses-proses internal, agar dapat menghasilkan produk yang berkualitas, pada waktu yang tepat dan secara ekonomis.

Silabus: Pengenalan Perencanaan dan Pengendalian produksi (PPIC). Sistem perencanaan produksi. Rencana induk produksi. Perencanaan kebutuhan material (Bill of Materials). Perencanaan kebutuhan kapasitas. Pengendalian persediaan. Pengendalian permintaan bebas dan lot size. Pelaksanaan produksi. Penjadwalan, urutan dan kinerja produksi. Pengenalan TOC/DBR. Implementasi dan integrasi sistem PPIC atau Praktikum perencanaan dan pengendalian produksi (PPIC Game), Teknik Peramalan.

Prasyarat: -

Buku Ajar:

1. Arnold, J.R. Tony and Chapman, Stephen N.; Prentice Hall; Introduction to Materials Management; 2004
2. Chapman, Stephen N.; The Fundamentals of Production Planning and Control; Pearson - Prentice Hall, 2006

PROGRAMA LINIER (3SKS)

Tujuan Pembelajaran: Mendidik Mahasiswa Mengetahui dan Menerapkan Model Matematis di Dalam Penyelesaian Persoalan Teknik dan Manajemen

Silabus: Model Program Linier & Penyelesaian Secara Grafis. Metode Simpleks. Dualitas dan Analisa Kepekaan. Model Transportasi. Model Penugasan. Program Integer. Program Matematik Multi Tujuan. Network.

Prasyarat: -

Buku Ajar:

1. Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006
2. Hellier, Lieberman, Introduction to Operations Research, Mc Graw Hill, 2005

PERANCANGAN TATA LETAK PABRIK (3SKS)

Tujuan Pembelajaran: Mampu merancang Tata Letak Pabrik dengan berorientasi kepada batasan dan tujuan yang optimal

Silabus: Fungsi Perancangan, Garis Besar Prosedur Perancangan. Perancangan Proses. Perancangan Aliran Material. Teknik Analisis. Perencanaan Hubungan Antar Aktivitas. Pelayanan Produksi dan Pabrik. Perhitungan Luas Ruang. Alokasi Area. Peralatan Pengangkut Material. Penyusunan Tata letak Pabrik. Pemilihan Lokasi Pabrik.

Prasyarat: Pengantar Mekanika dan Elektronika Pabrik

Buku Ajar:

1. Richard L. F., Facility Layout and Location, Prentice Hall, 1992
2. Plant Layout and Material Handling, John Wiley & Sons, 1977.
3. Meyers, E Fred, . Plant Layout and Material Handling 1st Edition. Prentice-Hall. 1993

FAKTOR MANUSIA DALAM REKAYASA & DESAIN + PRAKTIKUM (3SKS)

Tujuan Pengajaran: Mahasiswa memiliki pengetahuan serta kemampuan untuk menganalisa dan mendisain system interaksi manusia dengan mesin dan lingkungan kerjanya.

Silabus: Pengantar Faktor Manusia dalam rekayasa dan desain. Desain Antar Muka Pengguna. Sistem Kontrol Motorik Manusia. Alat Kerja dan Bantu Tangan. Antropometri Terapan. Maengatur Tata Letak Komponen dalam Sebuah Ruang Fisik. Aspek Interpersonal (Hubungan Antar Manusia). Dalam merancang. Pencahayaan dan Iklim. Suara dan Pergerakan. Kesalahan Manusia, Kecelakaan dan Keselamatan Kerja. Failure Mode and Effect Analysis. FMEA. System Design and Human factors

(Kuliah ini mengandung unsur Praktikum)

Prasyarat: Perancangan Kerja, Metode dan Standar Kerja

Buku Ajar:

1. Sanders, Mark S. & Ernest J. McCormick. Human Factors in Engineering and Design. McGraw-Hill. New York. 1993
2. Chapanis, Alphonse. Human Factors in Systems Engineering. John Wiley & Sons. New York. 1996
3. Wickens, D Christopher, . An Introduction to Human Factors Engineering, 2nd Edition. Prentice-Hall. 2004

SISTEM PEMELIHARAAN (2SKS)

Tujuan Pembelajaran: Memahami aspek-aspek penting dalam manajemen pemeliharaan dan mengetahui berbagai jenis manajemen pemeliharaan yang digunakan perusahaan

Silabus: Pengantar Manajemen Pemeliharaan. Organizing for Maintenance Operations. Paperwork Control. Maintenance Job Planning and Scheduling. Maintenance Work Measurement and Standards. Preventive Maintenance Measuring and Appraising Maintenance Performance. Total Productive Maintenance. Manajemen Pemeliharaan in Action.

Prasyarat: Proses Produksi

Buku Ajar:

1. Lawrence Mann, Jr., Maintenance Management, Lexington Books, 1978
2. Seiichi Nakajima, Introduction to Total Productive Maintenance, 1988
3. Antony Corder, di alih bahasa oleh Ir. Kusnul Hadi, Teknik Manajemen Pemeliharaan, Erlangga, 1996.
4. Palmer, Doc Richard., Maintenance Planning and Scheduling Handbook 2nd Edition. McGraw-Hill Professional. 2004.

STATISTIK INDUSTRI + PRAKTIKUM (3SKS)

Tujuan Pembelajaran : Mampu mengorganisir pengumpulan, pengolahan, & penganalisaan data dengan baik & benar secara statistic maupun engineering (rekayasa) dalam melakukan rancangan percobaan (DOE - Design of Experiment) yang bertujuan untuk pengambilan keputusan

Silabus: *Review of Basic Statistical Concepts. Single Factor Experiment (Fixed Effect Model). Single Factor Experiment (Random Effect Model). Randomized Complete Block Design. Latin Square Design. General Factorial Design. 2k Factorial Design. Blocking in Factorial Design. Factorial Experiments with Random Factors. Fractional Factorial Design. Nested Design. Response Surface Model.*

Prasyarat: Statistik dan Probabilitas.

Buku Ajar:

1. Design and Analysis of Experiments, Douglas C. Montgomery. John Wiley & Sons, 2000
2. Design and Analysis of Experiments, Angela Dean and Daniel Voss, Springer-Verlag, 2000
3. Experimental Design with Applications in Management, Engineering, and the Sciences, Paul D. Barger and Robert E. Maurer, Thomson Learning, 2002

SISTEM PRODUKSI + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Mampu menganalisa, merancang, mengimplementasikan, dan meningkatkan kinerja suatu sistem operasi produk/jasa secara terukur, terutama yang berdampak strategis (jangka panjang dan menengah) guna dapat menghasilkan produk/jasa yang bersaing serta sesuai kebutuhan pelanggan.

Silabus: Pengenalan sistem produksi. Strategi produksi. Pengembangan produk dan proses. Metode penentuan lokasi. Analisa tataletak (proses dan produk). Analisa kapasitas. Analisa, rancangan dan kinerja proses. Pendekatan proses dan kinerja pada rantai suplai. Perencanaan distribusi. Perencanaan, penjadwalan dan pengalokasian sumberdaya proyek teknik. Konsep JIT/lean production system. Perancangan, Implementasi dan integrasi kanban production system atau praktikum kanban production system (kanban game).

Prasyarat: Perencanaan Produksi dan Pengendalian Persediaan

Buku Ajar:

1. Chase and Aquilano; Operations Management; Pearson-Prentice Hall; 11th , Edition, 2006
2. Heizer, Jay and Render, Barry; Operations Management; Pearson-Prentice Hall; 2006
3. Kanban for The Shopfloor, The Productivity Press; 2002

PENELITIAN OPERASI (3SKS)

Tujuan Pembelajaran: Mendidik Mahasiswa Mengetahui dan Menerapkan Model Matematis di Dalam Optimalisasi Penyelesaian Persoalan Teknik dan Manajemen. industri yang dapat dimodelkan secara kuantitatif dan yang bersifat Deterministik dan Stokastik.

Silabus: Program Dinamis. Analisis Markov. Pohon Keputusan. Teori Permainan. Program Non Linier. Antrian. Simulasi.

Prasyarat: Program Linier

Buku Ajar:

1. Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006
2. Hellier, Lieberman, Introduction to Operations Research, McGraw-Hill, 2005

SISTEM INFORMASI (2SKS)

Tujuan Pembelajaran: Memahami peran sistem informasi manajemen dan teknologi informasi pada industri saat ini untuk menghadapi era globalisasi

Silabus: Pengantar Sistem Informasi Manajemen. MIS/IT Sebagai Keunggulan kompetitif. IT and Electronic Commerce. Database dan Database Manajemen. System Analysis and Design. MIS dan Hubungannya dengan RQM dan QS. CBIS. Accounting Information System. Decision Support System. Executive Information System. Marketing, Manufacturing Information System. Financial, Human Resource Information System.

Prasyarat: Organisasi dan Psikologi Industri

Buku Ajar:

1. McLeod, Management Information System, 10th edition, Prentice Hall, 2003

- Lucas, Information Systems Concepts for Management, McGraw-Hill, 1994 (referensi)

ORGANISASI & PSIKOLOGI INDUSTRI (2SKS)

Tujuan Pembelajaran: Mengetahui, memahami dan mampu menganalisis faktor-faktor yang mempengaruhi perancangan dan pengelolaan organisasi di dalam industri, serta mampu mengelola dan mengukur nilai asset sumber daya manusia dalam organisasi.

Silabus: Desain organisasi. Budaya Organisasi. Strategic Role of HRM & Effective Management of People. Ability Motivation & Opportunity. Job Analysis & Planning & Recruitment. Testing, Selection & Interview. Training & Development. Appraising & Managing Performance. Managing Careers & Fair Treatment. Establishing Strategic Pay Plans. Pay for Performance & Incentives. Benefits and Services. Labor Relations & Collective Bargaining. Employee Safety & Health. Linking to Organisational Outcomes. Human Resource Capital Management. Human Resource System for TQM.

Prasyarat: -

Buku Ajar:

- Strategic Human Resource Management, Mike Millmore, Philip Lewis, Prentice Hall 2007
- Human Resource Management, Gary Dessler, Prentice Hall, 10th edition, 2007
- Human Resource Strategy, Dreher & Dougherty, Mc Graw Hill, 2001

PERANCANGAN PRODUK + PRAKTIKUM (3SKS)

Tujuan Pembelajaran : Mendidik mahasiswa agar dapat menciptakan ide konsep produk atau jasa baru berdasarkan sebuah studi pasar terstruktur berbasis kepada marketing mix

Silabus : Penciptaan Ide, Pengertian Manajemen pemasaran . Global Marketing . Perilaku Konsumen . Marketing Mix, Sistem Pemasaran . Selling Skill . Blue Ocean Strategy . Strategic Brand Management . Market Research, Identifikasi Kebutuhan Konsumen. Menentukan Spesifikasi Produk, menyusun konsep produk. Menyusun Konsep, Memilih dan Menguji Konsep, Arsitektur Produk, Design for Manufacturing, Design for Assembly, Membuat Prototype, Keekonomian Produk, Mengelola Proyek Perancangan Produk, Presentasi Proyek Perancangan Produk.

Prasyarat : Faktor Manusia dalam Rekayasa dan Desain

Buku Ajar :

- Karl. T. Ulrich & Steven D. Eppinger. Product Design Development. 3rd Edition. Mc Graw-Hill. 2004
- Dieter. "Design Engineering", 3rd edition, Mc.Graw Hill 2000
- James G. Bralla. Design For Excellence. McGrawHill - 1996
- Milton D. Rosenav, Jr. et. al. The PDMA Handbook of New Product Development, John Willey & Sons. 1996
- Hamid Noor & Russel Radford. Production & Operation Management. McGrawHill. 1995

SISTEM KUALITAS (3SKS)

Tujuan Pembelajaran: Memberikan pengetahuan dan keahlian kepada mahasiswa untuk dapat merancang sebuah sistem peningkatan kualitas yang mampu melakukan penjaminan dan peningkatan kualitas produk dan proses secara berkesinambungan berdasarkan fakta (angka) dengan pendekatan matematika (statistik) dengan mempertimbangkan standard kualitas yang baku di dunia

Silabus: 3 pilar kualitas: peningkatan berkesinambungan, fokus pelanggan dan partisipasi total, konsep PDCA, 7 tools dan 7 new tools, teknik pemetaan proses, peran standar, standar internal (SOP, WI, dll) dan eksternal (ISO, JIS dll), Lean Six Sigma

Prasyarat : Statistik & Probabilitas

Buku Ajar:

- The Six Sigma Way Team Fieldbook, Peter S Pande et. al. McGraw-Hill, New York, 2002
- QC Problem Solving Approach: Solving Workplace Problems the Japanese Way, Katsuya Hosotani, 3A Corporation, Tokyo, 1982
- The Quality Toolbox Taguen Nancy R., ASQ Quality Press. Milwaukee. Wisconsin. 2005

PEMODELAN SISTEM + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Mahasiswa dapat menyusun sebuah model komputer berbasis discrete-event modeling dari sebuah sistem industri secara mikro, mensimulasikannya untuk melakukan analisa kelayakan dan mengeluarkan rekomendasi dari model tersebut (menjadi discrete-event system modeler)

Silabus: Konsep pemodelan, metodologi umum pemodelan sistem: konseptualisasi, pengembangan, simulasi dan analisa hasil simulasi, contoh-contoh kasus pemodelan, validasi dan verifikasi pemodelan diskrit, metodologi pencairan kebutuhan pengguna (user requirement), teknik penyusunan laporan dan presentasi hasil pemodelan.

