COURSE SYNOPSIS
FACULTY OF ENGINEERING

BACHELOR OF ENGINEERING WITH HONOURS

BPKP CODE	PROGRAMME CODE
HK01	**Civil Engineering**
HK02	**Electrical and Electronic Engineering**
HK03	**Chemical Engineering**
HK08	**Mechanical Engineering**
HK20	**Electronic (Computer) Engineering**

CIVIL ENGINEERING PROGRAMME (HK01)

HK01

KA13503 CALCULUS 1

The purpose of this course is to equip students with understanding, appreciation, and application of calculus as well as introduction to solving a variety of engineering problems using calculus.

References

Weir, M.D., Hass, J., and Giordano, F.R. (2008). Thomas' Calculus. 11th Edition. Pearson Addison Wesley.
Boston. Kreyszig, E. (2006). Advanced Engineering Mathematics. Wiley. Singapore.
Vraberg, D., PurcesII, E.J., and Rigdon, S.E. (2007). Calculus. Pearson Prentice Hall. New Jersey.

KA10102 CIVIL ENGINEERING MATERIALS

Introduction to common civil engineering materials used in construction. It discusses the performance of the construction materials, the composition, and engineering behaviours, manufacturing process, properties that affect their performance and how they are used in construction.

References

Doran, D. & Cather, B. 2008. Construction Materials Reference Book. UK: Elsevier.
Hasan, S.D. 2006. Civil Engineering Materials and Their Testing. UK: Alpha Science Int. Ltd.
Mamlouk, M.S. & Zaniewski, J. P. 2008. Materials for Civil and Construction Engineers, 2nd Ed. USA: Pearson.
M.S. Mamlouk and J.P. Zaniewski (1999), "Materials for Civil and Construction Engineers", Addison Wesley Longman, Inc. California, USA.
Shi, C. & Mo, Y.L. (eds.) 2008. High Performance Construction Materials: Science and Application. Singapore: World Scientific.

KA10302 CIVIL ENGINEERING DRAWING

This course discusses how the construction projects can be translated to drawing and dimensioning and detailing. Introduction to civil engineering drawing, importance of drawings, general information in drawing sheet, plan types, drafting elements, drafting scales, font types and sizes, drafting symbols, name of drawings, Print-out types, classification of engineering drawing, Infrastructure drawings, structural drawings, requirements in authority submission drawing. The course discusses on how drafting can be made manually on structural details for steel, timber and reinforced concrete as well as infrastructure details such as road, sewerage, drainage and water pipes. This course discusses on how civil engineering drawing can be drafted using autoCAD.

References

Ahmed Elsheikh, An Introduction to Drawing for Civil Engineers, MacGraw Hill Book Co Ltd, ISBN 0077090500 (1995).
Robert Parmley, Civil Engineer's Illustrated Sourcebook, MacGraw Hill Professional, ISBN 0071376070 (2003).
David A Madsen & Terence M. Shumaker, Civil Drafting Technology, 5th edition, Prentice Hall, ISBN 0130498793 (2003).
Mark W. Huth & Walter Wells, Understanding Construction Drawings, 3rd edition, Delmar Thomson Learning, ISBN 0766815803 (2000).
Gurcharan Singh & Subash Chander, Civil Engineering Drawing, Standard Publishers Distributors, ISBN 8186308385 (2000).

KA10502 ENGINEERING GEOLOGY

Knowledge on identification, processes and formation of different types of rocks, and knowledge on geological surveys and investigation methods.

References

Bell F.G, Engineering Geology, 1993, Elsevier Ltd.
Goodman R.E, Engineering Geology, 1993, John Wiley and Sons Inc.
Chernicoff & Whithey, Geology, An introduction to Physical Geology, 1995, Worth Publishers Inc. Monroe, J.S, Wicander R, The Changing Earth, 2006, Thomson Learning Inc.
Beavis F.C, Geologi Kejuruteraan, 1992, Dewan Bahasa &Pustaka. West, T.R, Geology Applied To Engineering, 1995, Prentice Hall Inc.
Dearman W R, 1991, Engineering Geological Mapping, Butterworth-Heinemann Ltd. Lundgren L.W, 1999, Environmental Geology, Prentice Hall.
A.C. Walthon, 1994, Foundation of Engineering Geology, Blackie Academic & Professional.

KA13603 CALCULUS 2

The intent of this course is to provide an in-depth appreciation of advanced differential and integral applications involving complex algebraic and trigonometric phenomena. Application of dot and cross products in vector value function, TNB frame, vector analysis in projectile motion and polar curves, and multiple integral in calculating area, volume and vector fields area among the major topics in this course.

References

M.D. Weir, J. Hass, and F.R. Giordano. 2005. Thomas' Calculus, 11th Edition. Addison Wesley.[ISBN-0-321-185587].
Strauss, Monty J., Bradley, Gerald L., Smith, Karl J. 2002. Calculus, 3rd Edition. Prentice Hall: USA. [ISBN: 0-13-095005-X].
Stewart, James. 2003. Calculus, 5th Ed. Thomson Learning: USA. [ISBN: 0-534-39339-X].

KA13803 ENGINEERING PROGRAMMING

This course is an introduction to programming using C++ programming language. It introduces students to design and develop basic program using C++ programming language. The topics cover introduction to computers and C++ programming language i.e. Classes, Objects, Strings, Control statements, Functions, Recursion, Arrays, Vectors, Pointers, File processing, Searching and Sorting.

References

Deitel, P., Deitel, H. and Sengupta, P. (2010). C++ How to Program (8th ed.). Prentice Hall: England.
Malik, D.S. (2011). C++ Programming From Problem Analysis to Program Design (6th ed.). Cengage Learning: USA. Forouzan, B.A. and Gilberg, R.F. (2004). Computer Science: A structured approach using C++. Thomson: USA.

KA10603 APPLIED MECHANICS

This course introduces the principles of statics and dynamics. The scope of the course covers the basic of the forces and moments, employing vectors for analysis. The study of a static system is extended to cover the system in equilibrium, virtual work and energy concepts. Kinematics and kinetics of a particle are then discussed to study the dynamic system involving a particle. The understanding of mechanics is required as an Engineer to mathematically model and predict the behaviour of physical systems. Prerequisites for this course are Engineering Mathematics I and II (KT00403 & KT00503).

References

Beer, F.P., Johnston, E.R. & Clausen, W.E. 2007. Vector Mechanics for Engineers: Dynamics, 8th ed. Singapore: McGraw Hill Hibbeler, R.C. 2007. Engineering Mechanics: Statics & Dynamics, 11th ed. Singapore: Prentice Hall.
Bedford, A. & Fowler, W. 2008. Engineering Mechanics: Statics & Dynamics, 5th ed. Singapore: Prentice Hall.
Tongue, B.H. & Sheppard, S.D. 2005. Dynamics: Analysis and Design of Systems in Motion. New Jersey: John Wiley.
Beer, F.P., Johnston, E.R. & Eisenberg, E.R. 2007. Vector Mechanics for Engineers: Statics, 8th ed. Singapore: McGraw Hill.
Nelson, E.W., Best, C.L. & McLean, W.G. 1998. Schaum's Outline of Theory and Problems of Engineering Mechanics: Statics & Dynamics, 5th ed. New York: McGraw-Hill.

KA10802 CONSTRUCTION TECHNOLOGY

To introduce the students to the basic knowledge of Construction Technology and to give them a clear understanding of different constructions in Civil Engineering and methods of constructions, repairing and maintenance

References

R. Chudley (1987), "Construction Technology", Volume 1-4, Longman Group Ltd, UK.
H.B Olin, J.L Schmidt ans W.H. Lewis (1995), "Construction: Principles, Materials, and Methods", Van Nastrand Reinhold New York, USA.
S. Kumar (1994), "Building Construction", Standard Publishers and Distributors, Delhi, India.
A.H. Harris (1988), "Masonry: Materials, Design, Construction and Maintenance", ASTM, Phildelphia , USA.

KA20102 ENGINEERING STATISTICS

The course is an introduction of basic concept of statistics and probability: and its applications in science and engineering. The course covers basic statistics which comprises of topics such as probability, random variables, probability distributions, tests of Hypothesis, correlation, regression, one-way ANOVA and nonparametric test.

References
Bluman, A.G. 2009. Elementary Statistics. 7th Edition. Mc-graw Hill International Edition.
Larson, R. And Farber, B. 2006. Elementary Statistics. 3rd Edition. Pearson Prentice Hall.
Navidi, W. 2008. Statistics for Engineers and Scientist. 2nd Edition. Mc-graw Hill International Edition.
Triola M.F. 2001. Essentials of Statistics. Addison-Wesley Publishing Company. USA.
Walpole & Myers. 2001. Probability and Statistics. 6th Ed. Prentice Hall : New Jersey.

KA20502 DIFFERENTIAL EQUATIONS

Basic concepts, variable separable, reduction to separable form, exact differential equations, integrating factors, linear differential equations. Applications to chemical reactions, and heat transfer problems.

References
Ervin Kreyszig , 1999, Advanced Engineering Mathematics, ed 10, Wiley Thomas G.B., 2001, Calculus, ed 10, Addison Wesley.
Glyn James, 2001, Modern Engineering Mathematics, ed 3 Prentice Hall Edward and Penney,2002, Calculus, Prentice Hall.
Boyce W.E, and Diprima R.C. 1995, Elementary Differential Equations and Boundary value Problems, John Wiley.

KA20703 FLUID MECHANICS

This course seeks to introduce basic principles of fluid mechanics and establish its relevance in civil engineering, starting from the introduction of fluid properties and pressure measurements, then to fluid statics and dynamics in terms of concept, calculation and application, and finally, to the analyses of fluids in pipelines.

References
Cimbala, J. M. &Çengel, Y. A.2010. Fluid Mechanics: Fundamentals and Application. 2nd Edition in SI unit, McGraw-Hill Education.
Potter, M. &Wiggert, D. C. 2008. Schaum's Outlines: Fluid Mechanics. McGraw-Hill.
Finnemore, E. J. &Franzini, J. B. 2002. Fluid Mechanics with Engineering Applications. 10th Ed. McGraw-Hill.

KA20903 MECHANICS OF SOLIDS

Fundamentals of mechanics; analysis of the stresses and the corresponding strain deformation in various structural members, considering the axial loading, torsion, bending of beams, shearing stresses in beams and thin walled members, stress transformation, Mohr Circle, Deflection of beams and Buckling of column.

References
Beer, F.P., Johnston, E.R. &Dewolf, J.T. 2006. Mechanics of Materials, SI Metric Edition, 4th Ed. New York: McGraw Hill. Gere, J.M. 2006. Mechanics of Materials. Canada: Thomson.
Hibbeler, R.C. 2008. Mechanics of Materials SI, Ed. Singapore: Prentice Hall.
Hibbeler, R.C. 2003. Mechanics ofMaterials, 5th Ed. New Jersey: Pearson.
Pytel, A. &Kiusalaas, J. 2003. Mechanics of Materials. Canada: Thomson.

KA21102 CONTRACT AND ESTIMATION

This course introduces the civil engineering students to the construction contract administrative and management, contractual relationship, the bid and award process, standard contract document, types of construction contract, Contracting method, construction contract procedure and guideline, type and condition of contract, taking off quantity and prepare the bill of quantity for structure and civil works.

References
Seeley I.H 1983. Building Economics, Appraisal and control of building cost and efficiency. 3rd Ed. Macmillan Education. London.
Douglas J.F, Peter S.B, TerjemahanZulkifli Y., Zakaria M.N. 1994. Perancangan Kos Bangunan. Dewan Bahasa dan Pustaka Malaysia.
Duncan P.C, Ian N.M, TerjemahanZubaidah R. 1990. Perancangan Kos Amali, Panduan untuk juru ukur bahan dan juru bina. Dewan Bahasa danPustaka. Malaysia.
Uzairi S 2000. Aturcara Kontrak & Taksiran. IBS Buku Sdn. Bhd. Malaysia.
Kamaruddin M.A 1993. Tender dan Kontrak Pembinaan. Dewan Bahasa dan Pustaka. Malaysia.
Gould F.E 2005. Managing the Construction Process. Estimating, Scheduling, and Project Control. 3rd Ed. Pearson, Prentice Hall, New Jersey. USA.
Schexnayder C.J, Mayo R.E Construction Management Fundamental. McGraw-Hill, Inc. Singapore.
George Stukhart. 1995. Construction Materials Management. Marcel Dekker, Inc. New York.

KA23702 CONCRETE TECHNOLOGY

Knowledge on concrete, its ingredients, strength development, types and tests on ingredients to develop concrete with good engineering properties. The procedure to design proportion of ingredients to make concrete of required strength is included. The properties of admixtures, effect of curing, handling and placing concrete are also to be discussed.

References

A.M. Neville, 2002, 'Properties of Concrete. Vol.2', Butterworth Longman Group Ltd, London. M.L. Gambhir, 2004, 'Concrete Technology 3rd Edition', McGraw Hill.
Newman, J. &Choo, B.S. 2003. Advanced Concrete Technology 1: Constituent Materials. Oxford: Elsevier.
Newman, J. &Choo, B.S. 2003. Advanced Concrete Technology 2: Concrete Properties. Oxford: Elsevier.
Newman, J., &Choo, B.S. 2003. Advanced Concrete Technology 3: Processes. 2003. Elsevier

KA20403 ENGINEERING SURVEY

This course provides a strong knowledge base in Surveying. This course discusses the following topics: Basic concept in Surveying, Chain Surveying, Stadia Tacheometry, Leveling and Sectioning, Contour Mapping, Trigonometrical Surveying, Traversing, Curve Ranging, Setting Out, Plane Table Surveying, Area and Volume Measurement, Photogrammetry, Astronomy and Remote Sensing.

References

J. Uren, W. F. Price (1994),' Surveying for engineering", Macmillan, UK.
J. R. Wirshing and R. H. Wirshing (1985)," Introductory Surveying', McGraww Hill, USA
A Banister and S. Raymond (1984)," Surveying", Pitman, UK.
A Banister, S. Raymond and R. Baker (1992)," Surveying" , Longman, UK.
T. J. M. Kennie and G. Petrie (1990), "Engineering Surveying Technology", Chapman and Hall, UK.

KA20602 NUMERICAL ANALYSIS

This course serves as an introduction to the numerical methods used to solve mathematical problems in engineering practice and that are often impossible to solve analytically. They are formulated so that they can be solved with arithmetic operations and can be implemented on computers.

References

Chapra, S.C. and Canale, R.P. (2006). Numerical Methods for Engineers. 5th Edition. McGraw Hill. New York.
Chapra, S.C. (2008) Applied Numerical Methods with MATLAB for Engineers and scientists. 2nd Edition. McGraw Hill. New York.
Gerald Recktenwald (2002). Numerical Methods with Matlab.2000, Prentice Hall.
Rao, S.S. (2002). Applied Numerical Methods for Engineers and Scientists. Pearson. New Jersey.
Matthews, J.H. and Fink, K.D. (2004). Numerical Methods using MATLAB. Pearson. New Jersey.

KA20801 SURVEY CAMP

A Problem-Based-Learning (PBL) course where students work in group to solve given engineering tasks by using theoretical and practical knowledge that they have learned beforehand in previous Engineering Survey classes.

KA21002 ELECTRICAL TECHNOLOGY

This course is a foundation course for non-electrical and electronics/computer engineering undergraduate students. This course describes the principles of electricity such as current, voltage, resistance and power. These principles are then applied to series, parallel, dc and ac circuits consisting of resistors, capacitors or inductors. This course also covers transformer and three phase systems in power application. Circuit software is used for simulation and verification of the electrical circuits' problems.

References

Thomas L. Floyd and David M. Buchla. 2010. Electric Circuits Fundamentals. Pearson Prentice Hall. Robert L. Boylestad. 2010. Introductory Circuit Analysis. Pearson Prentice Hall.
Edward Hughes. 2005. Hughes Electrical and Electronic Technology. Pearson Prentice Hall.

KA24003 THEORY OF STRUCTURE 1

The course contains structural analysis of determinate and indeterminate structures, elastic theorems and energy principles & moving loads and influence lines.

References:
Kassimali A., Structural Analysis, 2011, Cengage Learning, 0-495-29567-1 Hibbeler. R.C., Structural Analysis, 2009, Prentice Hall, 7th Edition, 981-06-8007-4.
Megson, T.H.G., 2005, Structural and Stress Analysis, Elsevier, 2nd Edition,0-750-6622-12.
Leet K.M. &Uang C.-M., Fundamentals of Structural Analysis, 2002, McGraw-Hill, International Edition, 0-07-122662-1 West
H.H. &Geshwindner L.F., Fundamentals of Structural Analysis, 2002, John Wiley, 2nd ed., 0-471-3556-9.
Utku S., Wilbur J.B. & Norris C.H., 2000, Elementary Structural Analysis, McGraw-Hill, 0-070-6593-38.

KA21603 GEOTECHNICAL ENGINEERING 1

Knowledge on properties and mechanics of soil include mass-volume relationship, compaction, permeability, shear strength, stress distribution, consolidation, settlement, earth pressure and bearing capacity.

References
R. Whitlow (2001), Basic Soil Mechanics, 4th Edition, Prentice-Hall.
D.F McCarthy (2002), Essential of Soil Mechanics and Foundation, 6th Edition, Prentice-Hall.
C. Liu and J.B Evett (2005), Soils and Foundations, SI Edition, Pearson- Prentice Hall.
M. Budhu (2006), Soil Mechanics and Foundations, 2nd Edition, John Wiley & Sons, Inc.
Bujang K Huat, *et al* (1991), Pengenalan Mekanik Tanah, Dewan Bahasa &Pustaka. NurlyGofar (2005), Introduction to Geotechnical Engineering, Part1, Prentice Hall.

KA21801 CONCRETE AND MATERIAL LAB

This course covers construction materials laboratory testing including density, gradation, absorption of aggregate tests, fresh and hardened concrete tests, non-destructive tests, steel, cement and masonry tests.

References
Hasan, S.D. Civil Engineering Materials and Their Testing. 2006. Alpha Science Ltd.
Harrison, T. 2004. Standard for Fresh Concrete: The Application of BSEN 206-1 and BS8500. BSI British Standard Institution.
Mamlouk, M.S. &Zaniewski, J. P. 2008. Materials for Civil and Construction Engineers, 2nd Ed. USA: Pearson.
Somayaji, S. 2001. Civil Engineering Materials. Prentice Hall.
Waterbury, L.A. 2008. Laboratory Manual: For the Use of Students in Testing Materials of Construction. Kessinger Publishing.

KA24201 STRUCTURE LAB

This course will expose the students on the testing procedures related to structure. The experiments will help students to understand the characteristics and properties of materials tested.

References
John Case & Chilver A.H. (1987) Kekuatan Bahan dan Struktur Dewan Bahasa dan Pustaka Kuala Lumpur.
Gere. J. M and Timoshenko S.P. (1996) Mechanics of Materials. Chapman & Hall, London U.K.
Lardner T. J. & Archer. R. R. (1994) Mechanics of Solids McGraw Hall Inc. Tokyo.

KA33903 HYDRAULICS

This course seeks to introduce basic principles of steady and unsteady flows; uniform and varied flows; resistance in open channels in steady flows; the application of energy and momentum principles in open channels; dimensional analysis and similarity; designs of open channels with the use of hydraulic software available.

References
Cruise, J. F., Sherif, M. M., Singh, V. P. 2007. Elementary Hydraulics. Thomson Nelson.
Chow, V. T. 1973. Open Channel Hydraulics. 4th Ed. McGraw-Hill.
Evett, J. B. & Liu, C. 1989. Schaum's Solved Problem Series: 2500 Solved Problems in Fluid Mechanics and Hydraulics. McGraw-Hill.

KA31303 GEOTECHNICAL ENGINEERING 2

Engineering properties of soils include consolidation, settlement of structure, shear strength, lateral earth pressure, retaining structure and slope analysis.

References
Cheng Liu and Jack B. Evett (2005), Soils and Foundations, Prentice Hall, New York.
B.M. Das, (2007), Principles of Foundation Engineering, 6th Edition, Thomson Asia Ltd., 2007, U.K.
Budhu, M (2007), Soil Mechanics and Foundations, 2nd Edition, John Wiley & Sons (Asia) Pte Ltd, Singapore.
McCarthy, D.F (2002), Essential of Soil Mechanics and Foundations, 6 Edition, Prentice Hall, New York.
Taylor, D.W. (1948) Fundamentals of Soil Mechanics, Wiley, New York.
Bowles Joseph E. (1996). Foundation Analysis and Design, Mc Graw-Hill, New York.

KA31503 THEORY OF STRUCTURE 2

The course includes flexibility and stiffness methods of matrix structural analysis for frames, direct stiffness method, computer analysis, structural dynamics & elastic stability.

References

Kassimali A., Structural Analysis, 2011, Cengage Learning, 0-495-29567-1 Hibbeler R.C., Structural Analysis, 2009, Prentice Hall, 7th Edition, 981-06-8007-4.
Leet K.M. &Uang C.M., Fundamentals of Structural Analysis, 2002, McGraw-Hill, International Edition, 0-07-122662-1.
West H.H. &Geshwindner L.F., Fundamentals of Structural Analysis, 2002, John Wiley, 2nd ed., 0-471-3556-9.
Utku S., Wilbur J.B. & Norris C.H., 2000, Elementary Structural Analysis, McGraw-Hill, 0-070-6593-38.
Weaver W. & Gere J.M., 2002, Matrix Analysis of Framed Structures, CBS Publishers.
Clough R.W. &Penzien J., Dynamics of structures, McGraw Hill.
Timoshenko S.P. &GoodierJ.N.,Theory of Elasticity, McGraw Hill.

KA34101 FLUID AND HYDRAULICS LAB

This course will expose the students on the testing procedures related to fluid mechanics and hydraulics. The experiments will help students to understand the characteristics and properties of materials tested.

References

John Case &Chilver A.H. (1987) KekuatanBahandanStruktur Dewan Bahasa danPustaka Kuala Lumpur.
Gere. J. M and Timoshenko S.P. (1996) Mechanics of Materials. Chapman & Hall, London U.K.
Lardner T. J. & Archer. R. R. (1994) Mechanics of Solids McGraw Hall Inc. Tokyo.
M.N. Fatimah, J.S. Faridah, and G.K Goh (1991), “MekanikBendaliruntukKejuruteraanAwam”, Unit Penerbitan Akademik, UTM, Johor, Malaysia.
Gupta, R.S. (1989). Hydrology & Hydraulic Systems. Prentice Hall, N.J.
J.F. Douglas, and R.D. Matthews (1996), “Fluid Mechanics”, Longman, Singapore.

KA34303 REINFORCED CONCRETE DESIGN

The course discusses the design principles and procedure for reinforced concrete structures in civil engineering degree courses to assist them for understanding the principles of element design and procedures for design of reinforced concrete buildings. The elements such as beams of rectangular and flanged sections, slabs of one-way and two-way; columns of short and slender sections, shallow foundations and pile cap.

References

MacGinley, T.J. & Choo BS (2003). Reinforced Concrete Design to BS 8110,
E & F.N. Spon Kenneth M. Leet&Dioniso Bernal (1997). Reinforced Concrete Design, McGraw Hill Inc. New York. W.M.C. McKenzie (2003), Design of Structural Elements, Palgrave Macmillan.
P. Dayaratnam (2000), Design of Reinforced Concrete Structures, Oxford & IBH Publishing Co. Pvt Ltd.
MacGregor JG &Bartlett FM (2000). Reinforced concrete: Mechanics & Design, Prentice Hall.

KA34503 HIGHWAY ENGINEERING

This course will expose students to the fundamental theory of highway engineering. Topics covered are: highway materials and evaluation, pavement failures and distresses, pavement design, road geometrics design, highway drainage and highway construction.

References

C. JotinKhisty& B. Kent Lall, 2003. Transportation Engineering. Prentice Hall.
C.A. O’Flaherty, 2008th Edition. Highway: The Location, Design, Construction & Maintenance of Pavements.
Fred L. Mannering, Walter P. Kilareski& Scott S. Washburn, 2005. Principles of Highway Engineering and Traffic Analysis John Wiley & Sons.
Martin Rogers, 2008. Highway Engineering. Blackwell Publishing.
Kenneth N. D, George P. K & A. SamerEzeldin .1999. Materials For Civil & Highway Engineers. Prentice Hall.
Karim M.R, Hamzah M. O & Hasan A. 1997. PembinaanJalanrayaBerbitumen. DBP. REAM, 2002. A Guide on Geometric Design of Roads.

KA34602 PROJECT MANAGEMENT

This course touches on engineering management aspects from the accounting perspective. An engineer needs to understand different approaches in planning, organisation, control and performance measurement as support in the process of product manufacturing and the provision of services. This course will also take a general approach in introducing the function of financial statements, taxation and audit, as well as financial information analysis and its relevance to the engineering discipline and professional environment. Emphasis is given to cost management techniques, decision-making techniques and the provision of engineering information in a financial format as a form of management support with an introduction to General Management and Project Management.

References
Horngren, C.T., Sundem, G.L. and Stratton, W.O. (2005). Introduction to Management Accounting (13th ed.). Pearson Prentice Hall:New Jersey.
Lucey, T. (2002). Costing. (6th ed.) DP Publications Ltd.
Atkinson, A.A, Kaplan, R.S. and Young, S.M. (2004). Management Accounting. (4th ed.). Pearson Prentice-Hall: New Jersey.
Garrison, R.H., Noreen, E.W. and Brewer, P.C. (2006). Managerial Accounting (11th ed.) McGraw-Hill.
Various journal articles to be provided from time to time.

KA30005 INDUSTRIAL TRAINING

Industrial Training is a required course for all the students in the Faculty of Engineering (FKJ). It is compulsory for students who have completed their 6th semester of study to undergo their industrial training. This industrial training is a full time attachment with the industry or any government body. It is 5-credit hour course for engineering students and 12-credit hour course for Information Technology students. At the completion of their industrial training, students will be awarded a Pass/Fail grade.