(Kuliah ini mengandung unsur Praktikum)

Prasyarat: Statistik & Probabilitas

Buku Ajar:

1. Business Dynamics: System Thinking and modeling for a ComplexWorld. John D. Sterman, McGraw-Hill, USA, 2000
2. Charles Harrell, Biman K. Ghosh, and Royce O. Bowden, Jr., Simulation Using Promodel, McGraw-Hill Higher Education, New York. 2000

MANAJEMEN PROYEK INDUSTRI (3SKS)

Tujuan Pembelajaran: Mahasiswa mampu merencanakan, melaksanakan dan mengendalikan sebuah proyek di Industri

Silabus: Pengertian Manajemen Proyek. System Theory. Organisasi PMDA Proyek. Sumberdaya Proyek. Organisasi Staf dan Tim Proyek. Manajemen Waktu. Topik Spesial. PERT. Grafik pada Proyek. Cost Control.

Prasyarat: Penelitian Operasional

Buku Ajar:

1. Kerzner, Harold T., Project Management : A System Approach to Project Planning, scheduling, and Controlling, John Wiley & Sons, 7th edition, 2002

PERANCANGAN TEKNIK INDUSTRI + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Memberikan pengetahuan mengenai pendekatan-pendekatan dan teknik-teknik yang digunakan pada setiap tahap proses perancangan produk serta memahami falsafah desain, keandalan dalam desain. Sehingga mampu melakukan analisis desain produk dengan memperhatikan interaksi material dan proses produksinya. Serta dapat memahami aspek teknis maupun ekonomis dalam perancangan produk dan proses untuk dikomersialkan

Silabus: Proses Perancangan. Metoda Perancangan. Metoda Rasional. Karakteristik Material. Pertimbangan-Pertimbangan Dalam Desain. Evaluasi Biaya. Rekayasa Nilai. Perancangan Produk Dan Rekayasa Nilai. Proses Kreativitas Dan Organisasi Inovasi. Analisis Nilai Fungsi Dan Biaya. Tahapan Rekayasa Nilai. Teknik-Teknik Rekayasa Nilai, Product Life Cycle, Komersialisasi

Prasyarat: Perancangan Produk, Analisa Kelayakan Industri

Buku Ajar:

1. George, E.D., Engineering Design : A Material and Processing Approach, McGraw-Hill, New York, 2000
2. Heller, D.E., Value Management, Value Engineering and Cost Reduction, Addison Wesley
3. Cross, N., Engineering Design Methods : Strategies for Product Design, John Wiley & Son, New York, 1994
4. Lawrence, D.M., Techniques of value Analysis and Engineering, McGraw-Hill
5. A.D. Raven., Profit Improvement by Value Analysis, Value Engineering and Purchase Price Analysis, Cassel and Co.

MANAJEMEN RANTAI PASOK (3SKS)

Tujuan Pembelajaran: Memberikan pemahaman mengenai konsep dan aplikasi SCM secara ilmiah sehingga mampu menganalisa dan mengevaluasi peran tiap actor dalam keseluruhan rantai suplai

Silabus: Pengantar SCM, Strategi dan Perencanaan. Enterprise Resource Planning. Purchasing. Metode Transportasi. Shortest Path. Travelling Salesman Problem. Vehicle Routing Problem. Manajemen Pergudangan. Reverse Logistics. Teori Lokasi. Proses Perencanaan Jaringan. Perkembangan SCM.

Prasyarat: Sistem Kualitas

Buku Ajar:

SIMULASI INDUSTRI + PRAKTIKUM (3SKS)

Tujuan Pembelajaran: Mahasiswa akan mampu untuk menyusun sebuah model computer yang kompleks dari sebuah sistem industri, mensimulasikannya dan melakukan analisa kelayakan sederhana dan menyusun rekomendasi dari hasil simulasi model tersebut (menjadi continuous system modeler)

Silabus: Konsep pemodelan kontinu, metodologi pemodelan kontinu, causal loop diagram, stock and flow diagram, pemahaman behavior overtime, pengembangan model berdasarkan studi kasus nyata, teknik pengembangan skenario, validasi dan verifikasi pemodelan kontinu, pengantar konsep pembelajaran berbasis permainan simulasi

(Kuliah ini mengandung unsur Praktikum)

Prasyarat: Pemodelan Sistem

Buku Ajar:

1. Business Dynamics: Systems Thinking and Modeling for a Complex World. John D. Sterman, McGraw-Hill, USA, 2000
2. Charles Harrel, Biman K. Gosh dan Royce Bowden, Simulation Using Promodel, McGraw-Hill Higher Education, New York, 2000

MANAJEMEN TEKNOLOGI (2SKS)

Tujuan Pembelajaran: Mahasiswa mampu mengidentifikasi perkembangan teknologi yang bisa berdampak kepada industri, mengidentifikasi teknologi tersebut, dan menterjemahkannya kedalam sebuah rencana teknologi (technology plan) untuk meningkatkan daya saing organisasinya

Silabus: Pengantar Manajemen Teknologi, Konsep model bisnis, inovasi dan teknologi, chasm dan tornado, kompetensi, pengantar manajemen perubahan, pengantar manajemen pengetahuan, pengantar manajemen resiko, hak cipta di Indonesia, isu keberlanjutan dalam teknologi, outsourcing, tren ERP

Prasyarat: Pengantar Teknik Industri

Buku Ajar:

1. Burgelman, Maidique and Wheelwright, Strategic Management of Technology and Innovation, 2001
2. Tarek Khalil, Management of Technology, 2000
3. Gaynor, Handbook of Technolgy Management, 1996

ANALISA KELAYAKAN INDUSTRI (2SKS)

Tujuan Pembelajaran: Agar mahasiswa mengetahui aspek-aspek apa saja yang digunakan dalam menganalisa kelayakan pabrik dan mampu mengidentifikasi dan menganalisa investasi dalam rangka kelayakan fasilitas.

Silabus: Studi Kelayakan Proyek. Fungsi Ruang Lingkupnya. Aspek Pasar dan Pemasaran. Aspek Teknik dan Teknologis. Aspek Manajemen Operasi. Aspek Lingkungan. Aspek Hukum. Aspek Ekonomi. Aspek Keuangan.

Prasyarat: Akuntansi Biaya, Ekonomi Teknik

Buku Ajar:

1. Clifton, Fyffe, Project Feasibility Analysis, John Wiley, 1997
2. Siswanto Sutojo, Studi Kelayakan Proyek, PPM, 1995

KERJA PRAKTEK (2 SKS)

Tujuan Pembelajaran: Mampu memahami penerapan berbagai keilmuan teknik industri di dunia lapangan kerja dan merefleksikan kedalam apa yang telah dipelajari selama ini di perkuliahan

Silabus:

Prasyarat: Perhatikan SOP Kerja Praktek

Buku Ajar: -

SKRIPSI (5 SKS)

Tujuan Pembelajaran : Mampu mengutarakan masalah dan pendapatnya dalam suatu diskusi ilmiah secara sistematis, jelas, benar. Mampu menyusun ide/solusi/pendapatnya dalam suatu penulisan ilmiah sesuai dengan kaidah penulisan ilmiah yang mengintegrasikan ilmu yang telah dipelajari.

Silabus: Keilmuan Teknik Industri untuk menyelesaikan sebuah kasus di dunia nyata

Prasyarat: Perhatikan SOP Skripsi

Buku Ajar: Manual Penyusunan Skripsi Universitas Indonesia

MATA KULIAH PILIHAN

DATA MINING (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu Mengorganisir pengumpulan, pengolahan, & penganalisaan data secara baik & benar untuk pengambilan keputusan

Silabus: Konsep dan Proses Data Mining, Algorithma dalam Data Mining, Aplikasi Data Mining dalam Organisasi

Prasyarat: Statistik dan Probabilitas, Statistik Industri,

Buku Ajar:

1. Nisbet, R. (2009). Handbook of Statistical Analysis and Data Mining Applications, Elsevier.

ANALISA MULTIVARIAT (3 SKS)

Tujuan Pembelajaran: Mampu Mengorganisir pengumpulan, pengolahan, & penganalisaan data yang bersifat multivariate secara baik & benar untuk pengambilan keputusan

Silabus: Review of Basic Statistical Concepts, Multiple Regression. Manova. Principal Component Analysis. Factor Analysis. Cluster Analysis. Discriminant Analysis. Logit Analysis. Canonical Correlation. Multidimensional Scaling. Structural Equation Modeling.

Prasyarat: Statistik dan Probabilitas, Statistik Industri

Buku Ajar:

1. Hair, J.F., B. Black, B. Babin, and R.E. Anderson (2005) Multivariate Data Analysis, Sixth Edition, Prentice Hall.
2. Richard Johnson and Winchern (1998) Applied Multivariate Statistical Analysis, Fourth Edition, Prentice

3. Hall.
W.R. Dillon and M. Goldstein (1984) *Multivariate Analysis: Methods and Applications*, John Wiley & Sons.

KETERAMPILAN INTERPERSONAL (3SKS)

Tujuan Pembelajaran: Mahasiswa dapat mengaplikasikan prinsip-prinsip komunikasi yang baik dan efektif serta standar perilaku sesuai dengan standard etika dan kebiasaan pada tingkat bisnis profesional

Silabus : Dasar-dasar ilmu komunikasi, Keterampilan Berbicara dengan publik, keterampilan Memimpin dan Mengikuti Rapat atau pertemuan, keterampilan mempresentasikan gagasan

Keterampilan memfasilitasi dan bernegosiasi, Keterampilan menulis formal dan membaca efektif

Prasyarat:

Buku Ajar:

1. *Human Relations in Business: Developing Interpersonal and Leadership Skills*. Michael G. Aamodt dan Bobbie L. Raynes. Thomson Learning, Belmont. 2001
2. *Human Relations: Interpersonal Job-Oriented Skills*, 9th Edition, Andre J. DuBrin. Pearson Education Inc. Upper Saddle, New Jersey. 2007.

REKAYASA SISTEM (3SKS)

Tujuan Pembelajaran : Mahasiswa dapat memahami dasar manajemen rekayasa sistem di Industri sehingga mampu untuk mengelola sebuah proses desain, instalasi, manajemen dan pengakhiran dari sebuah sistem yang kompleks

Silabus: Konsep dan metodologi rekayasa sistem industri. Siklus Hidup Sistem: Konsep, Pengembangan, Produksi, Pemanfaatan dan Dukungan, serta Akhir Sistem. Vee-Model. Proses-proses dalam Siklus Hidup Sistem: Proses Teknis, Proses Proyek, Proses Organisasi dan Proses Akuisisi Barang atau Jasa. Total System Value and Life Cycle Costing.

Prasyarat: Pemodelan Sistem

Buku Ajar:

3. *SYSTEMS ENGINEERING HANDBOOK: A GUIDE FOR SYSTEM LIFE CYCLE PROCESSES AND ACTIVITIES*, version 3.1, Edited by: Cecilia Haskins, CSEP, Kevin Forsberg, CSEP and Michael Krueger, CSEP. August 2007.
4. *Systems Engineering Principles and Practice*. Kossiakoff, Alexander and William N. Sweet. John Wiley & Sons. Hoboken - New Jersey. 2003.
5. *ISO/IEC 15288 Standard for Systems Engineering*. International Organization Standard -ISO.

ANALISA DAYA SAING PERUSAHAAN (3SKS)

Tujuan Pembelajaran: Mahasiswa mampu menganalisa factor-faktor internal dan eksternal dalam perusahaan untuk formulasi strategi peningkatan daya saing perusahaan.

Silabus: Resource Based Competitive Advantage, Risk management, Strategi Manajemen Informasi dan Pengetahuan untuk Peningkatan Daya Saing, Metode dan alat implementasi strategi, Competitive Intelligence.

Prasyarat: Akuntansi Biaya

Buku Ajar:

1. Sharp, S. 2009. *How to minimize risk, avoid surprise, and grow your business in a changing world*. John Willey.

OPTIMASI LANJUT (3SKS)

Tujuan Pembelajaran: Mahasiswa dapat merancang dan mengimplementasikan berbagai algoritma optimasi heuristic dan metaheuristic untuk menyelesaikan persoalan di bidang teknik industri.

Silabus: Pengantar optimasi, Teori kompleksitas, Dasar-dasar heuristic, Algoritma Hill Climbing, Algoritma Greedy, Simulated Annealing, Tabu Search, Genetic Algorithm, Teknik menangani kendala, metaheuristic multi-tujuan

Prasyarat: Penelitian Operasi

Buku Ajar:

1. *How to Solve It: Modern Heuristics*, Zbigniew Michalewicz, David B. Fogel. Springer, 2004
2. *Essentials of Metaheuristics*, Sean Luke, 2009, *Essentials of Metaheuristics*, Lulu, available at <http://cs.gmu.edu/~sean/book/metaheuristics/>
3. *Computational Intelligence, an introduction*, Andries P. Engelbrecht, John Wiley & Sons, England: 2007.

SUSTAINABLE MANUFACTURING AND INNOVATION (3SKS)

Tujuan Pembelajaran: Mahasiswa memahami aspek lingkungan dan keberlanjutan dalam proses manufaktur dan perannya dalam peningkatan daya saing perusahaan dan pengembangan inovasi.

Silabus: Konsep dan Proses keberlanjutan dalam proses manufaktur, Green Manufacturing (Remanufacturing, Reuse,

Recycling), Renewables and Resource Utilizations, Green Logistics and SCM, Eco-Innovation, Best Practices dalam Sustainable Manufacturing.

Prasyarat: Sistem Produksi

Buku Ajar :

1. Seliger, G. (2011). *Advances in Sustainable Manufacturing*, Springer.
2. Jovane, F. (2010). *The Manufuture Road: Towards Competitive and Sustainable High-Adding-Value Manufacturing*, Springer.
3. Allen, D.T. (2016). *Sustainable Engineering: Concepts, Design and Case Studies*, Prentice-Hall.
4. Hermosilla, J.C. (2009). *Eco-Innovation: When Sustainability and Competitiveness Shake Hands*.

PRODUCT LIFECYCLE MANAGEMENT (3SKS)

Tujuan Pembelajaran: Mahasiswa dapat memahami konsep siklus hidup produk dan peranannya dalam pembuatan strategi inovasi perusahaan

Silabus: Konsep siklus hidup produk, Manajemen fase-fase dalam siklus hidup produk, PLM dan Strategi inovasi, Strategi pengembangan produk dalam perusahaan.

Prasyarat: Perancangan Produk

Buku Ajar:

1. Stark, J, 2011. *Product Life Cycle Management, 21th Century Paradigm for Product Realisation*, 2nd Edition. Springer.
2. Grieves, M. 2005. *Product Lifecycle Management. Driving the Next Generation of Lean Thinking*, McGrawHill.

MAKRO ERGONOMI (3SKS)

Tujuan Pembelajaran: Mahasiswa dapat mengenal lebih dalam mengenai perancangan sistem kerja yang terdiri dari variable yang saling berinteraksi dengan perangkat keras dan lunak dalam lingkungan fisik internal, lingkungan eksternal, dan struktur organisasi serta proses agar menjadi lebih baik. Dan juga mahasiswa memahami ergonomi secara aplikatif.

Silabus: Pengantar makro ergonomic, Metode dan alat yang digunakan dalam analisa sistem kerja dan perancangan, Pengenalan integrasi organisasi dalam konteks *productivity, safety, health dan quality of work life*.

Prasyarat: Faktor Manusia dalam Rekayasa dan Desain

Buku Ajar:

1. Hendrick, W.H., Kleiner, Brian,. 2002. *Macroergonomics: Theory, Methods, and Applications (Human Factors and Ergonomics)*
2. Stanton, N., Hedge, A,. 2005. *Handbook of Human Factors and Ergonomics Methods*, CRC Press LLC.

SIMULASI DAN PEMODELAN DIGITAL MANUSIA (3SKS)

Tujuan Pembelajaran: Mahasiswa mampu memodelkan manusia dalam digital dan mensimulasikannya untuk mendapatkan sebuah perancangan kerja yang lebih efektif dan efisien.

Silabus: Antropometri, Human Factors and Ergonomics in Healthcare, Ergonomics Modelling & Usability Evaluation, Human Factors, Ergonomics and Safety in Manufacturing and Service Industries. Pengenalan Jack Software and Motion Capture.

Prasyarat: Faktor Manusia dalam Rekayasa dan Desain

Buku Ajar:

1. Duffy, G V. 2010. *Advances in Applied Digital Human Modelling*. CRC Press.
2. Jack Software Module dari Ergonomic Centre

TEKNIK PERAMALAN LANJUT (3SKS)

Tujuan Pembelajaran: Mahasiswa memahami konsep, metode, dan aplikasi teknik peramalan dan menganalisa peranan dan fungsinya dalam formulasi strategi perusahaan.

Silabus: Konsep dasar teknik peramalan, alat-alat dasar teknik peramalan, teknik peramalan lanjut, best practices penggunaan teknik peramalan.

Prasyarat:

Buku Ajar: Makridakis, S., Wheelwright, S.C., Hyndman, R.J. 1998. *Forecasting: Methods and Applications*. John Wiley and Son.

MANAJEMEN INOVASI (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu memahami konsep dan langkah-langkah dalam pengembangan inovasi di organisasi.

Silabus: State of the art 'Innovation', Strategi pengembangan inovasi, Langkah-langkah pengembangan inovasi, Pemberdayaan teknologi untuk pengembangan inovasi

Prasyarat: -

Buku Ajar:

1. Cooper, R.G. (2007), *Winning at New Products*, 3rd Edition.
2. Trott, P. (2008). *Innovation Management and New Product Development*, 4th Edition.
3. Tidd, J., Bessant, J., Pavitt, K. (2001). *Managing Innovation - Integrating Technological, Market and Organisational Change*, Second Edition, John Wiley & Sons Ltd., West Sussex, England.

CUSTOMER RELATIONSHIP MANAGEMENT (CRM) (3 SKS)

Tujuan Pembelajaran: Mahasiswa memahami peranan dan fungsi manajemen hubungan dengan pelanggan dalam peningkatan daya saing perusahaan (organisasi)

Silabus: Konsep dan Langkah-langkah Penerapan CRM dalam organisasi, Manajemen proses CRM, Mengukur kesuksesan CRM, Best Practices Implementasi CRM.

Prasyarat: Sistem Informasi

Buku Ajar :

1. Peppers, D. (2011). *Managing Customer Relationship: A Strategic Framework*, John Wiley& Sons.

LEAN MANUFACTURING (3 SKS)

Tujuan Pembelajaran: Mahasiswa dapat memahami konsep dari proses manufacturing yang efektif

Silabus: History dan Konsep Lean Manufacturing, Strategi dan Langkah-langkah penerapan Lean Manufacturing, Toyota Production System

Prasyarat:Sistem Produksi

Buku Ajar:

1. Wilson, L. (2009). *How to Implement Lean Manufacturing*, McGrawHill.
2. George L.M. (2004). *Lean Six Sigma Pocket Toolkit: A Quick reference Guide to Nearly 100 Tools for Improving Process Quality, Speed, and Complexity* .McGrawHill

RECONFIGURABLE MANUFACTURING SYSTEM (RMS) (3 SKS)

Tujuan Pembelajaran: Mahasiswa memahami konsep RMS dan perbedaannya dengan traditional manufacturing system dan didukung dengan praktikum.

Silabus: General RMS Characteristics, Enabling Technologies and Reconfigurable Characteristics, Reconfigurable Machines.

Prasyarat: Sistem Produkai

Buku Ajar:

1. Dashchenko, A. *Reconfigurable Manufacturing System and Transformable Factories*. 2010. Springer.

DECISIONS, UNCERTAINTIES AND RISKS (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu menganalisa risiko dan ketidakpastian berdasarkan alat-alat statistik secara baik & benar untuk pengambilan keputusan

Silabus: Konsep dan Proses Pengambilan Keputusan, Theory Ketidakpastian, Analisis Risiko

Prasyarat: Statistik dan Probabilitas, Statistik Industri

Buku Ajar:

1. Parmigiani, G. (2009). *Decision Theory: Principles and Approaches* , John Wiley.

Tujuan Pembelajaran: Mahasiswa mengetahui dan menguasai teknik-teknik pemrograman komputer, mampu merancang dan menerapkan algoritma untuk menyelesaikan permasalahan-permasalahan di bidang Teknik Industri dan mahasiswa mampu menganalisa tingkat keefisienan suatu algoritma yang sudah ada.

Silabus: Introduction to programming language and algorithm, Types, variables, operators, Loops and arrays, Objects and classes, Sorting: Insertion Sort and Merge Sort, Asymptotic Notation, Recurrences, Substitution, Master Method, Divide-and-Conquer: Strassen, Fibonacci, Polynomial Multiplication, Quicksort, Random Number, Randomized Algorithms, Tree, Hashing, Hash Functions, Greedy Algorithms, Minimum Spanning Trees, Shortest Paths: Dijkstra's Algorithm, Breadth-first Search

Prasyarat: -

Buku Ajar:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithm", The MIT Press, Cambridge, Massachusetts London, England.

REKAYASA PROSES BISNIS (3 SKS)

Tujuan Pembelajaran: Mahasiswa mendapatkan pengetahuan dan keahlian untuk dapat merancang sebuah sistem melalui rekaasa proses bisnis yang mampu melakukan penjaminan dan peningkatan kecepatan dan kualitas operasional sebuah organisasi / perusahaan berdasarkan fakta (angka) dengan pendekatan matematika, simulasi dan aliran informasi dengan membandingkan kepada best practice yang berlaku di dunia.

Silabus: Reengineering: The Path to Change, Rethinking Business Process, Business Process Reengineering, BPR in Service Industry, Manufacturing Industry and Information Technology,

Metodologi Rekayasa Proses Bisnis, Simulasi proses bisnis, Praktikum: membuat aliran proses bisnis, Praktikum: Membuat simulasi perbaikan aliran proses bisnis, Business Process Management.

Prasyarat: Pengantar Teknik Industri

Buku Ajar:

1. Reengineering Corporation , Michael Hammer & James Champy, Harper-London (2006)
2. Business Process Reengineering-Text and Cases, R Radhakrisnan, PHI-New Delhi (2010)
3. The Practical Guide to Business Process Reengineering using IDEF0, Feldmann Clarence.G, (1998), Donet Publishing New York
4. Process Mapping: How to Reengineer your Business Process., Hunt, Daniel.V., (1996), John Wiley and Sons Inc, New York
5. Process Innovation, Reengineering work through information technology, Davenport, Harvard Business School Press 2004.

METODE HEURISTIK DALAM OPTIMASI (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu merancang algoritma heuristik dan metaheuristik untuk menyelesaikan permasalahan optimasi, baik untuk satu tujuan atau multi-tujuan. Mahasiswa juga diharapkan mampu merancang algoritma metaheuristik parallel dan hybrid. Selain itu, mahasiswa diharapkan mampu menerapkan algoritma metaheuristik dalam salah satu bahasa pemrograman komputer.

Silabus: Introduction, Single-Solution Based Metaheuristics, Population-Based Metaheuristics, Population-Based Metaheuristics, Metaheuristics for Multiobjective Optimization, Hybrid Metaheuristics, Parallel Metaheuristics.

Prasyarat: -

Buku Ajar:

1. El-Ghazali Talbi, Metaheuristics: From Design to Implementation, Wiley:2009

PROGRAMA KENDALA (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu membangun model program kendala (constraint programming), memahami cara kerja solver constraint programming, memahami teknik-teknik lanjutan untuk meningkatkan efisiensi kinerja solver constraint programming.

Silabus: Propositional Logic, Modeling problems as SAT, Automated Reasoning: preliminaries, Resolution, Systematic Search, Stochastic Local search, Constraint Satisfaction Problems, Search Algorithms, Constraint type, Advanced technique, Modeling.

Prasyarat: -

Buku Ajar:

1. Rina Dechter, Constraint Processing, 2003, Morgan Kauffmann.
2. Edward Tsang, Foundations of Constraint Satisfaction. Books On Demand: 2014.

PROGRAMA LINEAR DAN STOKASTIK (3 SKS)

Tujuan Pembelajaran: Mahasiswa mengetahui dan menguasai teori dan dasar program linier dan stokastik, mampu menggunakan teknik-teknik lanjutan dalam program linier dan stokastik, dan dapat menerapkan pengetahuan program linier dan stokastik dan menggunakan perangkat lunak untuk menyelesaikan permasalahan-permasalahan program linier dan stokastik.