KA34802 TRAFFIC ENGINEERING

This course is an option course to expose students in the transportation planning and analysis. Topics to be covered are: transportation planning, highway capacity analysis, transportation modeling, urban transportation planning, parking studies and public transport studies.

References
Nicholas J. Garber and Lester A. Hoel (2010). Traffic and Highway Engineering. PWS Publishing. Singapore Ca O'Flaherty (1997). Transport Planning and Traffic Engineering. Arnold. London.
McShane R.W, Roess P. R and Prassas S. E. (2004). Traffic Engineering. Prentice Hall. New Jersey.
Transportation Research Board. (2000). Highway Capacity Manual. National Research Council.
Washington C.JotinKhisty, B kentLall (2003). Transportation Engineering: An Introduction. Prentice Hall. New Jersey Daniel Mohamed (1993). Pengenalan Tinjauan Dan Analisis Lalu Lintas.

KA35003 HYDROLOGY AND WATER RESOURCES

This course seeks to introduce basic principles and knowledge of hydrological cycle and water budget; precipitation and rainfall analysis; evaporation and evapotranspiration; infiltration; surface runoff; hydrograph analysis; floods & flood routing; groundwater.

References
Subramanya, K. 2009. Engineering Hydrology. 3rd Ed. McGraw-Hill.
Viessman, W. Jr., Lewis, G. L. 2003. Introduction to Hydrology. 5th Ed. Prentice-Hall.
Bedient, P. B., Huber, W. C., Vieux, B. E. 2008. Hydrology and Floodplain Analysis. 4th Ed. Pearson Education.
Chow, V. T., Maidment, D. R. & Mays, L. W. 1988. Applied Hydrology. McGraw-Hill.

KA30603 STEEL AND TIMBER DESIGN

This course is designed for complete structural design and drawing of steel structures and timber structure. Through this course, students understand introduction, limit state design, materials and properties and, loads and forces in steelwork design. Students able to develop design knowledge on beam, plate girder, tension member, compression member, truss and connections of riveted, bolted and welded. Students also develop knowledge in structural design using timber.

References
Dennis Lam, Thien-Cheong Ang& Sing Ping Chiew, 2004, Structural Steelwork: Design to Limit State Theory, 3rd Edition, Elsevier Butterworth-Heinemann.
IC Syal& Satinder Singh, 2005, Design of Steel Structures, Standard Publishers Distributions, India.
LJ Morris & DR Plum, 1996, Structural Steelwork Design to BS 5950, 2nd Edition, Pearson Prentice Hall.
THG Megson, 2000, Structural and Stress Analysis, Butterworth-Heinemann.
Jack C McCormac, 2008, Structural Steel Design, 4th Edition, Pearson International Edition.

KA35201 GEOTECHNICAL LAB

This course will expose the students on the testing procedures related to soil. The experiments will help students to understand the characteristics and properties of materials tested.

References
R. Whitlow (1995), "Basic Soil Mechanics", Longman Scientific and Technical, Essex,England.
Das B.M. (1994). Principles of Geotechnical Engineering. PWS Publishing Company, Boston.
John N. C. 1995. Geotechnical Engineering John Wiley. Singapore.
John Case &Chilver A.H. (1987) KekuatanBahandanStruktur Dewan Bahasa danPustaka Kuala Lumpur.
Gere. J. M and Timoshenko S.P. (1996) Mechanics of Materials. Chapman & Hall, London U.K. Lardner T. J. & Archer. R. R. (1994) Mechanics of Solids McGraw Hall Inc. Tokyo.

C.A. O'Flaherty, 2008th Edition. Highway: The Location, Design, Construction & Maintenance of Pavements. Martin Rogers,
2008. Highway Engineering. Blackwell Publishing.
Kenneth N. D, George P. K & A. SamerEzeldin .1999. Materials For Civil & Highway Engineers. Prentice Hall.
Karim M.R, Hamzah M. O & Hasan A. 1997. PembinaanJalanrayaBerbitumen. DBP.

KA35401 HIGHWAY AND TRAFFIC LAB

This course will expose the students on the testing procedures related to highway and traffic. Through experiments, students should be able to apply and appreciate the fundamental concepts and theories relating to highway and traffic engineering.

References

C. Jotin Khisty& B. Kent Lall, 2003. Transportation Engineering. Prentice Hall.
Fred L. Mannering, Walter P. Kilareski& Scott S. Washburn, 2005. Principles of Highway Engineering and Traffic Analysis. John Wiley & Sons.
Roger P.R, Elena S.P & William R.M. Traffic Engineering. 2004. Prentice Hall.
Arahan Teknik Jalan13/87, 1987. A Guide To The Design Of Traffic Signal.
Nicholas J. Garber and Lester A. Hoel, 2010, 4th Edition. Traffic and Highway Engineering.
C.A. O'Flaherty, 2008th Edition. Highway: The Location, Design, Construction & Maintenance of Pavements.
Martin Rogers, 2008. Highway Engineering. Blackwell Publishing.
Kenneth N. D, George P. K & A. SamerEzeldin .1999. Materials For Civil & Highway Engineers. Prentice Hall.
Karim M.R, Hamzah M. O & Hasan A. 1997. Pembinaan Jalan raya Berbitumen. DBP.

KA35603 FOUNDATION DESIGN

Planning for Earth retaining structures, embankments and dams, Soil parameters, Bearing capacity, Compressibility;
Selection of site, Types of structure, Soil Exploration, Lab and Field Tests; Earth Pressure theories; Retaining walls, Design considerations; Design of Earth Dams; Design of Gravity dams. A group project may be assigned involving the above topics.

References

Kameswara Rao, N.S.V (2010)., Foundation Design – Theory and Practice, John Wiley & sons, UK/Singapore.
Cheng Liu and Jack B. Evett (2005)., Soils and Foundations, Prentice Hall, New York.
Bowles Joseph, E (1996)., Foundation Analysis and Design, Mc Graw-Hill, New York.
Garg, S (2002)., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, New Delhi, India. 5
Tomlinson, M.J (2001)., Foundation Design and Construction, 7th Edition,Prentice Hall, New York.
Das B.M (2002)., Principles of Geotechnical Engineering, 5th Edition, Thomson Asia Ltd., 2002, U.K.

KA40102 FINAL YEAR PROJECT 1

Project design for integration of student's knowledge obtained through courses in the program. Emphasis is given towards creativity, analytical thinking, group work as well as ability to produce useful products by using theory learned from courses.
Students will be required to complete project report as well as give a presentation on the project. At the end of Project I, students are required to complete and present their project progress report for their understanding assessment and also to evaluate the capability of the students to proceed their projects to Project II.

References

Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2008.

KA44703 ETHICS AND LAW FOR ENGINEERS

The course is a combination of two areas of studies, ethics and law. However ethics subject will be taught at more depth and length whilst the subject of law at "awareness and mindful" levels. Further only laws frequently impacted by the engineering profession will be taught. The course covers both business and engineering ethics.

References

Beuchamp, L. Tom; Bowie, E. Norman; Ethical theory in business, 7th Edition Pearson Education/Prentice hall, 2004.
Jenning, M. Marianne, Business ethics, 4th edition, Thomson Learning, 2003.
Betty, F. Jeffry; Samuelson, S. Susan; Business law and the legal environment, Alt. edition, Thomson Learning, 2002.
Donaldson, Thomas; Werhen, H. Patricia; Cording, Margaret; Ethical issues in business, 7th edition, 2002.
Hartman, P. Laura; perspectives in business ethics, 3rd Edition, McGraw Hill, 2005.

KA40503 ENVIRONMENTAL ENGINEERING

This course is an introduction of environmental engineering including environmental legislation and regulation, water quality and treatment, wastewater treatment, air pollution, noise pollution, solid waste and hazardous waste management.

References

Davis, M.L. & Cornwell, D.A. (2008) Introduction to Environmental Engineering. WCB/McGraw-Hill. 4th Edition.
Metcalf &Eddy (2004) Wastewater Engineering Treatment & Reuse. McGraw-Hill. 4th Edition.
Noel De Nevers. (2000) Air Pollution Control Engineering. McGraw-Hill. 2nd Edition.
Tchobanouglas, Theisen& Vigil. (1993) Integrated Solid Waste Management. McGraw-Hill.
AktaKualitiAlamSekeliling 1974 (Akta 127) &Peraturan-peraturan&Perintah-perintah. International Law Book Services.

KA44901 ENVIRONMENTAL LAB

This course will expose the students on the testing procedures related to Environment. Through experiments, students should be able to apply and appreciate the fundamental concepts and theories relating to environmental engineering.

References

Davis, M.L. and Cornwell, D.A. 2008. Introduction to Environmental Engineering. 4th Ed. McGraw-Hill.
Salvato, J.A., Nemerow, N.L. and Agardy, F.J. 2003. Environmental Engineering. 5th Ed. John Wiley & Sons, Inc.
Masters, G.M. and Ela, W.P. 2008. Introduction to Environmental Engineering and Science. 3rd Ed. Prentice Hall.
Corbitt, R.A. 1999. Standard Handbook of Environmental Engineering. McGraw-Hill.

KA45102 INTERGRATED DESIGN PROJECT 1

The course discusses the design principles and procedure for reinforced concrete structures and prestressed concrete in civil engineering degree courses to assist them for understanding the principles of element design and procedures for design. The elements in reinforced concrete are One-way Ribbed Slab, Flat Slab, Yield line method, Building frame, Retaining walls. The Prestressed concrete principles are with Introduction, Materials, Prestressing system, Analysis of prestress and Bending stresses, Losses of Prestress and Deflections of prestressed concrete members, Flexural strength of prestressed concrete section, Shear and Torsional resistance, Transfer of Prestress in pretensioned, Anchorage zone of post-tensioned members, Limit state design criteria for prestress, Design of prestress sections, Design of Pretensioned and Post-tensioned flexural members.

References

MacGinley, T.J. & Choo BS (2003). Reinforced Concrete Design to BS 8110, E & F.N. Spon Kenneth M.
Leet&Dioniso Bernal (1997). Reinforced Concrete Design, McGraw Hill Inc. New York.
W.M.C. McKenzie (2003), Design of Structural Elements, Palgrave Macmillan.
P. Dayaratnam (2000), Design of Reinforced Concrete Structures, Oxford & IBH Publishing Co. Pvt Ltd.
MacGregor JG & Bartlett FM (2000). Reinforced concrete: Mechanics & Design, Prentice Hall.
Edward G. Nawy (2000). Prestressed Concrete, 3rd edition, Prentice Hall.
N Krishna Raju (2009). Prestressed Concrete, Fourth Edition, Tata McGraw-Hill.

KA40204 FINAL YEAR PROJECT 2

Project design for integration of student's knowledge obtained through courses in the program. Emphasis is given towards creativity, analytical thinking, group work as well as ability to produce useful products by using theory learned from courses.
Students will be required to complete project report as well as give a presentation on the project. At the end of Project 2, students are required to complete and present their final report/thesis or output and results as well as their project analysis.

References

Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2008

KA45803 INTERGRATED DESIGN PROJECT 2

This is a semester-project course oriented towards the development of knowledge and skills to design electronic or electrical systems at a professional level. Proficiency gained in other software and hardware design courses will be utilized in the design and development of a prototype system. Project development will utilize a mix of system architecture design, custom hardware design and software programming skills. The project will result in a prototype which will be built in a lab setting. Industry standard practices of design reviews, final project presentations, and weekly reports will be followed. The design process will be studied. Through the project, class discussions, and interactions with classmates this course will allow student to enhance their effectiveness in future projects in industry or academia.

References
Reis, Ronald A, Electronic project design and fabrication. Upper Saddle River, NJ. : Pearson, 2005. Bond, W. T. F. Designproject planning : a practical guide for beginners. London : Prentice Hall, 1996.
Cleland, David I. Project management : strategic design and implementation. New York : McGraw-Hill, 1994.

KA46003 MANAGEMENT AND ACCOUNTING FOR ENGINEERS

This course is a prerequisite for the completion of the degree KejuruteraanUniversiti Malaysia Sabah. It touches on manufacturing management aspects from the management accounting perspective. An engineer needs to understand different approaches in planning, organisation, control and performance measurement as support in the process of product manufacturing and the provision of services. This course will also take a general approach in introducing the function of financial statements, taxation and audit, as well as financial information analysis and its relevance to the engineering discipline and professional environment. Emphasis is given to cost management techniques, decision-making techniques and the provision of engineering information in a financial format as a form of management support.

References
Horngren, C.T., Sundem, G.L. and Stratton, W.O. (2005). Introduction to Management Accounting (13th ed.). PearsonPrentice Hall:New Jersey.
Lucey, T. (2002). Costing. (6th ed.) DP Publications Ltd.
Atkinson, A.A, Kaplan, R.S. and Young, S.M. (2004). Management Accounting. (4th ed.). Pearson Prentice-Hall: New Jersey.
Garrison, R.H., Noreen, E.W. and Brewer, P.C. (2006). Managerial Accounting (11th ed.) McGraw-Hill.
Various journal articles to be provided from time to time.