Silabus: Introduction, The geometry of Linear Models, The Simplex Method, Duality Theory, The Interior point Method, Modeling Languages, Sensitivity Analysis, Advanced Models and Methods, Two-stage Stochastic Optimization, Chance-Constrained Programming.

Prasyarat: -

Buku Ajar:

1. D. Bertsimas and J.N. Tsitsiklis, Introduction to Linear Optimization, Athena Scientific (1997).
2. John R. Birge and Francois Louveaux. Introduction to Stochastic Programming (Springer Verlag, 1997).
3. Alexander Shapiro, Darinka Dentcheva, and Andrzej Ruszczyński. Lectures on Stochastic Programming - Modeling and Theory (SIAM, 2009)

TEKNIK DAN APLIKASI NUMERIK (3 SKS)

Tujuan Pembelajaran: Mahasiswa mengetahui secara Logic peralatan Teknik Numerik untuk memecahkan berbagai persoalan dalam bentuk matematik dan fisika yang banyak ditemui dalam ilmu-ilmu Teknik dan bahkan Sosial dan Ekonomi. Teknik solusi yang disampaikan di sini menjadi populer dengan ditemukannya computer serta teknik digital. Penyelesaian yang sulit menjadi sangat dipermudah melalui pendekatan-pendekatan sistim dinamik yang memperkenalkan teknik iterasi atau yang di dalam ilmu komputer teknik do looping. Oleh sebab itu dibutuhkan langkah-langkah sistimatik, atau yang dikenal dengan algoritma, sesuai dengan cara computer berpikir logic dalam mencapai solusi. Berbagai contoh aplikasi adalah dikhususkan memecahkan persoalan-persoalan Teknik Industri.

Silabus: Memperkenalkan mahasiswa dengan problema sederhana dalam teori fungsi, seperti mencari angka rata-rata, pengaruh linierisasi fungsi pangkat banyak, mencari akar atau titik-nol suatu fungsi, intrapolasi dan extrapolasi; menghitung luas dan volum suatu benda tanpa bentuk dengan pendekatan numerik berdasarkan rumus integrasi; memecahkan persoalan sistim persamaan dengan banyak variable, termasuk simulasi atas model-model sistim persamaan; tak terkecuali adalah model regresi dengan banyak variable; memecahkan persoalan Eigenvalue dan Eigenvector; persoalan Nilai Awal dan Nilai Akhir; serta persoalan diferensial parsial.

Prasyarat: -

Buku Ajar:

1. Burden, Richard L. dan J Douglas Faires dan Albert C. Reynolds. 1981. Numerical Analysis. Boston: Prindle, Weber and Schmidt.
2. Hombeck, Robert W. 1975. Numerical Methods. New York: Quantum Publishersd, Inc
3. Chapra, Steven C dan Raymond P. Canale. 2002. Numerical Methods for Engineers. Boston: McGraw Hill Co.
4. McCalla, Thomas Richard. 1967. Introduction to Numerical Methods and Fortran Programming. New York: John Wiley & Sons

TEORI ANTRIAN (3 SKS)

Tujuan Pembelajaran: Mahasiswa mengetahui dan menguasai model antrian sederhana, antrian jaringan dan antrian siklus. Mahasiswa juga diharapkan menguasai teknik-teknik penyelesaian model antrian dan menterjemahkan persoalan nyata ke dalam model antrian.

Silabus: Introduction, Simple Markovian model, Advanced Markovian model, Networks, Series, Cyclic Queues, Networks, Series, Cyclic Queues, Fluid Models, Stability and Optimization, Traffic, Dependency.

Prasyarat: -

Buku Ajar:

1. Leonard Kleinrock, "Queueing Systems Volume I: Theory", New York: Wiley, 1975.
2. Donald Gross, John F. Shortle, James M. Thompson and Carl M. Harris, "Fundamentals of Queueing Theory", New York: Wiley, 2008

LOGISTIK MARITIM (3 SKS)

Tujuan Pembelajaran: Mahasiswa mampu untuk merancang, menganalisa, dan meningkatkan kinerja sistem logistik maritime pada umumnya, dan terminal kontainer serta pelayaran terjadwal (liner) pada khususnya.

Silabus: Ekonomi Maritim, Kontainerisasi, Pelayaran terjadwal, Berth Allocation Problem, Quay Crane Allocation Problem, Stacking problem, Stowage Planning, Integration phase, Intermodality, Synchomodality, LPG supply chain, Fuel supply chain, Integttation phase.

Prasyarat: -

Buku Ajar:

1. Duinkerken, M., & Günther, H.-O. (2007). Container Terminals and Cargo Systems. Berlin: Springer Berlin Heidelberg. <http://doi.org/10.1007/978-3-540-49550-5>
2. Inst, G. (1987). Indonesia ' s Sea Transport System - A Series of Maps, 491-502.
3. Ligteringen, H., & Velsink, H. (2014). Ports and Terminals. Delft: Delft Academic Press.
4. Meisel, F. (2009). Seaside Operations Planning in Container Terminals. <http://doi.org/10.1007/978-3-7908-2191-8>
5. Notteboom, T., & Rodrigue, J. P. (2009). The future of containerization: Perspectives from maritime and inland freight distribution. *GeoJournal*, 74(1), 7-22. <http://doi.org/10.1007/s10708-008-9211-3>
6. Stahlbock, R., & Voß, S. (2008). Operations research at container terminals: A literature update. *OR Spectrum*, 30(1), 1-52. <http://doi.org/10.1007/s00291-007-0100-9>

PENGANTAR MANAJEMEN ENERGI (3 SKS)

Tujuan Pembelajaran: Mahasiswa mengetahui prinsip-prinsip manajemen energy termasuk energy supply and demand sehingga mahasiswa dapat menumbuhkan "sense" akan pentingnya energy dan memasukkannya sebagai salah satu factor dalam pengambilan keputusan.

Silabus: Energi dan peradaban, Sumber-sumber energi dan keberlanjutan, Masa depan energi, Analis ekonomi dan

life cycle cost, Life cycle analysis, Pencahayaan, Ventilasi dan sistim pendinginan, Sistim transportasi yang berkelanjutan, Efektif program manajemen energi, Efektif program manajemen energy, Modeling kebijakan dan perencanaan energi

Prasyarat: -

Buku Ajar:

1. John Randolph and Gilbert M. Masters, Energy for Sustainability, Technology, Planning, Policy. Island Press, 2008
2. Barney L. Capehard, Wayne C. Turner, and William J. Kennedy, Guide to Energy Management 6th ed. CRC Press, the Fairmont Press, 2008
3. Wayne C. Turner and Steve Doty, Energy Management Handbook 6th ed. CRC Press, the Fairmont Press, 2007
4. Politic of Energy, 2007
5. Papers and related publications

BERPIKIR DISAIN (3 SKS)

Tujuan Pembelajaran: Mahasiswa mengetahui prinsip-prinsip berpikir disain dan mengetahui bagaimana implementasi dan manfaatnya dalam proses perancangan, pengambilan keputusan dan pemecahan masalah

Silabus: Philosophy of Design Thinking, Steps and Phases in Design Thinking, Design Centric Culture, User Centric Design, , Lean UX, Design Thinking and Problem Solving

Prasyarat: -

Buku Ajar:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Collins Publisher, 2009
2. Thomas Lockwood, Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Allworth Press, 2009
3. Jeff Gothelf, Lean UX: Applying Lean Principles to Improve User Experience, 2013

Course Syllabus**MPKT B / INTEGRATED CHARACTER BUILDING B**

General Instructional Objective: Develop students participation to improve awareness of social issues, national state, and the environment that is based on faith and piety, manners, and ethics in the context of academic science and technology development.

Learning Objectives: Students are expected to capable of: (1) Understanding, explaining, and analyzing the philosophy and logical science, attitude, social and culture in Indonesia. (2) Understanding academic and nation values from social and cultural diversity in Indonesia. (3) Understanding the problems by applying step learning actively and using information technology (4) Using Bahasa Indonesian in discussion and academic writing as well.

Syllabus: Topic which appropriate with target and method learning, problem based learning (PBL), Collaborative Learning (CL) and Computer mediated learning (CML)

Pre-requisite(s): -

Text Book(s): Appropriated with topic

ACADEMIC WRITING

Learning Objectives: After attending this subject, students are expected to capable of use English to support the study in university and improve language learning independently.

Syllabus: Study Skills: (Becoming an active learner, Vocabulary Building: word formation and using the dictionary Listening strategies Extensive reading) Grammar: (Revision of Basic grammar Types of sentences Adjective clauses, Adverb clauses Noun clauses, Reduced clauses) Reading: (Reading skills: skimming, scanning, main idea, supporting ideas, Note-taking Reading popular science article, Reading an academic text) Listening: (Listening to short conversations, Listening to a lecture and notetaking, Listening to a news broadcast, Listening to a short story) Speaking: (Participating in discussions and meetings, Giving a presentation) Writing: (Writing a summary of a short article Describing graphs and tables, Writing an academic paragraph, Writing a basic academic essay (5 paragraphs))

Pre-requisite(s): -

Text Book(s): Poerwoto, C. et.al. Reading Comprehension for Engineering Students

INTRODUCTION TO INDUSTRIAL ENGINEERING

Learning Objective(s): Early understanding about the Industrial Engineering Discipline scope and contributions, which includes concepts, methods and tools and how it relates to each other in service or manufacturing industry.

Syllabus: History of Industrial Engineering, Scope of Industrial Engineering, Brief introduction and explanation of component system which build Industrial Engineering, Explanation of curriculum structure in Industrial Engineering, Example of contribution of Industrial Engineers in service and manufacturing industry, Development of Industrial Engineering in the future, Professionalism definition and Ethics Engineering, and Cases in Ethics and Professionalism.

Pre-requisite(s): -

Text Book(s):

1. Maynard Harold B. (ed.), Maynard's Handbook of Industrial Engineering. McGraw-Hill Professional, 2001.
2. Badiru, Adedeji B., Handbook of Industrial and System Engineering, CRC Taylor-Francis, 2006.

INTRODUCTION TO ECONOMICS (2 SKS)

Learning Objective(s): Introduce the scope of economics science and business as an integral part of human activities to survive.

Syllabus: Basic Concepts. Supply, Demand and Market. Workforce, Land and Assets. Trade and Tax. Economic activities and National Income. Consumption and Investment. Money, Financial Market and Moneter. Unemployment, Inflation, and Economic Policy. Growth and Development. The purpose of Business. Business Plan. Start up. Business Operations. Capital. Marketing Principles. Financial Management. Resource Management. Service, Productivity and Information.

Pre-requisite(s): -

Text Book(s):

1. Samuelson, Paul E. dan William 1. D. Nordhaus. 2005. Economics. Boston: McGraw-Hill.).
2. Griffin, Ricky W. and Ronald J. Ebert. 2002. Business. Upper Saddle River: Prentice Hall.

INTRODUCTION TO ENGINEERING MATERIALS

Learning Objective(s): Students are expected to understand the processing, characteristics and application of engineering materials. structure and bonding in materials, material processing for all types of engineering materials

as well as basic concept in materials testing.

Syllabus : (1) Types of engineering materials and their applications; (2) Structures of engineering materials; (3) Properties of material; (4) Manufacturing and Processing of Metallic Materials; (5) Steel and iron: production and properties; (6) Aluminium: production and properties; (7) Other non-ferrous alloys: production and properties; (8) Polymer: processing and properties; (9) Ceramic: processing and properties; (10) Composite: processing and properties

Prerequisite : -

Textbooks :

1. Bondan T. Sofyan, Pengantar Material Teknik, Penerbit Salemba Teknika, 2010
2. W.D. Callister, Materials Science and Engineering: An Introduction, 6th ed., John Wiley & Sons, 2003
3. William F. Smith, Introduction to Materials Science and Engineering

ISLAMIC STUDY

General instructional objectives: The cultivation of students who have concern for social, national and country's issues based on Islamic values which is applied in the development of science through intellectual skills.

Learning Objectives: Course participants are expected to do the following when faced with a problem or issue which they must solve:

1. Analyze the problem based on the Islamic values they adopted
2. Analyze the problem by implementing active learning stages
3. Discuss and express their thoughts and ideas by using proper and correct Indonesian language in discussion and academic writing

Syllabus: Islam history: the meaning of Islam, the characteristic of Islam, the sources of Islamic teachings, Muhammad SAW as prophet and history figure, introduction of Islam in Indonesia, the teaching essence of Islam: the basic principle of Islam teachings, the unity of Allah, worship practice in live, eschatology and work ethics, human's basic rights and obligation, social structure in Islam: sakinah mawaddah and ramhah family, the social implication of family life, Mosque and the development of Islam, zakat and the economic empowerment of the people, Islam society, Science: reason and revelation in Islam, Islam's motivation in development of science, science characteristics, source of knowledge, IDI (each Faculty and Department/Study Program)

Prerequisite(s): MPKT

Textbooks: Adjusted to topics

CATHOLIC STUDY

General instructional objectives:

1. To help deliver students as intellectual capital in implementing lifelong learning process to become scientists with mature personality who uphold humanity and life.
2. Be scholars who believe in God according to the teachings of Jesus Christ by continuing to be responsible of his faith in life in church and society.

Syllabus: Almighty God and the God teachings; Man, Morals, science technology and art; harmony between religions; Society, Culture, Politics, Law: the substance of these studies

will be addressed by integrating the four dimensions of the teachings of the Catholic faith: the personal dimension, the dimension of Jesus Christ, the dimension of the Church, and Community dimension. Dimensions are implemented in the following themes: People, Religion, Jesus Christ, the Church, and Faith in the society. **Prerequisite(s):** MPKT

Textbooks: Adjusted to topics

CHRISTIAN STUDY

General instructional objectives: Cultivating students with comprehensive Christian knowledge and teaching in the midst of the struggle and the fight of the nation while also discussing the student's participation in line with the study to help improve and build our country.

Learning Objectives: Course participants are expected to do the following when faced with a problem or issue which they must solve:

1. Analyze the problem based on the Christian values
2. Analyze the problem by implementing active learning stages
3. Discuss the problem by using proper and correct Indonesian language

Syllabus : History (Historical terms): Status of the Bible, the existence of God and Morality, Christ the Savior, the Holy Spirit as existence reformer and outlook on the world: Faith and Knowledge of Science, Church and service, Ecclesiology, Spiritual and enforcement of Christian Human Rights and the world of ethics: Christian Ethics, Christian and worship, Christianity and politics, Christian love and social reality: Christian Organizations, Students and Service, Christian and expectations.

Prerequisite(s): MPKT

Textbooks: Adjusted to topics

BUDHIST STUDY

Syllabus: Almighty God and the God Study (Faith and piety, Divine Philosophy / Theology), Human (Human Nature, Human Dignity, Human Responsibility), Moral (Implementation of Faith and Piety in everyday life), Science, Technology and Art (Faith, Science and Charity as a unity, the Obligation to study and practice what you are taught, Responsibility for nature and environment), harmony between religion (religion is a blessing for all mankind, the essence of the religious plurality and togetherness), community (the role of religious society in creating a prosperous independent society , the responsibility of religious society in the realization of human rights and democracy), Culture (the responsibility of religious society in the realization

of critical thinking (academic), work hard and fair), Politics (Religion contribution in the political life of nation and country), Law (Raise awareness to obey and follow God's law, the role of religion in the formulation and enforcement of law, the function of religion in the legal profession)

Prerequisite(s): MPKT

Textbooks: Adjusted to topics

HINDU STUDY

Syllabus: Character, History (Character in Hindu religion, Hindu history), Source and scope of Hinduism (the Veda as the source of Hindu religion teachings, the scope of the teachings in Hindu religion), The concept of the God (Brahman) according to the Veda, the Path to Brahman (Catur Marga Yoga, Mantra and Japa), Human Nature (The purpose of human life, Human's duties, obligations, and responsibilities both individually or collectively), Ethics and morality (Principles teaching, self-control), in-depth understanding of the scripture (deep understanding of the Bhagawadgita, deep understanding of the Sarasamuschaya), The Role of Hinduism in science, technology, and art (Hinduism benefits in science and technology in accordance with each department, benefit / the role of Hinduism in the arts), Cohesion and community's prosperity / independence (Benefits of unity in the religious plurality, independent community (kerthajagathita) as a common goal, Tri Pitakarana), Culture as an expression of Hindu religious practice, Contribution to the Hindu religion teachings in the political life of nation and country, laws and the enforcement of justice, Awareness of and obeying the Rita / Dharma.

Prerequisite(s): MPKT

Textbooks: Adjusted to topics

Linear Algebra

Learning Objectives: Students can explain/ understand/apply linear algebra and associate this subject with some other subjects.

Syllabus: Introduction of elementary linear algebra, Matrix, Determinant, Vectors in R^2 and R^3 . Euclidean vector space, General vector space, Review of vector space, Product space, Value and diagonalization eigen vector, Linear Transformation, Application on the system of differential equation, Application on the quadratic surface, Decomposition of LU, Least Squares.

Prerequisite: -

Handbook:

1. H. Anton, Elementary Linear Algebra, 9th ed, John Wiley & Sons, 2005.
2. G. Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press, 2007.

SPORTS / ARTS

The Art subject discuss on how to develop the student's participation and appreciation

to fully understand, develop awareness, have aesthetic concerns, have imagination, have creativity to create work of art and culture in the form of art works such as: painting, batik, photography, calligraphy, comic or in the form of performance art such as: film appreciation, Bali dance and music, Javanese music, theatre and traditional puppet performance. The Sport subject discuss the general knowledge of sport (history, rules of the games and how to lead a match) and sport skills (physical aspects of movement, technique, tactics and mentality)

Mechanic and Thermal Physics + Lab

Learning Objectives: Students understand the concepts and basic laws of mechanic physics and applied in a systematic and scientifically problem solving that influenced by the force, both moving or not moving objects.

Syllabus: Scale, kinematics of point objects, mechanics of point objects, law of conservation of linear momentum and energy, harmonic motion, gravity, dynamics and kinematics of rigid objects, Introduction and basic concept (pressure, thermodynamic system, state of the system, temperature), expansion, equilibrium energy (thermal state equation), heat transfer, ideal gas, first law of thermodynamics, enthalpy and entropy, The first law of thermodynamics application for open and closed system, Second law of thermodynamics, kinetic theory of ideal gas.

Practical of Mechanics: Measurement, Moment of inertia, Gravity acceleration, Fluid density, Scratch coefficient, Collision, Swing torque, Viscosity of water, Young's modulus, Viscosity of Newtonian fluid, Fluids surface tension, Oscillation, **Practical of Heat:** Coefficient of linear expansion, Heat conductivity, Thermocouple calibration, Calorimeter, Joule Constant, Laplace Constant, Heat Collector, Determining of air C_p/C_v , Expansion of fluids and water anomaly.

Prerequisite: -

Handbook:

1. Halliday.D, R Resnick, Physics I, 4th ed Wiley 1991.
2. Ganijanti AS, Mekanika, Penerbit Salemba Teknik, 2000.
3. Tipler PA, Fisika I, ed III, terjemahan Lea Prasetyo, Penerbit Erlangga, 1998.
4. Giancoli D.C, General Physics, Prentice Hall Inc, 1984.
5. Sears-Salinger, Thermodynamics, Kinetic theory and statistical thermodynamics, Wesley, 1975.
6. Giancoli, D.C, Physics: principles with applications, Prentice Hall Inc, 2000

MPKT A / INTEGRATED CHARACTER BUILDING A

General Instructional Objective: To develop student's participation in raising their awareness towards issues within the society, country, nation, and surrounding environment based on their faith, piety, manners, and academic ethics in order to develop Science and Technology.

Learning Objectives: Students are expected to capable of:

1. Understanding, explaining, and analyzing

the philosophy and logical science, attitude, social and culture in Indonesia.

2. Understanding academic and nation values from social and cultural diversity in Indonesia.

3. Understanding the problems by applying step learning actively and using information technology.

4. Using Bahasa Indonesian in discussion and academic writing as well.

Syllabus: Topic which appropriate with target and method learning, problem based learning (PBL), Collaborative Learning (CL) and Computer mediated learning (CML)

Prerequisite: -

Handbook: Appropriated with topic

Engineering Drawing

Learning Objective(s): Course participants are able to transfer geometric component by drawing according to standard draw which is recognized by International Standard Organization (ISO). Students understand the theory and procedure of engineering drawing based on ISO standard. Students are able to read, interpret, and transfer 2D/3D geometric draw from component or construction. Students are able to draw the orthogonal projection based on ISO standard.

Syllabus: Illustration: Function and benefit of Engineering Drawing; SAP; Measurement and Evaluation; Introduction to drawing equipment; Basic definition of geometric, paper format, draw regulation, line, field, line configuration, basic geometric form; Visualization geometric: Skew projection and isometric, function and line types, configuration geometric form; Orthogonal Projection: Projection standard, viewing concept, width display principle; Advanced orthogonal projection: Circle region concept, special region concept, trimming concept, display width, refraction.

Pre-requisite(s): -

Text Book(s):

1. ISO 1101, Technical Drawings, International Organization for Standardization.
2. A.W. Boundy, Engineering Drawing , McGraw-Hill Book Company
3. Colin Simmons & Dennis Maguire, Manual of Engineering Drawing, Edward Arnold
4. Warren J. Luzadder, Fundamentals of Engineering Drawing, Prentice-Hall, Inc.
5. Giesecke-Mitchell-Spencer-Hill-Dygdon-Novak, Technical Drawing, Prentice Hall Inc.

OPTICS, ELECTRICITY, AND WAVE PHYSICS + LAB

Learning Objectives: Students understand the concept and basic law of Magnet and Electricity physics and apply it systematically and scientifically in solving everyday magnet and electricity physics problem, can understand the concepts and basic law of Optical and Wave physics and apply systematic and scientific problem solving in a natural wave phenomenon

or wave that arises due to technical, physical properties of light and geometric optics.

Syllabus: Electric charge and Coulomb law, Electric field, Static and Gauss law, Electric potential, Capacitor, Direct electric current and basic circuit analysis, Magnetic field, Induction and electromagnetic, Faraday law and inductance, Material magnetism properties, A series of transient, Alternating current, Waves, Sounds, Polarization, Interference, Diffraction, Optical geometry, Lighting and photometry. Practical of Electricity: Electrolysis, Wheatstone bridge, Kirchhoff law, Earth's magnetic field, Temperature coefficient, Characteristic of series RLC circuit, Ohm law, Transformer. Practical of Optics: Polarimeter, Lens, Photometry, Prisms bias index, Spectrometer, Diffraction grid, Newton's ring.

Prerequisite: -

Handbook:

1. Halliday, D, R. Resnick, Physics II, 5th ed, Wiley, 2001.
2. Ganijanti AS, Gelombang dan Optik, ed III, Jurusan Fisika FMIPA UI, 1981.
3. Tipler P.A, Fisika II, ed III terjemahan Bambang Sugiyono, Penerbit Erlangga, 2001.
4. D.C.Giancoli, General Physics, Prentice Hall

METHODS, STANDARDS AND WORK DESIGN +

LAB Learning Objective(s): Course participants are able to measure, analyze, design and increase the effectiveness and efficiency of human work through methods improvements and work standards.

Syllabus: Introduction of Human Factors, History of Human Factors and Future Trends, Problem Solving Tools, Operation Analysis, Man Machine Chart and Flow Process Chart, Anthropometry, Time Study, Performance Rating & Allowances, Work Sampling. Standard Data, Predetermined Time Study, Wage Design, Training and Learning Curves.

Pre-requisite(s): Statistics and Probability

Text Book(s):

1. Method, Standard and Work Design, 11th edition, Benjamin Niebel & Andris Freivalds, McGraw-Hill International, 2003
2. The Ergonomics Kit for general industry, dan Macleod, Taylor & Francis, 2006
3. Motion and Time Study: Design and Measurement of Work, Barnes, Ralph M., John Wiley and Sons, 1980

COST ACCOUNTING

Learning Objective(s): Course participants understand accounting principles and are able to

calculate accounting problems systematically and present them as a financial report. They should also be able to analyze and evaluate the conditions of the company based on those reports.

Syllabus: Accounting Equation. Basic Production Cost of Manufacturing. Cost of Goods Sold (COGS). Profit and Loss Statement. Balance Sheets. Penilaian Persediaan (Perusahaan Dagang). Depresiasi. Working Capital. Profit Planning and Control. Overhead Cost Allocation. Activity Based Costing. Job Order Cost Accounting. Process Cost Accounting.

Pre-requisite(s): Introduction to Economics

Text Book(s):

1. Lawrence H. Hammer, William K. Carter, Milton F Usry, Cost Accounting, ITP Co., Ohio, 2004
2. Weygrandt, Kieso, Kell, Accounting Principles, John Willey and Sons CO., Canada, 2003

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PRODUCTION PROCESS + LAB (3 SKS)

Learning Objective(s): Course participants have the knowledge about technology and process to understanding how a product is made through manufacturing processes.

Syllabus: Casting and Cost Analysis. Heat Forming. Cold Forming. Plastics, Ceramics and Composite Forming. Pressure forming and cost analysis. Extraction & cost analysis. Gas Flame Process and Arc Process. Resistance Welding and Other Welding Process. Joining and Fastening.