KA41503 ADVANCED GEOTECHNICAL ENGINEERING

Planning for Earth retaining structures, embankments and dams, Soil parameters, Bearing capacity, Compressibility; Selection of site, Types of structure, Soil Exploration, Lab and Field Tests; Earth Pressure theories; Retaining walls, Design considerations; Design of Earth Dams; Design of Gravity dams. A group project may be assigned involving the above topics.

References
KameswaraRao, N.S.V (2010), Foundation Design – Theory and Practice, John Wiley & sons, UK/ Singapore.
Cheng Liu and Jack B. Evett (2005), Soils and Foundations, Prentice Hall, New York.
Bowles Joseph, E (1996), Foundation Analysis and Design, McGraw-Hill, New York
Garg, S (2002), Irrigation Engineering and Hydraulic Structures, Khanna Publishers, New Delhi, India. 5 Tomlinson, M.J (2001), Foundation Design and Construction, 7th Edition,Prentice Hall, New York. Das B.M (2002), Principles of Geotechnical Engineering, 5th Edition, Thomson Asia Ltd., 2002, U.K.

KA42003 ADVANCED CONCRETE TECHNOLOGY

Knowledge on special types of concrete, testing and quality control, durability issues including its repair and maintenance for long life service. The technology for particular types of structures including precast system, seismic retrofitting of concrete structures and green concrete technology also included. Knowledge on formwork and its principals of design are also to be discussed.

References
A.M. Neville, 2002, 'Properties of Concrete. Vol.2', Butterworth Longman Group Ltd, London.
George, G.P. and Andreas, J.K. 1997. Earthquake-Resistant Concrete Structures. London, E & FN Spon.
J. Newman, &Choo, B.S. 2003. Advanced Concrete Technology 3: Processes. 2003. Elsevier.
J. Newman, &Choo, B.S. 2003. Advanced Concrete Technology 4: Testing and Quality. 2003. Elsevier. Peter, H.E. and Brandon, H.E. 1993. Concrete Repair and Maintenance.RSMean, USA.
Robert, L.P. and Garold, D.O. 1996. Formwork for Concrete Structures, Third Edition.USA, McGraw-Hill.

KA42203 WATER AND WASTEWATER ENGINEERING

Students will acquire essential principles knowledge and practice of the theory and application of water supply and wastewater engineering. Emphasis on the knowledge on water resources includes quality of drinking water, water collection, treatment processing and water distribution. Whereas in wastewater engineering involves the comprehension of wastewater characteristics, collection or sewer designs, wastewater treatment and process, and final disposal.

References
Shun Dar Lin, 2014, Water & Wastewater calculation manual, 3rd edition, McGraw Hill Professional
Twort, Ratnayaka& Brandt,2009, Water Supply 6th edition, Butterworth-Heinemann.
Mark J Hammer, 2000, Water & Wastewater, Prentice Hall
Tillman GM. (1996) Water Treatment. Ann Abor Press Michigan

KA42403 ADVANCED STRUCTURAL DESIGN

This course is intended to be an advanced follow-up to Reinforced Concrete and Steelwork design modules undertaken in the Third Year by students in the Civil Engineering Program (HK01). Topics to be covered include structural robustness, composite steel design, portal frame design, yield line analysis and strip method for RC slab design and pre-stressed concrete beam design.

References

Hicks, S. J., and Lawson, R. M. 2003. SCI P287 Design of Composite Beams using Precast Concrete Slab. The Steel Construction Institute. [ISBN: 1 85942 139 3]
Mosley, B., Bungey, J. and Hulse, R. 2007.Sixth Edition.Reinforced Concrete Design to Eurocode 2. Palgrave MacMillan. [ISBN-10: 0-230-50071-41]
Salter, P. R., Malik, A. S. and King, C. M. 2004. SCI P252 Design of Single Span Portal Frames to BS5950-1:2000. The Steel Construction Institute. [ISBN: 1 85942 087 7]

KA43003 ADVANCED PROJECT MANAGEMENT

This course will include legal requirement related to construction work, financial cash flow for construction, employment regulation, and management theories as a syllabus to develop the graduate engineers to have knowledge about how the project can be managed at advance level.

References

Stephen P. Robbins and David A. DeCenzo (2005), Fundamentals of Management, Prentice Hall, New York.
Andrew J. Dubrin, (2006), Essentials of Management, 6th Edition, Thomson Asia Ltd., 2006, U.K.
David A. Whetten and Kim S. Cameron (2005), Developing Management Skills, 6th Edition, Prentice Hall, New York.
Frederick E. Gould and Nancy E. Joyce (2003), Construction Project Management, 2nd Edition, Prentice Hall, New York.
Frederick E. Gould (2005) Managing The Construction Process, Prentice Hall, New York.
Employment Act 1955 (Act 265) Regulations And Orders & Selected Legislation (2014). ILBS, Petaling Jaya, Malaysia.

KA43203 TRANSPORTATION ENGINEERING

This course includes urban transport planning processes, transit system (MRT, LRT, Monorail), bus services, land use and transport demand, socio-economic pattern, transport modeling, forecasting transport demand, formulation of transport policies, urban traffic control, sustainable urban transport, traffic impact analysis, environmental impact analysis, financial analysis, road safety, traffic calming and intelligent transport system.

References

Hutchingson, B.C., 1974. Principles of Urban Transport System Planning, Scripta Book Company, Washington, D.C.
Meyer, M.D. dan E.J. Miller, 1984. Urban Transportation Planning : A Decision Oriented Approach, McGraw-Hill Book Company, New York.
Riza Atiq O.K. Rahmat, 1994. Model Pengangkutan Bandar : Pendekatan Secara Teori dan Amali, Dewan Bahasa & Pustaka, Kuala Lumpur.
Grava, S, 2003, Urban Transportation Systems Choices for Communities, McGraw-Hill.
Almselati, A. S. I., Rahmat, R. &Jaafar, O, 2011, An Overview of Urban Transport in Malaysia. The Social Sciences 6(1): 24-33.
Goldman, T. & Gorham, R, 2006, Sustainable Urban Transport: Four Innovative Directions. Technology in society 28(1): 261-273.
Ladin, M. A., Das, A. M., Najah, A., Ismail, A. &Rahmat, R. a. a. O. 2014, A Review of Strategies to Implement Sustainable Urban Transportation Options in Malaysia, JurnalTeknologi 69(2).

KA43403 ADVANCED ENVIRONMENT ENGINEERING

This course equips students with an appreciation of impacts of engineering activity on the environment and to provide them with professional skills to analyze and minimize the adverse impact. The course discuss the theories, measurement and impacts of pollution and engineering works upon the environment, causes and effects of environmental problems and engineering method to control. The concern and knowledge in physical-chemistry of environment processes, water issues, solid waste and energy for green technology are provided to develop theoretical and practical knowledge in which to take appropriate technical solutions and take suitable planning to contribute for a sustainable development.

References
S. Edward Rubin (2001). Engineering and the Environment.McGraw-Hill, Boston.
Architectural Institute of Japan (2005).Architecture for a Sustainable Future. Published by Institute for building environment and energy conservation
Stationery Office (2006). Low or zero carbon energy sources: strategic guide. Stationery Office
Sue Roaf, Manuel Fuentes, Stephanie Thomas (2014). Eco-house 4th Edition.Routledge. UK
Tony Burton, Nick Jenkins , David Sharpe, Ervin Bossanyi (2011). Wind Energy Handbook. Wiley-Blackwell; 2nd Edition
Solar Energy International (2004).Photovoltaics: Design and Installation Manual. New Society Publishers
Martin Godfrey Cook(2011). The Zero carbon House. The Crowood Press Ltd

KA45503 BUILDING PATHOLOGY

The Course aims to equip students with the knowledge and ability to appraise existing buildings; the knowledge of building defects' diagnosis, maintenance, repair methodology and maintenance management.

References
Samuel Y. Harris. 2001. Building Pathology: Deterioration, Diagnostics, and Intervention. First Edition, Wiley & Sons, USA
CIB – W086. 2013. Edited by Vasco Peixoto De Freitas. A State-of-the-Art Report on Building Pathology. ISBN 978-90-6363-082-9
Chris Jenner. 2015. Survey Your Home for Structural Building Defects: For Homeowners, Property Developers, Students, Professionals and Property Purchasers. Second Edition. UK. ISBN 978-0-9571620-3-7
David Watt. Building Pathology.Second Edition. 2007. Blackwell Publishing Asia Pty, Ltd, Australia
Robert A. Young. 2008. Historic Preservation Technology. New York. John Wiley & Sons

KA46203 BRIDGE ENGINEERING

Introduction of bridge structures, types and design. Introduction of loads, design features, and permissible stresses; Review of bridge engineering and Malaysian standards for road bridges; Malaysia-specific design consideration; Detailed design of different of steel and concrete bridges; Pre-stressed concrete bridges; Design long span bridges, movable and collapsible bridges; Bridge bearings; Expansion Joints; Wearing course; River Training and Protective Works; Construction, erection and maintenance of bridges.

References
Rakshit, K.S; Design and Construction of Highway Bridges, New Central Book Agency, Kolkata, India, 1992
Jim J. Zhao &Dmetrios E. Tonias; Bridge Engineering, 3rd Edition, McGraw Hill, 1995
Wai- Fah Chen &LianDuan (Eds) Bridge Engineering Handbook; Jain Book Agency, India 1999
Gupta, B.L, Gupta,A; Highway and Bridge Engineering, Jain Book Agency, India 2014
Bindra, S.P; Principles and Practices of Bridge Engineering, Jain Book Agency, India 2015

KA46403 SOIL STABLIZATION AND GROUND IMPROVEMENT

The course covers problematic of soft ground and method of ground improvement and soil stabilization.

References
H. Bredenberg, G. Holm, B. B. Broms, Dry Mix Methods for Deep Soil Stabilization 1998.
Manfired R. Hausmann, Engineering Principles of Ground Modification, McGraw-Hill Pub, Co., 1990.
M C. R. Davies, F.Schlosser Ground improvement geosystems.
Koerner, R. M., Designing with geosynthetics, Prentice Hall Inc. 1998.
R. Whitlow (2001), Basic Soil Mechanics, 4th Edition, Prentice-Hall.
Braja M Das (2007), Principles of Foundation Engineering, 6th Edition, Thomson

KA46803 ADVANCED HIGHWAY ENGINEERING

The course covers asphalt mix types, hot mix asphalt design, analytical flexible pavement design and sustainable concept in highway material.

References
Garber, Nicholas, and Lester Hoel (2015).Traffic and Highway Engineering, 5th Edition, Cengage Learning.
HarlodsN.Atkins (2003). Highway Materials, Soils and Concretes 4th Edition. Prentice Hall Ohio.
Martin Rogers (2008). Highway Engineering 2nd Edition. Blackwell Publishing.
Read, J. and Whiteoak, D. (2003). The shell bitumen handbook 6th Edition. Thomas Telford.
Rajib B. Mallick and Tahar El-Korchi (2013). Pavement Engineering: Principles and Practice, 2nd Edition. CRC Press.

KA47003 INTRODUCTION TO GIS

This course provides an introduction to the basic concepts, features and capabilities of GIS. The focus of this course is to learn the usefulness of GIS in civil engineering to solve problems using basic skills of GIS.

References

Gorr, W.L., Kurland, K.S. 2008. GIS Tutorial: Workbook for ArcView 9. 3rdEd. ESRI Press.
Ormsby, T., Napolean, E., Burke, R., Groessl, C., Bowden, L. 2010. Getting to Know ArcGIS Desktop.ESRI Press. Wise, S. 2002. GIS basics.Taylor & Francis.
Chang, K.T. 2009.Introduction to Geographic Information Systems.5thEd. McGraw-Hill.

KA47203 FINITE ELEMENT METHOD

Pengenalan – Kaedahketeganganlangsung – Prinsip-prinsippegun, Rayleigh-Ritz daninterpolasi – Sesaranberasaskanunsur-unsuruntukmekanikstruktur–segitigayangbersisilurusdantetrahedron– Perumusanisoparametrik–Transformasikoordinat.

References

Cook R.D., Malkus D.S. &PleshaM.F., Concepts & Applications of Finite Element Analysis, John Wiley, 1989,: 0471503193. ChandrupatlaT.R. &Belegundu A.D., Introduction to Finite Elements in Engineering, Prentice Hall, 2002, 0-13-061592-7.
Bathe K.J., Finite Element Procedures in Engineering Analysis, Prentice Hall, 1985. Gallaghar R.H., Finite Element Analysis: Fundamentals, Prentice Hall, 1984.
RajasekaranS.,FiniteElementAnalysisinEngineeringDesign,WheelerPub.KrishnamoorthyC.S.,FiniteElementAnalysis- Theory and Programming, Tata McGraw-Hill.
Zienkiewics O.C. & Taylor R.L., The Finite Element Method, Vol I & II, McGraw-Hill.

KA47403 SUSTAINABILITY AND GREEN TECHNOLOGY

The intent of this course is to provide an introduction to the concept of sustainability in civil engineering and approaches to green technology on material construction and design work.

References

Jamal M. Khatib, Sustainability of Construction Materials, 1st Edition, 2009.
Alfred Straus, Dan M. Frangopol and KonradBergmeister, Life-Cycle and Sustainability of Civil Infrastructure Systems, 2013 by Taylor & Francis Group, LLC.
Yudelson and Jerry, Green Building A to Z: Understanding the language of Green Building, 2007
Sandra Mendler, William Odell and Mary Ann Lazarus, The Guide Book to Sustainable Design, 2nd Edition, 2006

KA47603 TUNNEL ENGINEERING

This course aims to provide students appreciation of the fundamental concepts tunnel engineering with relevant topics to enable the student candidates to plan routes, design for space-proofing and structure of the tunnel.

References

Thomas, A. 2008. Sprayed Concrete Lining. CRC Press. [ISBN: 9780415368643].
Mosley, B., Bungey, J. and Hulse, R. 2007. Sixth Edition. Reinforced Concrete Design to Eurocode 2. Palgrave MacMillan. [ISBN-10: 0-230-50071-41].
Bell, F. G. 2007. Engineering Geology. Second Edition. Butterworth Heinemann. [ISBN: 978-0750680776].

KA47803 EARTHQUAKE ENGINEERING

This course allows structural engineers to consolidate their knowledge on the effect of earthquake ground motions on civil engineering structures. The course will cover the analysis and the design of structures made of various materials that are located in active seismic zones. The course will also introduce the use of supplemental damping and seismic isolation systems to raise the seismic performance of buildings and bridges. The course will also call upon the critical sense of structural engineers in order to allow the seismic evaluation of existing structures. Finally, the course will allow structural engineers to acquire new basic knowledge in earthquake engineering that will allow them to communicate better with scientists and engineers of other disciplines in earthquake engineering (e.g. seismologist, geotechnical engineers, etc.).

References

Filiatrault, André (2002), “Elements of Earthquake Engineering and Structural Dynamics”, Second Edition. Polytechnic International Press, 2002.
Chopra, Anil K. (2001), Dynamics of Structures: Theory and Applications to Earthquake Engineering, Third Edition, Prentice Hall.
Bruce A. Bolt, Earthquakes – 4th Edition, W.H. Freeman and Company, New York.
Christopoulos, Constantin and Filiatrault, Andre (2006), “Principles of Passive Supplemental Damping and Seismic Isolation”, IUSS Press.

KA48003 SOLID WASTE MANAGEMENT

The course covers the practices and technologies that can be applied to the management and reduction and prevention of solid waste. Its include the issues in waste management, definition and characteristics of waste, storage and transportation, treatment and processing of solid waste, land filling technologies and operations. Discussion on hazardous waste and specific waste such as biomedical and electrical are also included in this course.

References

Ramesha Chandappa, 2012, Solid waste management: principles and practice, Springer-Verlag BH. ISBN 978-3-642-28681-0l.
Nicholas P. Cheremisinoff, 2003, Handbook of solid waste management and waste minimisation technologies, Butterworth-Heinemann (BH) Elsevier Science (USA). ISBN 0-7506-7507-1.
Subhash Anand, 2010, Solid Waste management, Mittal Publication India, ISBN 81-8324-353-3 .
George Tchobanoglous and Frank Keith, 2002, Handbook of Solid waste management, McGraw Hill Professional Publishing.

KA48203 ADVANCED TRAFFIC ENGINEERING

Highway and traffic analysis involves an extremely complex interaction of economic, behavioral, social, political and environmental. This course aims to provide students with a solid introduction to the principles of traffic engineering with the focus on traffic analysis, urban traffic optimization and solution to traffic problem for construction and operation of highways.

References

Nicholas J. Garber and Lester A. Hoel. 2010. Fourth Edition (SI Edition). Traffic Engineering. PWS Publishing Singapore.
Harlods N.Atkins. 2003. 4th Edition. Highway Materials, Soils and Concretes. Prentice Hall Ohio.
Martin Rogers. 2008. Second Edition. Highway Engineering. Blackwell Publishing.
Retting, Richard A., Susan A. Ferguson, and Anne T. Mccartt. A Review Of Evidence-Based Traffic Engineering Measures Designed To Reduce Pedestrian-Motor Vehicle Crashes. American Journal of Public Health 93, No. 9 (2003): 1456-1463.

KA48403 MARINE AND COASTAL ENGINEERING

This course introduces the fundamental principles and concepts of ocean and coastal engineering. It gives an overview in a number of subjects including wave theory, wave transformation, design wave specification, wind, tides, sediment transport, coastal morphology, and coastal protection.

References

Reeve, D., Chadwick, A. & Fleming, C. (2004). “Coastal Engineering –Processes, Theory and Design Practice. Spon Press.
Kamphuis, J. W. (2000). “Introduction to Coastal Engineering and Management”, World Scientific.
Sorensen, R. W. (2005). “Basic Coastal Engineering”, 3rd Edition, Plenum Publishing Corporation.
Dean, G. R (2002). “Coastal Processes with Engineering Applications”. Cambridge University Press.

KA48603 INTERGRATED WATER RESOURCES MANAGEMENT

Water resources development planning, storm water management, cross-drainage design, river design and irrigation system.

References

DID Malaysia, Urban Storm water Management Manual for Malaysia, JPS Malaysia, K. Lumpur, 2000.
Novak, P., Moffat, A.I.B., Nalluri, C. & Narayanan, R. Hydraulic Structures, Spon Press, London, 3rd Edition, 2001. Chin, D.A Water Resources Engineering. Prentice Hall, New Jersey, 2000.
James, L.G. & Skoyerboe, G.V., Surface Irrigation: Theory and Practice, Prentice Hall, 1992.
Stahre, P. & Urbanos, B.R., Stormwater Detation for Drainage, Water Quality and CSO Management. Prentice Hall, 1990. Mc Cuen, ‘Hydrologic Design and Analysis’ Mc Graw Hill, 1998.

ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (HK02)

KE17103 MULTIVARIABLE CALCULUS

This course covers vector analysis and multivariable calculus. Topics include vectors, Dot product and Cross product, vector-valued functions in planar and space curves, line and plane in space, projectile motion, polar coordinates and curves, Tangential, Normal, and Binormal (TNB), partial derivatives and chain rule of multiple variables, directional derivatives and estimation, extreme values and Lagrange multiplier, double and triple integrals, integration in vector fields and flux. As its name suggests, multivariable calculus is the extension of calculus to more than one variable. In multivariable calculus, functions of two or more independent variables are involved. One key difference is that more variables means more geometric dimensions. This makes visualization of graphs both harder and more rewarding and useful. For example, in electricity and magnetism, the magnetic and electric fields are functions of the three space variables and one time variable. By the end of the course, student should know how to differentiate and integrate functions of several variables.

References

1. Weir, M.D., Hass, J., and Giordano, F. R. (2008).Thomas' Calculus.11th Edition. Pearson Addison Wesley.
2. Boston. Kreyszig, E. (2006). Advanced Engineering Mathematics. Wiley. Singapore.
3. Vraberg, D., Purcesll, E.J., and Rigdon, S.E. (2007). Calculus. Pearson Prentice Hall. New Jersey.

KE17203 DIFFERENTIAL EQUATIONS

This course is one of the fundamental courses for an electrical and electronics engineering student. It begins with the definition and terminology of the differential equations. Various approaches such as Direct Integration, Separable Variable, Linear Integrating Factor, Nonlinear Integrating Factor and Substitution methods are introduced to solve the linear and nonlinear first order ordinary differential equations. The students learn about modeling the systems of differential equations using fundamental knowledge of science and physics. Then with the various approaches, the students are able to formulate and solve the engineering problems with initial value conditions. Next, homogeneous and non-homogeneous higher order ordinary differential equations are solved using approaches such as Complementary Functions and Particular Integral, Superposition, Reduction Order, Variation of Parameters, D-operator, Euler-Cauchy, Laplace Transform. Linear Equations and Inverse Matrices as well as Eigenvalues and Eigenvectors are studied. Homogenous and non-homogeneous first order linear systems can be solved using Undetermined Coefficients and Variation of Parameters approaches. MATLAB M-file programming and SIMULINK block diagram will be studied as a tool to demonstrate the differential equations can be solved with the various approaches mentioned above.

References

1. D. G. Zill, 2017. *A First Course in Differential Equations with Modeling Applications*, *11th Edition*. Brooks Cole. [ISBN: 978-1305965720]
2. G. Strang, 2014. *Differential Equations and Linear Algebra.* Wellesley-Cambridge.
    a. [ISBN: 978-0980232790]
3. B. R. Hunt, R. L. Lipsman, J. E. Osborn and J. M. Rosenberg, 2012. ***Differential Equations with MATLAB***, *3rd Edition.* John Wiley: London. [ISBN: 978-1118376805]
4. E. Kreyszig, 2011. *Advanced Engineering Mathematics*, *10th Edition.* Wiley. [ISBN: 978-0470458365]

KE17303 ELECTRICAL AND ELECTRONICS SYSTEM

The purpose of this course is to introduce the fundamental aspects of analyzing the electrical & electronics circuit's technology. Both of the electrical & electronics circuit technology were covered. In electric circuits part, it's comprises of electric circuits fundamental, resistive network analysis and AC network analysis. Some of the topics are Ohm's law, KVL, KCL, voltage & current divider, measuring devices, node voltage method, mesh current method, superposition, thevenin & Norton equivalent circuit, maximum power transfer, energy storage in capacitor & inductors, supersposition of AC signals and AC circuit analysis method. In electronics part, the semiconductor & diodes, the bipolar junction transistor (BJT's) and Field Effect transistor (FET) were included. The topics incorporate pn junction, rectifier circuit, npn BJT, MOSFET amplifiers and switches.

References

1. Hughess, E. 2002. Electrical & Electronic technology. (8th Edition). Prentice Hall.
2. Hambley, A.R. 2002. Electrical Engineering: Principles & Applications. (2nd edition): Prentice Hall.
3. Carlson, A.B. 2000. Circuits: Engineering concepts & Analysis of Linear Electric Circuits Brooks/Cole: Thomson Learning.
4. Rudra Pratap, 2006, Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers, New York, Oxford University Press.
5. Smith, R.J & Dorf, R.C. 1992. Circuits, Devices and Systems. (5th edition). John Wiley & Sons, Inc.

KE17403 ELECTRIC CIRCUIT ANALYSIS

This course covers fundamental topics that are common to a wide variety of electrical engineering devices and systems. The topics include circuit analysis techniques, power analysis, time-response of first- and second-order systems, sinusoidal steady-state response, frequency domain analysis, filters, pole-zero plotting and analysis in the complex plane.

References

A. M. Davis, 1998. Linear Circuit Analysis – PWS Publishing Company.
1. L. O. Chua, C. A. Desoer, E. S. Kuh, 1987. Linear and Nonlinear Circuits – McGraw Hill.
2. R. E. Thomas, A, J. Rosa, 2004. The Analysis and Design of Linear Circuits – John Wiley and Sons.
3. R. A. DeCarlo, P. Lin, 2001, Linear Circuit Analysis – Oxford University Press.

KE17503 ENGINEERING PROGRAMMING

This course is an introduction to programming using C++ programming language. It introduces students to design and develop basic program using C++ programming language. The topics cover introduction to computers and C++ programming language i.e. Classes, Objects, Strings, Control statements, Functions, Recursion, Arrays, Vectors, Pointers, File processing, Searching and Sorting.

References

1. Deitel, P., Deitel, H. and Sengupta, P. (2010). C++ How to Program (8th ed.). Prentice Hall: England.
2. Malik, D.S. (2011). C++ Programming From Problem Analysis to Program Design (6th ed.). Cengage Learning: USA.
3. Forouzan, B.A. and Gilberg, R.F. (2004). Computer Science: A structured approach using C++. Thomson: USA.

KE17603 LOGIC DESIGN

The KE10603 Logic Design covers the digital building blocks, tools, and techniques in the design of computers and other digital system. This course covers a variety of basic topics, including switching theory, combinational sequential logic circuits, and memory element.

References

1. Macrovitz, A.B. 2002 Introduction to Logic Design. McGraw-Hill. New York.
2. Ercegovac, M.D. Lang, T. Moreno, J.H. 1999. Introduction to Digital System. McGraw-Hill. USA Tokheim, R.L. 1994 Digital Electronic. McGraw-Hill. Singapore.
3. Tocci, R.J. Widmer N.S. Moss G.L. 2007 Digital System Principles and Application. Prentice Hall. London.

KE17803 MATERIAL SCIENCE AND ELECTRONIC DEVICES

Introduction to semiconductor materials, fundamentals of carrier phenomena, operating principles of p-n junction diodes, metal-semiconductor contacts (Schottky diodes), BJT and field-effect transistors (MOSFETS and JFETS), etc and knowledge leading to understanding of photo emitters, photo detectors and other optoelectronic devices.

References

1. R.. F. Pierret Semiconductor Device Fundamentals, Addison-Wesley, 1996.
2. S. Sedra, Kenneth C. Smith, 2003. Microelectronic Circuits – Oxford niversity Press.
3. Michael Shur, Introduction to Electronic Devices, John Wiley & Sons;(January 1996).
4. Simon M. Sze, Semiconductor Devices, Physics and Technology, John Wiley & Sons; 2nd Edition (2001).
5. A. J. Dekker, Solid State Physics, Macmillan, 1998.