Pre-requisite(s): Introduction to Industrial Engineering

Text Book(s):

Kalpakjian, Serope, Manufacturing Engineering and Technology, 3rd edition, Addison-Wesley, 1995

LINEAR PROGRAMMING

Learning Objective(s): Course participants are able to implement mathematical model in developing solutions for engineering and management problems.

Syllabus: Linear programming model & graphical solutions, Simplex methods, Duality and sensitivity analysis, Transportation models, Assignment model, Integer Programming. Multi-Goal Mathematical Programming, Network.

Pre-requisite(s): -

Text Book(s):

1. Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006
2. Hellier, Lieberman, Introduction to Operations Research, Mc Graw Hill, 2005

Introduction to Mechanics and Electronics Factory

Learning Objective(s): Course participants understand basic concepts from engineering mechanics and also can identify various factory facility based on prime movers and electric power.

Syllabus: Introduction to engineering mechanics; Introduction to prime movers; Gasoline Ignition Engine; Diesel Ignition Engine; Turbine Principle; Basic definition of electric power system; Electric power system element (Transformator, Machine AC, Machine DC); PLC; Pneumatic System.

Pre-requisite(s): Material Sciences

Text Book(s):

1. Timoshenko, Strength of Material, Prentice Hall, 1976
2. Popov, Mechanics of Materials, MIR Publisher, 1979

Human Factor in Engineering & Design + Lab

Learning Objective(s): Course participants are able to analyze and design a human machine interaction and its workplace

Syllabus: Introduction to human factors in engineering design, Interface design, Human controls systems, Work tools and hand tools, Workplace layout and design, Applied anthropometry, Interpersonal aspects in Engineering and Design, Climate and Lights, Human Error, Overview of Occupational Health and Safety.

Pre-requisite(s): -

Text Book(s):

1. Sanders, Mark S. & Ernest J. McCormick. Human Factors in Engineering and Design. McGraw-Hill. New York. 1993
2. Chapanis, Alphonse. Human Factors in Systems Engineering. John Wiley & Sons. New York. 1996
3. Wickens, D Christopher,. An Introduction to Human Factors Engineering, 2nd Edition. Prentice-Hall. 2004

Maintenance Systems

Learning Objective(s): Course participants understand the important aspects in the maintenance system management and the type of approach that is currently used in the industry.

Syllabus: Organizing for Maintenance Operations. Paperwork Control. Maintenance Job Planning and Scheduling. Maintenance Work Measurement and Standards. Preventive Maintenance Measuring and Appraising Maintenance Performance. Total Productive Maintenance. Maintenance Management in Action

Pre-requisite(s): Production Process

Text Book(s):

1. Lawrence Mann, Jr., Maintenance Management, Lexington Books, 1978
2. Seiichi Nakajima, Introduction to Total Productive Maintenance, 1988
3. Antony Corder, di alih bahasa oleh Ir. Kusnul Hadi, Teknik Manajemen Pemeliharaan, Erlangga, 1996.
4. Palmer, Doc Richard., Maintenance Planning and Scheduling Handbook 2nd Edition. McGraw-Hill Professional. 2004.

Industrial Statistics + Lab

Learning Objective(s): Course participants are able to organize the collection, process, and analysis of data using statistics and engineering principles to support decision making process, within DOE - Design of Experiment.

Syllabus: Review of Basic Statistical Concepts. Single Factor Experiment (Fixed Effect Model).

Single Factor Experiment (Random Effect Model).
 Randomized Complete Block Design. Latin Square
 Design. General Factorial Design. 2k Factorial
 Design. Blocking in Factorial Design. Factorial
 Experiments with Random Factors. Fractional
 Factorial Design. Nested Design. Response Surface
 Model.

Pre-requisite(s): Statistics and Probability

Text Book(s):

1. Design and Analysis of Experiments, Douglas C. Montgomery. John Wiley & Sons, 2000
2. Design and Analysis of Experiments, Angela Dean and Daniel Voss, Springer-Verlag, 2000
3. Experimental Design with Applications in Management, Engineering, and the Sciences, Paul D. Barger and Robert E. Maurer, Thomson Learning, 2002

Production Planning and Inventory Control + Lab

Learning Objective(s): Course participants are able to analyze, design, implement and evaluate an integrated production planning and control system by controlling information flow, scheduling of production resources and internal processes, resulting a high quality product at the right time and the right cost.

Syllabus: Production planning system, Master Requirement Planning (MRP), Material Requirement Plan, Capacity planning, Inventory control, Lot sizing, Production scheduling, Sequencing and evaluation, TOC/DBR concepts, PPIC game.

Pre-requisite(s): -

Text Book(s):

1. Arnold, J.R. Tony and Chapman, Stephen N.; Prentice Hall; Introduction to Materials Management; 2004
2. Chapman, Stephen N.; The Fundamentals of Production Planning and Control; Pearson - Prentice Hall, 2006

Organization & Industrial Psychology

Learning Objective(s): Course participants are able to analyze the influencing factors of design and organizations management in industry including human capital assets.

Syllabus: Organizational Design. Culture.. Strategic Role of HRM & Effective Management of People. Ability Motivation & Opportunity. Job Analysis & Planning & Recruitment. Testing, Selection & Interview. Training & Development. Appraising & Managing Performance. Managing Careers & Fair Treatment. Establishing Strategic Pay Plans. Pay for Performance & Incentives. Benefits and Services. Labor Relations & Collective Bargaining. Employee Safety & Health. Linking to Organizational Outcomes. Human Resource Capital Management. Human Resource System for TQM.

Pre-requisite(s): -

Text Book(s):

1. Strategic Human Resource. Management, Mike Millmore, Philip Lewis, Prentice Hall 2007
2. Human Resource Management, Gary Dessler, Prentice Hall, 10th edition, 2007
3. Human Resource Strategy, Dreher & Dougherty, Mc Graw Hill, 2001

PLANT LAYOUT DESIGN

Learning Objective(s): Course participants are able to design the layout of a plant based on constraint and optimum goals.

Syllabus: Design function, Design procedure, Process planning, Material flow planning, Analysis technique, Relationship planning between activities, Plant and production support services, Space calculations, Area allocation, Material handling equipment, Plant layout development, Plant location considerations.

Pre-requisite(s): -

Text Book(s):

1. Richard L. F., Facility Layout and Location, Prentice Hall, 1992
2. Plant Layout and Material Handling, John Wiley & Sons, 1977.
3. Meyers, E Fred, . Plant Layout and Material Handling 1st Edition. Prentice-Hall. 1993

PRODUCT DESIGN + LAB

Learning Objective(s): Course participants are able to create new product or service concept ideas according to structural market study based on marketing mix

Syllabus: Idea Generation, Description of Marketing Management, Global Marketing, Consumer Behavior, Marketing Mix, Marketing System, Selling Skill, Blue Ocean Strategy, Strategic Brand Management, Market Research, Consumer Needs Identification, Product Specification Determination, Concept Design, Concept Selection and Testing, Product Architecture, Design for Manufacturing, Design for Assembly, Prototyping, Project Presentation.

Prerequisite(s): Human Factors in Engineering and Design

Text books:

1. Karl. T. Ulrich & Steven D. Epingger. Product Design Development. 3rd Edition. Mc Graw-Hill. 2004
2. Dieter. "Design Engineering", 3rd edition, Mc.Graw Hill 2000
3. James G. Bralla. Design For Excellence. McGrawHill - 1996
4. Milton D. Rosenav, Jr. et. al. The PDMA Handbook of New Product Development, John Willey & Sons. 1996
5. Hamid Noor & Russel Radford. Production & Operation Management. McGrawHill. 1995

INDUSTRIAL FEASIBILITY ANALYSIS

Learning Objective(s): Course participants know the aspects used to analyze industry feasibility and able to identify and analyze investment of facility feasibility

Syllabus: Project feasibility study, scope function,

market and marketing aspects, engineering and technology aspects, operation management aspect, environment aspect, law aspect, economics aspect, financial aspect

Prerequisite(s): Cost Accounting, Engineering Economics

Text books:

1. Clifton, Fyffe, Project Feasibility Analysis, John Wiley, 1997
2. Siswanto Sutojo, Studi Kelayakan Proyek, PPM, 1995

QUALITY SYSTEM (3 SKS)

Learning Objective(s): Course participants are able to design a quality improvement system that able to do assurance and improvement of continuous product and process quality based on the fact (number) using mathematical (statistical) method with world's quality standard consideration

Syllabus: 3 quality basics: continuous improvement, customer focus and total participation, PDCA concept, 7 tools and 7 new tools, technique of process mapping, standard role, internal standard (SOP, WI, etc), and external standard (ISO, JIS, etc), Lean Six Sigma

Prerequisite(s): Statistics and Probability

Text books:

1. The Six Sigma Way Team Fieldbook, Peter S Pande et.al. McGraw-Hill, New York, 2002
2. QC Problem Solving Approach: Solving Workplace Problems the Japanese Way, Katsuya Hosotani, 3A Corporation, Tokyo, 1982
3. The Quality Toolbox Taguen Nancy R., ASQ Quality Press. Milwaukee. Wisconsin. 2005

SYSTEM MODELLING + LAB

Learning Objective(s): Course participants are able to design a computerized model based on discrete-event modeling from micro industrial system, simulating that model to do feasibility analysis and generating recommendation from the model (becoming discrete-event model)

Syllabus: Modeling concept, general method of system modeling: conceptualization, development, simulation and analysis, modeling case study, validation and verification of discrete model, user requirement method, technique of report design, and presentation of modeling result

Prerequisite(s): Statistics and Probability

Text books:

1. Mastering the Requirement Process, Suzanne Robertson & James Robertson, 2nd Edition, Addison Wesley Professional, 2006
2. Scenarios, Stories and Use Cases: Through the Systems Development Life-Cycle, Ian Alexander and Neil Maiden, John Wiley & Sons. 2004

3. Excel® Dashboards & Reports, Michael Alexander and John Walkenbach, Wiley Publishing, Inc. 2010
4. Information Dashboard Design, Stephen Few, O'Reilly, 2006.

PRODUCTION SYSTEM + LAB

Learning Objective(s): Course participants are able to analyze, design, implement and improve the performance of an operation system, especially with significant impact to the long term strategic goals of the organization to produce the right product for the customer.

Syllabus: Production Strategy. Product and Process Development. Location Analysis. Product and Process Layout Analysis. Capacity Analysis. Process Design, Analysis and Performance. Distribution Planning. JIT/Lean Production System.

Resource planning, scheduling and allocation
Kanban production system (kanban game).

Pre-requisite(s): Production planning and inventory control

Text Book(s):

1. Chase and Aquilano; Operations Management; Pearson-Prentice Hall; 11th , Edition, 2006
2. Heizer, Jay and Render, Barry; Operations Management; Pearson-Prentice Hall; 2006
3. Kanban for The Shopfloor, The Productivity Press; 2002

INDUSTRIAL PROJECT MANAGEMENT

Learning Objective(s): Course participants are able to plan, conduct, and control projects in industry

Syllabus: Project management description, system theory, project of PMDA organization, project of human resource, staff organization and project team, time management, special topic of PERT, project graph, cost control

Prerequisite(s): Operational Research

Text books:

1. Kerzner, Harold T., Project Management : A System Approach to Project Planning, scheduling, and Controlling, John Wiley & Sons, 10th edition, 2009

Operation Research

Learning Objective(s): Course participants are able to use mathematical optimization model to solve engineering and management problems that could be converted to deterministic and stochastic quantitative model

Syllabus: Dynamic Programming. Markov Analysis. Decision Tree. Game Theory. Non-Linear Programming. Queuing theory. Optimization Simulation

Pre-requisite(s): Linear Programming

Text Book(s):

1. Hamdy A. Taha, Operations Research, 7th ed., Prentice-Hall, Inc. 2006
2. Hellier, Lieberman, Introduction to Operations Research, McGraw-Hill, 2005

Computation Lab

Learning Objective(s): Course participants are able to use computational language tools, such as flow charts, pseudo codes, and IDEF to make an algorithm. Participants should also be able to solve a problem in the field of Industrial Engineering using computational programs.

Syllabus: Design tools, branching, loop, data structure, sorting, and optimization.

Pre-requisite(s): Linear Programming

Text Book(s):

1. 1 Walkenbach, J. (2007). Excel 2007 Power Programming with VBA.
2. Robert Sedgewick, Kevin Wayne. (2011). Algorithms 4th Edition Algorithms (4th Edition).

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Occupational, Health, Safety & Environment

Learning Objective(s): Course participants are able to identify various hazard, characterization, propose suitable method for minimizing and mitigating risks, and also designing management system of safety work. Students is also expected to increase their awareness about health and safety in industry, and understand about framework and safety standard regulation and also environment program.