KE18201 ENGINEERING LAB 1 (Circuit & Electrical and Electronics System)

This course is intended to expose the students with hands-on experimental works experience in basic electronics and digital circuitry. It begins with the introduction of general practice in engineering laboratory works such as lab safety, logbook and formal technical report writing. Before the actual lab session started, the students will be introduced with various apparatus in the laboratory such as oscilloscope, multimeter, signal generator, breadboard, and electronics components. The student also will learn the computer aided circuit simulation tool using P-Spice software. The student is required to complete the simulation works before they conduct the actual experimental works in the laboratory. At the end of the course, the students will be evaluated individually with practical test.

References

1. A.S. Sedra, K.C. Smith, 2003. Microelectronic Circuits – Oxford University Press.
2. R.C. Dorf, J. A. Svoboda, 2006. Introduction to Electric Circuits, 7th Ed – Wiley.
3. R.A. DeCarlo, P. Lin, 2001. Linear Circuit Analysis – Oxford University Press.
4. A.M. Davis, 1998. Linear Circuit Analysis – PWS Publishing Company.
5. M. H. Rashid, 1998. Microelectronic Circuits: Analysis and Design – Brooks Cole.
6. D. J. Comer, D. T. Comer, 2002. Fundamentals of Electronic Circuit Design – Wiley.

KE27103 COMPLEX ANALYSIS

This third engineering mathematics course covers advanced mathematical methods that will be used in upper-level electrical and electronic engineering courses. It also develops the methods to formulate basic engineering problems in a way that makes them amenable to computational/numerical analysis. The course will consist of two main modules:

(1) MATLAB as a robust computational tool, used to reinforce, enrich and integrate ideas throughout the course. Students will learn how to solve linear algebra and differential equations computationally.

(2) Complex Analysis, including rectangular and polar representations in the complex plane with associated forms of complex arithmetic, powers, roots and complex logarithms, complex differentiation, analytic functions and Cauchy-Riemann equations, complex Taylor series, complex exponential, sinusoidal and hyperbolic functions, and Euler's formula. Numerical methods in Fourier Series applications will be introduced.

References

1. Zill D.G. and Cullen M.R. 2008. Differential Equations with Boundary Value Problems, 7th Edition. Thompson.
2. Boyce W.E. and Diprima R.C. 2008. Elementary Differential Equations and Boundary Value Problems, 9th Edition. John Wiley: London.
3. Werner E. Kohler and Lee W. Johnson 2009. Elementary Differential Equations with Boundary Value Problems, 3rd Edition. Addison Wesley.
4. Leedder G. 2005. Differential Equations: A Modelling Approach, 1st Edition. McGraw-Hill.
5. Richard B. and Gabriel C. 2006. Schaum's Outline of Differential Equations, 3rd edition. McGraw-Hill.
6. Hunt B.R., Lipsman R.L., Osborn J.E. and Rosenberg J.M. 2005. Differential Equations with MATLAB, 2nd Edition. John Wiley: London.

KE27203 COMPUTER ARCHITECTURE AND MICROPROCESSORS

This course consists of 2 modules comprising Microprocessors and Computer Architecture. Module 1 on Microprocessors introduces students to microprocessor and assembly language programming in general, and then discuss, in details, how to program in assembly language, a common microprocessor, the Intel 80386DX. Finally interfacing techniques between the Intel 80386DX microprocessor to peripheral devices is then given. In Module 2, the structure, function and architecture of computers are introduced. Besides that, module 2 also serves to provide knowledge on characteristics of modern-day computer systems. At the end of the course, students should able to appreciate the knowledge of microprocessor design into computer architecture operations and functions of performances optimization.

References

1. Brey B.B., 2009.The Intel Microprocessors, Pearson International Edition, New Jersey.
2. Stallings, William. 2003. Computer Organization & Architecture - Designing For Performance. Sixth Edition (International). Prentice Hall.
3. Triebel, Walter A.. 2003. The 8088 and 8086 microprocessors : programming, interfacing, software, hardware, and applications : including the 80286, 80386, 80486, and Pentium processor families, Prentice Hall.
4. Hall D.V., 1992, Microprocessors and Interfacing: Programming and hardware, McGraw Hill, Singapore. Uffenbeck J., 2002. The 80x86 Family Design, Programming and Interfacing, Prentice Hall, New Jersey.
5. Brey B., 1996. Programming the 80286, 80386, 80486 and Pentium-based Personal Computer, Prentice Hall, New Jersey.
6. D. A. Patterson & J.L. Hennesy. 1999. Computer Organization and Design - The Hardware/Software Interface, Morgan Kaufmann.
7. Thomas C. Bartee, Computer Architecture and Logic Design, McGraw Hill, 1991.
8. John P. Hayes, Computer Architecture and Organization, 3rd Ed., McGraw Hill, 1998.
9. B. Hamacher, Z. Vranesic and S. Zaky, Computer Organization, 5th Ed., McGraw Hill, 2002
10. A.S. Tanenbaum, Structured Computer Organization, 5th Ed., Pearson Prentice Hall, 2006.

KE27303 ANALOG ELECTRONIC

This course is one of the foundation courses for an electrical and electronics engineering and related fields student. It will provide the students with fundamental elements and concepts of analog electronics such as amplifier, Bipolar Junction Transistor (BJT), Field effect transistor (FET), Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET), CMOS, Operational amplifier, and so on. Topics to be covered include basic amplifier and feedback theory, dc bias calculations and circuits, Circuit stability and frequency response, BJT and MOSFET small and large signal device models, gain and frequency response characteristics of amplifiers, large-signal characteristics and operational amplifier design for different mode of operations as well. The analysis and design of analog circuits incorporating Bipolar, MOSFET, CMOS and OP-Amp technologies will be considered.

References

1. Allan R. Hambley, 2000. Electronics – Prentice-Hall.
2. David Comer, Donald Comer, 2002. Fundamentals of Electronic Circuit Design – Wiley.
3. Richard C. Jaeger, Travis Blalock, 2003. Microelectronic Circuit Design – McGraw-Hill.
4. Donald. Neamen, 2001. Electronic Circuit Analysis and Design - McGraw-Hill.
5. M. Rashid, 1999. Microelectronic Circuits: Analysis and Design, PWS Publishing Company, 1999.

KE27403 PROBABILITY AND RANDOM VARIABLES

This course covers the fundamentals of probability and random processes useful in fields such as networks, communication, signal processing, and control. It Introduces probabilistic techniques for modeling random phenomena and making estimates, inferences, predictions, and engineering decisions in the presence of chance and uncertainty. Topics include sample space, probabilistic models, conditional probability, discrete and continuous random variables, transform techniques, Bernoulli and Poisson processes, limit theorems and elements of statistical inference.

References

1. Roy D. Yates, David Goodman, 2004. Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers - Wiley.
2. Dimitri P. Bertsekas, John N. Tsitsiklis, 2008. Introduction to Probability – Athena Scientific.
3. Alberto Leon-Garcia, 2008. Probability, Statistics, and Random Processes For Electrical Engineering – Prentice Hall
4. Peyton Peebles, 2000. Probability, Random Variables, and Random Signal Principles – McGraw-Hill.
5. Sheldon Ross, 2009. A First Course in Probability – Prentice Hall.
6. Richard H. Williams, 2002. Probability, Statistics, and Random Processes for Engineers – CL Engineering.

KE27503 MICROELECTRONICS

The purpose of this course is to introduce the exciting and rapidly growing field of Microelectronics to Electrical and Electronics Engineering students. This course is focusing on the principles of CMOS VLSI Design as a main role of Digital Integrated Circuit Design. In this course, basic of CMOS logic and circuit design, fundamental models of MOSFET and BJT operation, CMOS processing technology, CMOS system design and methods in the context of modern digital integrated circuit (IC) technology will be introduce and analyze. All of these components are vital to the understanding of both the operation of present day devices and any future development of electronics system device of digital circuits design.

References

1. Betty L. Anderson & Richard L. Anderson, 2005, Fundamentals of Semiconductor Devices, McGraw Hill International Edition
2. N.H.E Weste & K. Eshraghian. 1994. Principles of CMOS VLSI Design - A Systems Perspective. (Second Edition). Addison-Wesley Publishing Company.
3. Rabaey JM, A. Chandrakasan & B. Nikolic. 2003. Digital Integrated Circuits- A Design Perspective (Second Edition), Prentice Hall.
4. C.G.Sodini & R.T Howe, 1997. Microelectronics - An Integrated Approach. International Edition. Prentice Hall
5. Rudra Pratap, 2006, Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers, New York, Oxford University Press.
6. Ben G. Streetman & Sanjay Kumar Banerjee, 2006. Solid State Electronic Devices, Pearson, N. J.

KE27603 ELECTROMAGNETICS

This course introduces electromagnetic principles and describes ways in which those principles are applied in engineering devices and systems. Topics include Maxwell's equations in integral and differential forms with associated boundary conditions as descriptions of all electromagnetic principles, static electric fields in free space and in materials, static magnetic fields in free space and in materials, propagation and reflection of plane waves, and transmission lines. This course can also be seen as the foundation course in the physical layer of communication systems. Hence applications may include wireless communication through radio waves using antennas and free space propagation, high speed networks, light over fiber, and high speed chip to chip connections.

References

1. Nannapaneni Narayana Rao, 2004. Elements of Engineering Electromagnetics,– Prentice Hall.
2. Daniel Fleisch, 2008. A Student's Guide to Maxwell's Equations – Cambridge University Press. William Hayt, John Buck, 2005. Engineering Electromagnetics – McGraw-Hill.
3. Umran S. Inan, Aziz Inan, 1998. Engineering Electromagnetics – Prentice Hall. Magdy F. Iskander, 2000. Electromagnetic Fields and Waves – Waveland Pr Inc.
4. Stuart M. Wentworth, 2006. Fundamentals of Electromagnetics with Engineering Applications – Wiley.

KE27703 ENGINEERING THERMODYNAMICS

This course discusses basic thermodynamics principles and thermodynamic processes including the study and analysis of thermodynamic law and thermodynamic flow processes, gas power cycles, and refrigeration cycles.

References

1. Moran, M. J. and Shapiro, H. N. 2008. Fundamentals of Engineering Thermodynamics, 6th Ed. John Wiley & Sons: USA.
2. Cengel Y.A. and Boles M.A. 2007. Thermodynamics: An Engineering Approach, 6th Ed. McGraw-Hill: USA.
3. Potter, M. C. and Scott, E. P. 2004. THERMAL SCIENCES An Introduction to Thermodynamics, Fluid Mechanics, and Heat Transfer, Thomsons Brooks/Cole: USA.
4. Russell, L. D. and Adebiyi, G. A. 1993. Classical Thermodynamics, International Ed.Saunders College Publishing: USA.
5. Sonntag, R. E., Borgnakke, C., and Wylen, G. C. V. 1998. Fundamentals of Thermodynamics, 5th Ed. John Wiley & Sons:USA.
6. GranetI. 1996. Thermodynamics and Heat Power, 5th Ed. Prentice-Hall: USA.
7. Howell J. and Buckius R. 1992. Fundamentals of Engineering Thermodynamics, 2nd Ed. McGraw-Hill: USA.
8. Rogers G.F.C. and Mayhew Y.R. 1992. Engineering Thermodynamics, Work & Heat Transfer, 4th Ed. Longman: UK.
9. Black W.Z. and Hartley J.G. 1996. Thermodynamics, 3rd Ed. SI Version. Addison Wesley: USA.

KE27803 APPLIED MECHANICS

This course introduces the principles of statics and dynamics. The scope of the course covers the basic of the forces and moments, employing vectors for analysis. The study of a static system is extended to cover the system in equilibrium, virtual work and energy concepts. Kinematics and kinetics of a particle are then discussed to study the dynamic system involving a particle. The understanding of mechanics is required as an Engineer to mathematically model and predict the behaviour of physical systems. Prerequisites for this course are Engineering Mathematics I and II.

References

1. Bedford, A. & Fowler, W. 2008. Engineering Mechanics: Statics & Dynamics, 5th ed. Singapore: Prentice Hall.
2. Beer, F.P., Johnston, E.R. & Clausen, W.E. 2007. Vector Mechanics for Engineers: Dynamics, 8th ed. Singapore: McGraw Hill.
3. Tongue, B.H. & Sheppard, S.D. 2005. Dynamics: Analysis and Design of Systems in Motion. New Jersey: John Wiley.
4. Beer, F.P., Johnston, E.R. & Eisenberg, E.R. 2007. Vector Mechanics for Engineers: Statics, 8th ed. Singapore: McGraw Hill.
5. Nelson, E.W., Best, C.L. & McLean, W.G. 1998. Schaum's Outline of Theory and Problems of Engineering Mechanics: Statics & Dynamics, 5th ed. New York: McGraw-Hill.

KE28101 ENGINEERING LAB 2 (Logic and Analog Electronics)

This course is intended to expose the students with hands-on experimental works experience in electronics and microcontroller system design. It begins with the introduction of general practice in engineering laboratory works such as lab safety, logbook and formal technical report writing. The student is required to complete the simulation works before they conduct the actual experimental works in the laboratory. The electronics part will cover application of diode, BJT and Op-amp in electronics system design. In which, the combination of DC

biasing and AC signal will be involved in the experimental. The application part consists of utilizing a microcontroller to program and to apply electronics sensors and actuators on a mobile robot. The experiments are accumulative and the students' end product is to apply and test the hardware and software programs on a mobile robot. PIC microcontrollers will be introduced. The lab experiments cover basic I/O, ADC, PWM, and Serial: USART, I2C, SPI, DC motors, IR and micro sensor applications. At the end of the course, the students will be evaluated individually with practical test.

References

1. A. S. Sedra, K.C. Smith, 2003. Microelectronic Circuits – Oxford University Press.
2. R. C. Dorf, J. A. Svoboda, 2006. Introduction to Electric Circuits, 7th Ed – Wiley.
3. R. A. DeCarlo, P. Lin, 2001. Linear Circuit Analysis – Oxford University Press.
4. A. M. Davis, 1998. Linear Circuit Analysis – PWS Publishing Company.
5. M. H. Rashid, 1998. Microelectronic Circuits: Analysis and Design – Brooks Cole.
6. D. J. Comer, D. T. Comer, 2002. Fundamentals of Electronic Circuit Design – Wiley.

KE37103 SIGNALS AND SYSTEMS

This course develops the mathematical foundation and computational tools for processing continuous-time and discrete-time signals in both time and frequency domain. Key concepts and tools introduced and discussed include linear time-invariant systems, impulse response, frequency response, convolution, filtering, sampling, Fourier transform and Z-Transform. The course provides background to a wide range of applications including speech, image, and multimedia processing, bio and medical imaging, sensor networks, communication systems, and control systems.

References

1. Edward W. Kamen, Bonnie S Heck, 2006. Fundamentals of Signals and Systems Using the Web and MATLAB® – Prentice Hall.
2. Benoit Boulet, Leo Chartrand, 2005. Fundamentals of Signals and Systems – Da Vinci Engineering Press
3. Chi-Tsong Chen, 2004. Signals and Systems – Oxford University Press.
4. Steven T Karris, 2008. Signals and Systems with MATLAB Computing and Simulink Modeling – Orchard Publications
5. James H. McClellan, Ronald W. Schafer, Mark A. Yoder, 2003. Signal Processing First – Prentice Hall.
6. Alan V. Oppenheim, Alan S. Willsky, 1996. Signals and Systems – Prentice Hall.

KE37203 MEASUREMENT AND INSTRUMENTATION

This course covers static and dynamic characteristics of instrumentation system, accuracy, precision, sensor elements and circuit for measuring temperature, position, velocity, level, force, and flow rate. Other topic includes the introduction of ultrasonic sensor system, signal processing, conditioning and transmission circuit and data presentation circuits.

References

1. J. P. Bentley, 2005, Principles of Measurement Systems, Fourth Edition, Pearson Prentice Hall, Malaysia. Doeblin E O. 1995. Measurement systems, applications and design, New york, McGraw Hill.
2. Usher M J .1994. Sensors and trasducers, London: Mcgraw Hill.
3. Coombs C F. 1995. Electronic Instrument handbook, New Jersey: McGraw Hill.
4. Other instrumentation & measurement references.

KE37303 ELECTRICAL MACHINES

This course begins with the fundamentals of mechanics, which will provide the students the basic knowledge required to understand electromechanical energy conversion and to relate the speed, power and torque of rotational systems. Electric machine principles, construction, analysis, characteristics, and applications of transformers, dc motors, dc generators, Induction motors, Synchronous motors and generators are covered in detail. Special types of motors such as stepper motors, single-phase motors, repulsion motors are also discussed in this course.

References

1. Stephen J. Chapman.2004.Electric Machinery Fundamentals 4th Edition. Singapore. McGraw-Hill.
2. Syed A. Nasar. 1995. Electric Machines and Power Systems –volume 1: Electric Machines. New York. McGraw-Hill Inc.
3. Theodore Wildi.2002.Electrical Machines, Drives, and Power Systems. 5th Edition. Prentice Hall.
4. Richardson D.V.1990.Rotating Electric Machinery and Transformer Technology. Prentice Hall.
5. Hughes E (Revised by I McKenzie Smith) 1995. Electrical Technology. Singapore. Prentice Hall.

KE37403 CONTROL SYSTEMS

This course will introduce basic concepts of control systems within the constraints of linear time invariant systems. Students are first introduced to basic definitions and system modeling. Laplace Transform is reviewed to show the transformation of time domain to frequency domain for the purpose of analysis and design. Techniques such as Root Locus, Bode and Nyquist plots will be discussed for analysis and controller design.

References

1. Norman S. Nise 2008. Control Systems Engineering, 5th Edition. Wiley.
2. K. Ogata 1997. Modern Control Engineering, Prentice Hall.
3. G.C. Goodwin et al. 2001. Control System Design, Prentice Hall.
4.

KE37503 POWER SYSTEM ANALYSIS

Electric energy is the most popular form of energy, because it can be transported easily at high efficiency and reasonable cost. Extensive efforts are being made to create a more competitive environment for electricity markets in order to promote greater efficiency. Thus, the power industry faces many new problems, with one of the highest priority issues being reliability, that is, bringing a steady, uninterruptible power supply to all electricity consumers. The restructuring and deregulation of electric utilities, together with recent progress in technology, introduce unprecedented challenges and opportunities for power systems research and open new opportunities to young power engineers.

References

1. Saadat H. 2004. Power system analysis. Ed Singapore. Mc Graw Hill.
2. Grainger J.J. dan Stevenson W.D.1994.Power system analysis. Ed Singapore.Mc Graw Hill. Stevenson, W.D. 1995. Element of power system analysis. 4th Ed. New York: McGraw Hill.
3. Gross, C.A. 1986. Power system analysis. 2nd Ed. Singapore : John Wiley & sons.
4. Glover, D.J. dan Sarma, M.S. 1996. Power system analysis & design. 2nd Ed. London: Power series in engineering.

KE37603 COMMUNICATION SYSTEMS

The course contains the principles of electronic communications. It starts with the introduction to communication systems, followed by signal representations in communications with brief review of signals and systems. The next part covers modulation techniques. It begins with advantages and classification of modulations, baseband and bandpass concept. After that, analog modulation theory of AM, FM, and PM are given, with their respective modulators and demodulators. Digital transmissions are presented afterwards, starting from the review of sampling followed by pulse modulation with variants of PAM and PCM, and digital modulations (ASK, FSK, PSK and QAM). The last part deals with other important topics in communications, i.e. error control coding, multiplexing and multiple-access, and link budget analysis.

References

1. Simon Haykin, Communication Systems, 5th ed., John Wiley, 2009 J. E. Pearson, Basic Communication Theory, Prentice Hall, 1993.
2. Bernard Sklar, Digital Communications: Fundamentals and Applications, 2nd ed., Prentice Hall, 2001.
3. A.B. Carlson and P. B. Crilly, Communication Systems: An Introduction to Signals and Noise in Electronic Communications, 5th ed., McGraw Hill, 2009.
4. Hwei P. Hsu, Schaum's Outlines of Analog and Digital Communication Systems, 2nd ed., McGraw Hill, 2002.
5. J. G. Proakis, M. Salehi, and G. Bauch, Contemporary Communication Systems Using MATLAB, 2nd ed., CL-Engineering, 2003.

KE37703 ENGINEERS IN SOCIETY

The course is a combination of two areas of studies: ethics and law. In this course,the subject of ethics will be taught at more depth and length, whilst the subject of law is taught at an "awareness and mindful" level. Further only laws that frequently impact the engineering profession will be taught. The course covers both business and engineering ethics.

References

1. Beuchamp, L. Tom; Bowie, E. Norman; Ethical theory in business, 7th Edition Pearson Education/Prentice hall, 2004. Jenning, M. Marianne, Business ethics, 4th edition, Thomson Learning, 2003.
2. Betty, F. Jeffry; Samuelson, S. Susan; Business law and the legal environment, Alt. edition,
3. Thomson Learning, 2002. Donaldson, Thomas;
4. Werhen, H. Patricia; Cording, Margaret; Ethical issues in business, 7th edition, 2002.
5. Hartman, P. Laura; perspectives in business ethics, 3rd Edition, McGraw Hill, 2005.
6. Charles B. Fleddermann; Engineering Ethics 4th Edition.

KE38101 ENGINEERING LAB 3 (Machines, Power System)

The students are exposed in basic practical experiments in Electric Machines and Power System Engineering in order to strengthen their theoretical knowledge. During the first 6 weeks of the semester the students will do experiments in the Electric Machine Lab and the remaining 6 weeks, in the Power System lab.

References

1. TERCO Lab manual for Electric Machines Lab.
2. TERCO Lab manual for Power system Lab.
3. Electric Machinery Fundamentals, S.J.Chapman, McGraw-Hill.
4. Power System Analysis, H.Saadat, International Edition.

KE38201 ENGINEERING LAB 4 (Communications & Instrumentation)

Engineering laboratory course introduces students to engineering problems and design solutions for common communication system. Experiment on instrumentation will be conducted to understand the operation and characteristics of different types of sensors

Rujukan

1. Bernard Sklar, Digital Communications: Fundamentals and Applications, 2nd ed., Prentice Hall, 2001.
2. Hwei P. Hsu, Schaum's Outlines of Analog and Digital Communication Systems, 2nd ed., McGraw Hill, 2002.
3. J. G. Proakis, M. Salehi, and G. Bauch, Contemporary Communication Systems Using MATLAB, 2nd ed., CL-Engineering, 2003.
4. J. P. Bentley, 2005, Principles of Measurement Systems, Fourth Edition, Pearson Prentice Hall, Malaysia. Doeblin E O. 1995. Measurement systems, applications and design, New york, McGraw Hill.
5. Usher M J .1994. Sensors and trasducers, London: Mcgraw Hill.

KE38303 ELECTRICAL AND ELETRONICS DESIGN

This will focus on the aspect of application and simulation in *Circuit Theory, Software Simulation, Hardware Application and Combining the software and hardware into system.*

References

1. Hughess, E. 2002. Electrical & Electronic technology. (8th Edition). Prentice Hall.
2. Hambley, A.R. 2002. Electrical Engineering: Principles & Applications. (2nd edition): Prentice Hall.
3. Carlson, A.B. 2000. Circuits: Engineering concepts & Analysis of Linear Electric Circuits Brooks/Cole: Thomson Learning.
4. Rudra Pratap, 2006, Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers, New York, OxfordUniversity Press.
5. Reis, Ronald A, Electronic project design and fabrication. Upper Saddle River, NJ. : Pearson, 2005.
6. Bond, W. T. F. Design project planning : a practical guide for beginners. London : Prentice Hall, 1996.
7. Cleland, David I. Project management : strategic design and implementation. New York : McGraw-Hill, 1994.
8. Smith, R.J & Dorf, R.C. 1992. Circuits, Devices and Systems. (5th edition). John Wiley & Sons, Inc.
9. L. O. Chua, C. A. Desoer, E. S. Kuh, 1987. Linear and Nonlinear Circuits – McGraw Hill.
10. R. E. Thomas, A, J. Rosa, 2004. The Analysis and Design of Linear Circuits – John Wiley and Sons.
11. R. A. DeCarlo, P. Lin, 2001, Linear Circuit Analysis – Oxford University Press.
12. A. M. Davis, 1998. Linear Circuit Analysis – PWS Publishing Company.

KE38403 DESIGN PROJECT

This is a semester-project course oriented towards the development of knowledge and skills to design electronic or electrical systems at a professional level. Proficiency gained in other software and hardware design courses will be utilized in the design and development of a prototype system. Project development will utilize a mix of system architecture design, custom hardware design and software programming skills. The project will result in a prototype which will be built in a lab setting. Industry standard practices of design reviews, final project presentations, and weekly reports will be followed. The design process will be studied. Through the project, class discussions, and interactions with classmates this course will allow student to enhance their effectiveness in future projects in industry or academia.

References

1. Reis, Ronald A, Electronic project design and fabrication. Upper Saddle River, NJ. :
2. Pearson, 2005. Bond, W. T. F. Design project planning : a practical guide for beginners. London : Prentice Hall, 1996.
3. Cleland, David I. Project management : strategic design and implementation. New York : McGraw-Hill, 1994.

KE30005 INDUSTRIAL TRAINING (LI)

Industrial Training is a required course for all the students in the Faculty of Engineering (FKJ). It is compulsory for students who have completed their 6th semester of study to undergo their industrial training. This industrial training is a full time attachment with the industry or any government body. It is 5-credit hour course for Engineering students and 12-credit hour course for Information Technology students. At the completion of their industrial training, students will be awarded a Pass/Fail grade.

KE39103 ENGINEERING SERVICES

This course is intended to expose the students with hands-on experience on CAD for building services requirements. The students will be exposed to basic 2D CAD and also theoretical aspects that need to be included in the design. The students will also attend lectures by invited architects, quantity surveyors, C&S consultants, M&E consultants and contractors. This exposure will allow them to have a basic understanding of the building services, areas and peoples who are involved in it. The CAD design will include Lighting, Power Socket and ELV (telephone, CCTV, PA system). Students will also be exposed to design regulations and requirements. Students will be exposed to real life design projects as Problem Based Learning (PBL) with UMS or with local M&E consultancy companies.