Syllabus: Introduction to Regulation and Standards; Risk Perception, Assessment and Management; Machinery Hazards; Noise Hazards; Process Safety Hazard; Fire and Explosion Hazard; Electrical Hazard; Toxicology in The Workplace; Environmental Protection; Environmental Protection Control Processes; Hazard Communication to Employees; Personal Protective Equipment (PPE): Types of PPE and Selection of PPE; Safety Audits, Incident and Emergency Planning.

Pre-requisite(s): -

Text Book(s):

1. Charles A. Wentz, Safety, Health and Environmental Protection, MGH, 1998.
2. Asfahl, C.R., Rieske, D.W., Industrial Safety and Health Management, 6th Ed., Pearson Education, Inc. 2010.
3. National Regulations on Safety and Health Management

Supply Chain Management

Learning Objective(s): Course participants are able to understand about concept and application of SCM to analyze and evaluate the role of operators in a whole supply chain

Syllabus: Introduction to SCM, Strategy and Planning, Enterprise Resource Planning, Purchasing, Transportation Method, Shortest Path, Traveling Salesman Problem, Vehicle Routing Problem, warehousing management, reverse logistics, location theory, network planning process, SCM development

Prerequisite: Quality System

Text Book(s):

1. Novack, R.A., Supply Chain Management: A Logistics Perspectives, 2008.

Industrial Simulation + Lab

Learning objective(s): Course participants are able to design a complex computerized model from industrial systems and simulate and conduct a simple feasibility study and design a recommendation from model simulation result (becoming a continuous system modeler)

Syllabus: Concept of continuous modeling, method of continuous modeling, causal loop diagram, stock and flow diagram, comprehending of behavior overtime, model development based on real case study, technique of scenario development, validation and verification of continuous model, introduction of study concept based on simulation game

Prerequisite: System Modeling

Text books:

1. Information Dashboard Design, Stephen Few, O'Reilly, 2006.
2. Charles Harrell, Biman K. Ghosh, and Royce O. Bowden, Jr., Simulation Using Promodel, McGraw-Hill Higher Education, New York. 2003
3. SEMS Courses Module, 2011

Industrial Engineering Design + Lab

Learning objective(s): Course participants are able to conduct product development process by considering the interaction between material, human resources and production process and able to analyze technical and financial aspects of the NPD project for commercialization.

Syllabus: Introduction to NPD Process, Overview of Stage-Gate Model and Concurrent Engineering, Analysis of Material and Technology Utilization, Design Considerations, Financial Analysis of Project, Market and Functionality Testing, Production Capacity Planning, Commercialization, Implementation of NPD Process, Presentation of NPD Project.

Prerequisites: Perancangan Produk, Analisa Kelayakan Industri

Text Book(s):

1. George, E.D., Engineering Design : *A Material and Processing Approach*, McGraw-Hill, New York, 2000.
2. Trott, P. (2008). *Innovation Management and New Product Development*, 4th Edition.
3. Cooper, R.G. (2007), *Winning at New Products*, 3rd Edition.

Information System

Learning Objective(s): Course participants understand the role of information system management and technology in the industry to face the globalization era.

Syllabus: Introduction to information system. Information system as a competitive advantage. IT and Electronic Commerce, Enterprise Information System (ERP), Electronic Commerce. Database dan Relational Database Management System. System Analysis and Design. Business Process, MIS and ist relation with RQM dan QS. CBIS. Accounting Information System. Decision Support System.

Executive Information System. Marketing, Manufacturing
Information System. Financial, Human
Resource Information System.

Pre-requisite(s): Organization and Industrial
Psychology

Text Book(s):

1. McLeod, Management Information System, 10th edition, Prentice Hall, 2006
2. Kenneth C. Laudon, Management Information Systems , Prentice Hall, 2011

SPECIAL TOPICS IN INDUSTRIAL ENGINEERING

Learning Objective(s): Course participants will have a broad description about the current progress in the service and manufacturing industry, and how industrial engineering could contribute to the enhancement of efficiency and effectiveness.

Syllabus: Inviting guest lecturers from various field of expertise

Pre-requisite(s): 7th semester or above students

Text Book(s): -

INTERNSHIP (2 SKS)

Learning Objective(s): Course participants are able to understand about industrial engineering implementation in industry and implement all the subjects that have been studied in real world

Syllabus:

Prerequisite(s): Notice the SOP of internship

Text books: -

UNDERGRADUATE THESIS

Learning objective(s): Course participants are able to identify problems and opinion in scientific discussion systematically, clearly, and accurately. Capable of sorting ideas/solutions/opinions in a scientific writing based on scientific writing guideline that integrates a whole knowledge.

Syllabus: Industrial Engineering to solve a case in real world

Prerequisite(s): Notice SOP of final project

Text books: Guideline of Undergraduate Thesis in University of Indonesia

Technology Management

Learning objective(s): Course participants are able to identify technology development that have an impact to industry, identify that technology, and translate into technology plan for improving organization competitiveness

Syllabus: Introduction to technology management, business model concept, innovation and technology, chasm and tornado, competence, introduction to change management, introduction to risk management, patents in Indonesia, sustainability issue in technology, outsourcing, ERP trend

Prerequisite(s): Introduction to Industrial Engineering

Text books:

1. Burgelman, Maidique and Wheelwright, Strategic Management of Technology and Innovation, 5th Edition, 2009
2. Tarek Khalil, Management of Technology: The Key to Competitiveness and Wealth Creation, McGraw-Hill, 2000

Multivariate Analysis

Learning Objective(s): Course participants are able to organize the extraction, process & analysis of multivariate data in a right way to make decisions.

Syllabus: of Basic Statistical Concepts, Multiple Regression. Manova. Principal Component Analysis. Factor Analysis. Cluster Analysis. Discriminant Analysis. Logit Analysis. Canonical Correlation. Multidimensional Scaling. Structural Equation Modeling.

Pre-requisite(s): Statistics and Probability, Industrial Statistics

Text Book(s):

1. Hair, J.F., B. Black, B. Babin, and R.E. Anderson (2005) *Multivariate Data Analysis*, Sixth Edition, Prentice Hall.
2. Richard Johnson and Winchern (1998) *Applied Multivariate Statistical Analysis*, Fourth Edition, Prentice Hall.
3. W.R. Dillon and M. Goldstein (1984) *Multivariate Analysis: Methods and Applications*, John Wiley & Sons.

Interpersonal Skills

Learning Objective(s): Course participants are able to implement the principles of effective communication and behavior standard according to ethics and habits in a professional level of organization.

Syllabus: Basics of Communication Science. Reading and Controlling Body Language. Listening and Inquiring Skill to Facilitate, Development of Presentation Materials, Presentation Preparation, Processing the Question and Answer Session, Formal Writing Skill (Proposal, Report, Letter, Correspondence, Manner), and Effective Reading.

Pre-requisite(s): -

Text Book(s):

1. *Interpersonal Skills in Organizations*, 3rd Edition, De Janasz, Suzanne C, Karen O. Dowd and eth Z. Schneider, McGraw-Hill International Edition. New York. 2009.

Product Life Cycle Management

Learning Objective(s): Course participants are able to understand the product life cycle and its role in creating company's innovation strategy.

Syllabus: Product Life Cycle Concept, Product Life Cycle Phase Management, PLM and Innovation Strategy, Product Development Strategy in Enterprise.

Pre-requisite(s): Product Design

Text Book(s):

1. Stark, J, (2011). *Product Life Cycle Management, 21st Century Paradigm for Product Realisation*, 2nd Edition. Springer.
2. Grieves, M. (2005). *Product Lifecycle Management. Driving the Next Generation of Lean Thinking*, McGrawHill.

Macro Ergonomics

Learning Objective(s): Course participants are able to understand comprehensively about work system design that consists of interacting variables such as hardware and software within

internal and external physical environment, organization structure and process in order to make it better. Ability to understand how to implement ergonomic science.

Syllabus: Introduction to macroergonomics, method and tools that are used in work system design and analysis, introduction to organization integration in productivity, safety, health and quality of work life context

Pre-requisite(s): Human Factors in Engineering and Design

Text Book(s):

1. Hendrick, W.H., Kleiner, Brian, (2002). *Macroergonomics: Theory, Methods, and Applications (Human Factors and Ergonomics)*
2. Stanton, N., Hedge, A, (2005). *Handbook of Human Factors and Ergonomics Methods*, CRC Press LLC.

Finance and Investments

Learning Objective(s): Course participants possess the knowledge about industrial finance and investments in general and multinational including international trading and finance.

Syllabus: International Trade Theory, Trade Policies, Monetary and Payment System, Market and Exchange Mechanism, International Investment, Multinational Finance, Foreign Investment Analysis.

Pre-requisite(s):

Text Book(s):

1. Root, Franklin R. 1978. *International Trade Investment*. Cincinnati: South-Western Publishing Co.
2. Grubel, Herbert G. 1981. *International Economics*, Homewood: Richard D. Irwin Co.
3. Shapiro, Alan C. 2003. *Multinational Financial Management*. Hoboken: John Wiley & Sons Inc.

Innovation Management

Learning Objective(s): Course participants are able to understand the concept and steps in developing innovation within organization.

Syllabus: State of the art 'Innovation', Innovation Development Strategy, Country Innovation, Process Innovation, Innovation Development Procedure, Technology Empowerment to Develop Innovation.

Pre-requisite(s): -

Text Book(s):

1. Cooper, R.G. (2007), *Winning at New Products*, 3rd Edition.
2. Schilling, M.A. (2010). *Strategic Management of Technological innovation*, 3rd Edition, McGrawHill.
3. Trott, P. (2008). *Innovation Management and New Product Development*, 4th Edition.
4. Tidd, J., Bessant, J., Pavitt, K. (2001). *Managing Innovation - Integrating Technological, Market and Organisational Change*, Second Edition, John Wiley & Sons Ltd., West Sussex, England.

Customer Relationship Management

Learning Objective(s): Course participants are able to understand the role and function of customer relationship management in improving organization's/company's competitiveness.

Syllabus: Concept and Procedure of CRM Implementation in Organization, CRM Process Management, Managing Networks for CRM performance CRM Success Measurement, Best Practices of CRM Implementation, Managing supplier partner relationships, IT for CRM

Pre-requisite(s): Information System

Textbooks:

1. Peppers, D. (2011). *Managing Customer Relationships: A Strategic Framework*, John Wiley & Sons.
2. Francis Buttle (2009). *Customer Relationship Management*, Elsevier.

Lean Operations

Learning Objective(s): Course participants are able to understand the concept of effective manufacturing process.

Syllabus: History and Concept of Lean Operations and Manufacturing, Strategy and Procedure of Lean Manufacturing Implementation, Toyota Production System

Pre-requisite(s): Production System

Text Book(s):

1. Wilson, L. (2009). How to Implement Lean Manufacturing, McGrawHill.
2. Askin, R.G., (2002). Design and Analysis of Lean Production System, John Wiley & Sons.
3. Pascal, D. (2007). Lean Production Simplified, Productivity Press.

Reconfigurable Manufacturing System

Learning Objective(s): Course participants are able to understand the concept of manufacturing facility analysis and planning and the differences compared to models of manufacturing system and supported with laboratory work.

Syllabus: General RMS Characteristics, Enabling Technologies and Reconfigurable Characteristics, Reconfigurable Machines.

Pre-requisite(s): Production System

Text Book(s):

1. Meyers, F.E., Stephens, M.P. (2005). Manufacturing Facilities Design and material Handling, 3rd Ed. Prentice-Hall.

Linear and Stochastic Programming

Learning objective(s): Course participants could understand the theory and basics of linear and stochastic programming, able to use advance methods in linear and stochastic programming, and could use software to solve problems in linear and stochastic programming.

Syllabus: Introduction, The geometry of Linear Models, The Simplex Method, Duality Theory, The Interior point Method, Modeling Languages, Sensitivity Analysis, Advanced Models and Methods, Two-stage Stochastic Optimization, Chance-Constrained Programming.

Textbooks:

1. D. Bertsimas and J.N. Tsitsiklis, Introduction to Linear Optimization, Athena Scientific (1997).
2. John R. Birge and Francois Louveaux. Introduction to Stochastic Programming (Springer Verlag, 1997).
3. Alexander Shapiro, Darinka Dentcheva, and Andrzej Ruszczyński. Lectures on Stochastic Programming - Modeling and Theory (SIAM, 2009)

Queuing Theory

Learning objective(s): Course participants are able to understand simple, network and cycle queuing models. Participants are also able to understand methods for solving queuing models and translating real-world problems into a queuing model.

Syllabus: Introduction, Simple Markovian model, Advanced Markovian model, Networks, Series, Cyclic Queues, Networks, Series, Cyclic Queues, Fluid Models, Stability and Optimization, Traffic, Dependency.

Textbooks:

1. Leonard Kleinrock, "Queueing Systems Volume I: Theory", New York: Wiley, 1975.
2. Donald Gross, John F. Shortle, James M. Thompson and Carl M. Harris, "Fundamentals of Queueing Theory", New York: Wiley, 2008

Data Mining

Learning Objective(s): Course participants are able to organize the extraction, process, and data analysis in a right way to make decisions.

Syllabus: Concept and Process of Data Mining, Algorithm in Data Mining, Data Mining Application in Organization.

Pre-requisite(s): Statistics and Probability, Industrial Statistics.

Text Book(s):

1. Nisbet, R. (2009). Handbook of Statistical Analysis and Data Mining Applications, Elsevier.



Systems Engineering

Learning Objective(s): Course participants are able to understand the basics of system engineering management in industries to be able to cultivate a design process, installation, management and termination of a complex system.

Syllabus: Concept and methodology of industrial system engineering. System Life-Cycle: Concept - Development - Production - Benefit and Support - End of System. Vee-Model. Processes in System Life Cycle: Technical Process. Project Process. Organization Process and Acquisition Process of Goods and Services. System Value and Life Cycle Costing. The Role of Modeling and Simulation in System Engineering.

Pre-requisite(s): System Modeling

Text Book(s):

1. Cecilia Haskins, CSEP, Kevin Forsberg, CSEP and Michael Krueger, CSEP. *Systems Engineering Handbook: A Guide For System Life Cycle Processes And Activities*, version 3.1, 2007
2. Kossiakoff, Alexander and William N. Sweet. *Systems Engineering Principles and Practice*. John Wiley & Sons. Hoboken - New Jersey, 2003.
3. ISO/IEC 15288 Standard for Systems Engineering. International Organization Standard (ISO).

Enterprise Competitiveness Analysis

Learning Objective(s): Course participants are able to analyze company's internal and external factors for setting up company strategy for achieving competitive advantage through value innovation and strategic position and capabilities development.

Syllabus: Understanding Industry Profitability, The Vertical Boundaries of the Firm, Strategic Positioning for Competitive Advantage, Leveraging Market Power to Grow, Risk Management, Competitor and Competition, Competitive Intelligence

Pre-requisite(s): Cost Accounting

Text books:

1. Besanko, David. 2007. *Economics of Strategy*, Willey, 4th edition.
2. Sharp, S. 2009. *How to minimize risk, avoid surprise, and grow your business in a changing world*. John Willey.
3. Porter, M. 2008. *The Five Competitive Forces That Shape Strategy*. Harvard Business Review
4. Porter, M. 1998. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press.
5. Carbal, Luis. 2000. *Introduction to Industrial Organization*, MIT Press

Advanced Optimization

Learning Objective(s): Course participants are able to design and implement various heuristic and meta-heuristic optimization algorithms to solve problems in industrial engineering field.

Syllabus: Introduction to Optimization. Complexity Theory. Basics of Heuristic. Hill Climbing Algorithm. Greedy Algorithm, Simulated Annealing, Tabu Search, Genetic Algorithm, Challenge Counter Techniques, Multi-destinations metaheuristic.

Pre-requisite(s): Operation Research

Text Book(s):

1. Zbigniew Michalewicz, David B. Fogel (2004). *How to Solve It: Modern Heuristics*, Springer.
2. Essentials of Metaheuristics, Sean Luke (2009). *Essentials of Metaheuristics*, Lulu, available at <http://cs.gmu.edu/~sean/book/metaheuristics/>
3. Andries P. Engelbrecht (2007) *Computational Intelligence, An introduction*, John Wiley & Sons, England.

Sustainable Manufacturing and Innovation

Learning Objective(s): Course participants are able to understand the environmental and sustainability aspects of manufacturing process and their roles in increasing the competitiveness of enterprise and innovation development.

Syllabus: Concept and Sustainability Process in manufacturing process. Green Manufacturing (Remanufacturing, Reuse, Recycling), Renewables and Resource Utilizations, Green Logistics and SCM, Eco-Innovation, Best Practices in Sustainable Manufacturing.

Pre-requisite(s): Production System

Text Book(s):

1. Seliger, G. (2011). *Advances in Sustainable Manufacturing*, Springer.
2. Jovane, F. (2010). *The Manufuture Road: Towards Competitive and Sustainable High- Adding-Value Manufacturing*, Springer.
3. Allen, D.T. (2012). *Sustainable Engineering: Concepts, Design and Case Studies*, Prentice-Hall.
4. Hermosilla, J.C. (2009). *Eco-Innovation: When Sustainability and Competitiveness Shake Hands*.

Human Digital Modeling and Simulation

Learning objective(s): Course participants are able to model digital human and simulate it to obtain more effective and efficient work design

Syllabus: Anthropometry, Human Factors and Ergonomics in Healthcare, Ergonomics Modelling & Usability Evaluation, Human Factors, Ergonomics and Safety in Manufacturing and Service Industries. Introduction to Jack Software and Motion Capture.

Text books:-

1. Duffy, G V. 2010. *Advances in Applied Digital Human Modelling*. CRC Press.
2. Jack Software Module dari Ergonomic Centre

Decision Uncertainties and Risk

Learning objective(s): Course participants are able to analyze risks and uncertainties based on statistical tools accurately to make decision

Syllabus: Concept and Decision Making Process, Uncertainty Theory, Risks Analysis Prerequisites: Statistics and Probability, Industrial Statistics

Prerequisite(s): Statistics and Probability

Text books:

1. Parmigiani, G. (2009). *Decision Theory: Principles and Approaches*, John Wiley.

Maritime Logistics

Learning objective(s): Course participants are able to design, analyze and decrease workflow of a maritime logistic system, container terminal and scheduled shipping (liner).

Syllabus: Maritime Economy, Containerization, Scheduled Shipping, Berth Allocation Problem, Quay Crane Allocation Problem, Stacking problem, Stowage Planning, Integration phase, Intermodality, Synchomodality, LPG supply chain, Fuel supply chain, Integration phase.

Textbooks:

1. Duinkerken, M., & Günther, H.-O. (2007). Container Terminals and Cargo Systems. Berlin: Springer Berlin Heidelberg. <http://doi.org/10.1007/978-3-540-49550-5>
2. Inst, G. (1987). Indonesia ' s Sea Transport System - A Series of Maps, 491-502.
3. Ligteringen, H., & Velsink, H. (2014). Ports and Terminals. Delft: Delft Academic Press.
4. Meisel, F. (2009). Seaside Operations Planning in Container Terminals. <http://doi.org/10.1007/978-3-7908-2191-8>
5. Notteboom, T., & Rodrigue, J. P. (2009). The future of containerization: Perspectives from maritime and inland freight distribution. *GeoJournal*, 74(1), 7-22. <http://doi.org/10.1007/s10708-008-9211-3>
6. Stahlbock, R., & Voß, S. (2008). Operations research at container terminals: A literature update. *OR Spectrum*, 30(1), 1-52. <http://doi.org/10.1007/s00291-007-0100-9>

Energy Management

Learning objective(s): Course participants are able to understand the energy management principles, including energy supply and demand, which grows sense of the importance of energy and include it in decision making.

Syllabus: Energy and civilization, sources of energy and sustainability, energy future, economic and life cycle cost analysis, Life cycle analysis, lighting, ventilation and refrigeration systems, system of sustainable transport, effective energy management program, effective program management of energy, Modeling policy and energy planning

Textbooks

1. John Randolph and Gilbert M. Masters, *Energy for Sustainability, Technology, Planning, Policy*. Island Press, 2008
2. Barney L. Capehard, Wayne C. Turner, and William J. Kennedy, *Guide to Energy Management* 6th ed. CRC Press, the Fairmont Press, 2008
3. Wayne C. Turner and Steve Doty, *Energy Management Handbook* 6th ed. CRC Press, the Fairmont Press, 2007
4. *Politic of Energy*, 2007
5. Papers and related publications

Design Thinking

Learning objective(s): Course participants could understand design and its implementation; also the advantage of using design thinking in the design process, decision process and problem solving activity.

Syllabus: Philosophy of Design Thinking, Steps and Phases in Design Thinking, Design Centric Culture, User Centric Design, , Lean UX, Design Thinking and Problem Solving

Textbooks:

1. Tim Brown, *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*, Harper Collins Publisher, 2009
2. Thomas Lockwood, *Design Thinking: Integrating Innovation, Customer Experience, and Brand Value*, Allworth Press, 2009

Numerical Methods and Application

Learning objective(s): Course participants could understand the logic of numerical methods in solving mathematical and physical problems found in the field of engineering, social and economy. Course participants are able to solve difficult problems using dynamic systems which use iteration methods in industrial engineering cases.

Syllabus: simple problems in function theory (average rate, effect of linearization of a multi ranked function, roots and zero point of a function, interpolations and extrapolations); calculating the area and volume of an object without any form using numerical approach based on the formula of integration; Solving multi-variables equation system (including simulations on models of the equation system); multi-variables regression models; Eigenvalue and eigenvector problems; Start Value and End Value probles; Partial differential.

Textbooks:

1. Burden, Richard L. dan J Douglas Faires dan Albert C. Reynolds. 1981. *Numerical Analysis*. Boston: Prindle, Weber and Schmidt.
2. Hombeck, Robert W. 1975. *Numerical Methods*. New York: Quantum Publishersd, Inc
3. Chapra, Steven C dan Raymond P. Canale. 2002. *Numerical Methods for Engineers*. Boston: McGraw Hill Co.
4. McCalla, Thomas Richard. 1967. *Introduction to Numerical Methods and Fortran Programming*. New York: John Wiley & Sons

Business Process Reengineering

Learning objective(s): Course participants are able to design a system by using business process reengineering which could measure and assure the quality and speed of an organization's operation process based on facts by using mathematical approaches, simulations and information stream compared to worldwide best-practice.

Syllabus: Reengineering: The Path to Change, Rethinking Business Process, Business Process Reengineering, BPR in Service Industry, Manufacturing Industry and Information Technology, BPR methodology, Business Process Simulation,

Business Process Management.

Textbooks:

1. Rengineering Corporation , Michael Hammer & James Champy, Harper-London (2006)
2. Business Process Reengineering-Text and Cases, R Radhakrisnan, PHI-New Delhi (2010)
3. The Practical Guide to Business Process Reengineering using IDEF0, Feldmann Clarence.G, (1998), Donet Publishing New York
4. Process Mapping: How to Reengineer your Business Process., Hunt, Daniel.V., (1996), John Wiley and Sons Inc, New York
5. Process Innovation, Reengineering work through information technology, Davenport, Harvard Business School Press 2004.

Algorithm and Programming

Learning objective(s): Course participants know and are able to use computer programming techniques. They are able to design and implement algorithms to solve problems in the field of Industrial Engineering. Course participants could analyse how efficient an algorithm is.

Syllabus: Introduction to programming language and algorithm; Types, variables, operators; Loops and arrays; Objects and classes; Sorting: Insertion Sort and Merge Sort; Asymptotic Notation; Recurrences; Substitution, Master Method; Divide-and-Conquer: Strassen, Fibonacci, Polynomial Multiplication; Quicksort, Random Number, Randomized Algorithms; Tree, Hashing, Hash Functions; Greedy Algorithms, Minimum Spanning Trees; and Shortest Paths: Dijkstra's Algorithm, Breadth-first Search.

Prerequisite(s): Basic Statistics

Text books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "*Introduction to Algorithm*", The MIT Press, Cambridge, Massachusetts London, England.

Heuristic Methods in Optimization

Learning objective(s): Course participants are able to design heuristic and metaheuristic algorithms to solve optimization problems with single or multiple objectives. Course participants are also able to design parallel and hybrid metaheuristic algorithm. These meta-heuristic algorithms would be implemented in a programming language.

Syllabus: Introduction, Single-Solution Based Metaheuristics, Population-Based Metaheuristics, Population-Based Metaheuristics, Metaheuristics for Multiobjective Optimization, Hybrid Metaheuristics, Parallel Metaheuristics.

Buku Ajar:

1. El-Ghazali Talbi, Metaheuristics: From Design to Implementation, Wiley:2009

Constraint Programming

Learning objective(s): Course participants are able to build a constraint programming model, and to understand how solver constraint programming works and its advance methods in increasing efficiency.

Syllabus: Propositional Logic, Modeling problems as SAT, Automated Reasoning: preliminaries, Resolution, Systematic Search, Stochastic Local search, Constraint Satisfaction Problems, Search Algorithms, Constraint type, Advanced technique, Modeling.

Textbooks:

1. Rina Dechter, Constraint Processing, 2003, Morgan Kauffmann.
2. Edward Tsang, Foundations of Constraint Satisfaction. Books On Demand: 2014.