References

1. Wohlers, Terry T., 1998. Applying AutoCAD: A step-by-step approach for AutoCAD Release 14, New York : Glencoe/McGraw-Hill.
2. Yarwood, A., 1999, AutoCAD Release 14: A Concise Guide, Harlow Essex : Longman
3. http://www.autocadcentral.com/Tutorials/tutorials_index.htm
4. Garis Panduan Pendawaian Elektrik (Suruhanjaya Tenaga)
5. Ray C. Mullin, Electrical Wiring (Residential), 16th Edition, DELMAR CENGAGE learning

KE39203 INDUSTRIAL AUTOMATION

This course is one of the elective courses for an electrical and electronic engineering student who is specializing in Control & Automation. It covers the area of fundamentals of manufacturing and automation which includes the production operations and automation strategies. High volume production system is also introduced which emphasized on automated assembly system. Industrial robotics is also covered in the aspects of robot technology, robot programming and robot applications. Another area covered in this course is the material handling and storage which will expose the students on the aspects of automated materials handling and automated storage systems. The students will also learn the group technology and flexible manufacturing systems encompassing the group technology and flexible manufacturing systems. In the aspect of control system, programmable logic controllers are taught and practical laboratory experiences are provided. This course also cover the area of computer integrated manufacturing. This course will also expose students to the industrial environment in their case study visit to the industry. Students are also introduced to the Automation Studio software through experiments to familiarize them with the control drawings, symbols and standards.

References

1. M. P. Groover, 1992. *Automation, Production Systems and Computer Integrated Systems*, Prentice Hall
2. Frank D. Petruzella, 2005. *Programming Logic Controllers*, McGraw Hill
3. John W. Webb & Ronald A. Reis *Programmable logic Controllers: principles and applications*. Prentice Hall
4. James A. Rehg & Henry W. Kraebber, 2004. *Computer-integrated Manufacturing.* Prentice Hall
5. Saeed B. Niku 2001. *Introduction to Robotics: Analysis, Systems, Applications,* Prentice Hall

KE47103 DIGITAL SIGNAL PROCESSING

This course addresses the mathematics, implementation, design and application of the digital signal processing algorithms widely used in areas such as multimedia telecommunications and speech and image processing. Topics include discrete-time signals and systems, discrete-time Fourier transforms and Z-transforms, discrete Fourier transforms and fast Fourier transforms, digital filter design and implementation, and multi-rate signal processing. Classroom lectures are supplemented with implementation exercises using MATLAB.

References

1. John G. Proakis, Dimitris G. Manolakis, 2006. *Digital Signal Processing* - Prentice Hall.
2. Chi-Tsong Chen, 2000. Digital Signal Processing – Oxford University Press.
3. Emmanuel Ifeachor, Barrie Jervis, 2001. *Digital Signal Processing: A Practical Approach* – Prentice. Hall
4. Sanjit K. Mitra, 2005. *Digital Signal Processing* - McGraw-Hill.
5. Alan V. Oppenheim, Ronald W. Schafer, 2009. Discrete-Time Signal Processing – Prentice. Hall
6. Boaz Porat, 1996. A Course in *Digital Signal Processing* – Wiley.

KE47203 ELECTRICAL ENERGY UTILIZATION

This course introduces the fundamentals in electric energy systems which will enable a student to understand current issues and challenges in electric power systems and what it takes to have a reliable electric power supply at your house. The topics will include electric power plants (renewable and non-renewable); transmission and distribution; and utilization. Maintaining the balance between generation and consumption is important to avoid catastrophic blackout events. Hence, the notion of stability and available control concepts will be introduced.

References

1. Pieter Schavemaker, Lou van der Sluis, 2008. *Electrical Power System Essentials* - Wiley Stephen. Chapman, 2001. *Electric Machinery and Power System Fundamentals* – McGraw-Hill.
2. Frank Delea, Jack Casazza, 2010. *Understanding Electric Power Systems: An Overview of the Technology, the Marketplace, and Government Regulation* – Wiley-IEEE Press.
3. John Grainger, Jr., William Stevenson, 1994. *Power System Analysis* – McGraw-Hill.
4. Gilbert M. Masters, 2004. *Renewable and Efficient Electric Power Systems* – Wiley-IEEE Press.
5. Alexandra von Meier, 2006. *Electric Power Systems: A Conceptual Introduction* – Wiley-IEEE Press

KE47303 POWER ELECTRONICS AND DRIVES

This course introduces to students the various power semiconductor devices such as diodes, thyristors, triacs, GTO, BJT, MOSFET, IGBT and SIT, and their properties. The protection circuits, series and parallel connections and associated problems and solutions are also described. The principle of various converters such as Diode rectifiers, Thyristor converters, DC-DC choppers, DC voltage regulators (buck, boost, buck-boost and Cuk), AC Voltage regulator, Cyclo-converters, DC_AC Inverters and their analysis and design are dealt with in detail. Introduction to both DC and AC motor speed control and gate-drive circuits are also discussed.

References

1. Power Electronics (Third Edition), M.H. RASHID, Prentice hall, 2004.
2. Power Electronics (Third Edition), C.W. LANDER, McGraw-Hill.
3. Elements of Power Electronics, P.T. KREIN, Oxford University Press.
4. Power Electronics, (Third Edition), N MOHAN, John Wiley & Sons.

KE47403 MANAGEMENT AND FINANCE FOR ENGINEERS

This course aims to teach students on how to apply the project management skills and economic techniques in evaluating the design and engineering alternatives. The role of engineering economics is to assess the appropriateness of a given project, estimate its value, and justify it from an engineering standpoint. At the end of the course, students will be able to identify and discuss issues and challenges faced by engineers relating to engineering management in the current economic scenarios.

References

1. Stanley E. P., Samuel J. M., Jack R.M, Scot M.S, Margaret M. Sutton; (2008); ***Project Management : Planning, Scheduling, and Controlling Projects,*** John Wiley & Sons Inc. USA
2. Leland Blank, Anthony Tarquin; ***Engineering Economy 7th Edition***, McGraw Hill International Edition
3. Park Chan, ***Fundamentals Engineering Economics***, 2nd Edition., Prentice-Hall. (2008)

KE47503 HIGH VOLTAGE ENGINEERING

The demand for the generation and transmission of bulk amount of electric power today, necessitates in transmission at extra-high voltages. At this juncture, a student of electrical engineering is expected to possess adequate knowledge of high voltage techniques and should have sufficient background in high voltage engineering. This course exposes the students to the generation, the measurement and testing of high voltages and currents, the concepts of ionization, conduction and breakdown in vacuum, gases, solids and liquids – in the context of the insulation requirements of power system. An introduction to the philosophy and practice of diagnostic testing, life assessments, reliability estimation and co-ordination of electrical insulation is also included.

References

1. High Voltage Engineering, MS Naidu and V Kamaraju, McGraw-Hill-2004 (third edition). High Voltage Engineering: Theory and Practice, Khalifa, M.Dekker Inc, 1990.
2. High Voltage Test Techniques Kind, Dieter, Butterworth-Heinemann.
3. High Voltage Engineering Fundamentals, Kuffel, E., Butterworth, Heinemann (Sd). High-Voltage Engineering, Second Edition, .Abdel-Salam, Mazen Marcel Dekker.

KE48101 ENGINEERING LAB 6 (Power Electronics, High Voltage)

The students are exposed in basic practical experiments in Power Electronics and High Voltage Engineering in order to strengthen their theoretical knowledge. During the first 7 weeks of the semester the students will do experiments in the Power Electronics lab and the remaining 7 weeks, in the High Voltage lab.

References

1. High Voltage Lab Manual, FKJ, UMS. TERCO Lab manual for HV lab. TERCO Lab manual for PE lab.
2. Power Electronics lab Manual, SKTM, UMS

KE40002 FINAL YEAR PROJECT I

Project design for integration of student's knowledge obtained through courses in the program. Emphasis is given towards creativity, analytical thinking, group work as well as ability to produce useful products by using theory learned from courses. Students will be required to complete project report as well as give a presentation on the project. At the end of Project I, students are required to complete and present their project progress report for their understanding assessment and also to evaluate the capability of the students to proceed their projects to Project II.

References

Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2008.

KE40004 FINAL YEAR PROJECT II

Project design for integration of student's knowledge obtained through courses in the program. Emphasis is given towards creativity, analytical thinking, group work as well as ability to produce useful products by using theory learned from courses. Students will be required to complete project report as well as give a presentation on the project. At the end of Project II, students are required to complete and present their final report/thesis or output and results as well as their project analysis.

References

Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2008.

KE49113 DIGITAL COMMUNICATION

This Course discusses the basic elements of digital communication systems. Main topics to be covered digitally modulated signals and their spectral characteristics, PCM, DPCM, Delta modulation, the baseband and baseband modulation, demodulation, coherent/non coherent detection methods in AWGN channel, their error performance, comparison of modulation techniques, introduction to source coding, channel coding, spread-spectrum and multiple access techniques.

References:

1. *Digital Communications - John G. Proakis . Masoud salehi – 5th Edition, McGraw- Hill, 2008.*
2. *Digital and Analog Communicator Systems - Sam Shanmugam, John Wiley, 2005*
3. *Principles of communication systems - Herbert Taub. Donald L Schiling, Goutam Sana, 3rd Edition,McGraw-Hill, 2008.*
4. *Digital Communication - Simon Haykin, Jon Wiley, 2005.*
5. *B. Sklar, "Digital Communication Fundamentals and Applications", 2 nd Edition, Pearson Education,2009*
6. *J.G Proakis, "Digital Communication", 4 th Edition, Tata Mc Graw Hill Company, 2001*

KE49123 WIRELESS COMMUNICATION

This course covers the fundamentals aspects of existing wireless communications such as 3G, 4G, WLAN / Wifi, LTE, WiMax, etc. It focuses on design and analysis of radio communication. The course contains, wireless communication and diversity, wireless channel modelling, Code Division Multiple Access (CDMA), Multiple Input Multiple Output (MIMO) antenna based wireless communication systems and Orthogonal Frequency Division Multiplexing (OFDM).

References:

1. Mobile Wireless Communications. Mischa Schwartz. Paperback (2013) Cambridge University Press.
2. Goldsmith, A. 2005. *Wireless Communications*. Cambridge University Press
3. Molisch, A.F. 2011. *Wireless Communications*. John Wiley
4. Du, K.L. and Swamy, M.N.S. 2010. Wireless Communication Systems. Cambridge University Press

KE49133 ANTENNAS AND APPLICATIONS

Antenna acts as RF / microwave system`s energy sensing purpose. Review of frequency domain electromagnetic wave dynamics, radiation, or RF energy liberates as well as receives by antenna as its universal characteristics will be discussed. Various types of commonly used wire and aperture antenna, and antenna array techniques, polarization, cross polarization and other aspects of antenna design and orientations will be addressed. Radio wave (RW) propagation characteristics, impedance of free space, different types of RW characteristic antennas, its virtual height, and reusable frequency for different sort of communication will be addressed. Current topics such as adaptive and smart antennas will be introduced for assessment and use of it from traditional antenna system. Nano- antenna and biological application of it will be deliberated in this course.

References:

1. Vincent F. Fusco, 2005, *Foundations of Antenna Theory and Techniques*, Pearson / Prentice Hall.
2. Constantine, A. Balanis, 2010, *Antenna theory, Analysis and design*, John Wiley and Sons.
3. Simon R. Saunders, 2011, *Antennas and Propagation for Wireless communication* Systems, John Wiley and Sons.
4. *Antennas for All Applications – John D. Kraus and R. J. Marhefka, and Ahmad S. Khan TMH, New Delhi, 4th ed., (Special Indian Edition) 2010.*
5. Constantine A. Balanis, 2005, *Antenna Theory: Analysis and Design*, John Wiley & Sons, New Jersey.
6. Fawwaz T. Ulaby, Fundamentals of Applied Electromagnetics, 6/e , Pearson ; International Edition.
7. William H. Hayt, Jr, John A. Buck, 2001, Engineering Electromagnetics, 6/e, McGrawHill International.

KE49143 SETALLITE COMMUNICATION

The course will cover every aspects of satellite communication like orbital mechanics, launching techniques, satellite link design, earth station technology and different access system towards a satellite. Different applications of satellite communication will be discussed at the end.

References:

1. Denis Rodd y"Satellite Communication" 4th Edition, Mc Graw Hill International, 2006.
2. Timothy Pratt, Charles Bostian and Jeremy Allnutt "Satellite Communications", 2nd Edition, John Wiley & Sons, 2003.
3. W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, "Satellite Communication Systems Engineering", 2nd Ed., Pearson Education., 2007.

KE49213 ROBOTICS

his course is one of the elective courses for an electrical and electronic engineering student who is specializing in Control & Automation. The course serves as a foundation course to teach the mathematics, design, analysis, and control of robotic systems. The course will expose students to experience to design software solutions for planning and controlling of robotic paths. Robotic programming software will also be introduced as a tool to control real-life robots which includes the Flexible Manufacturing System.

References

1. Saeed B. Niku, Introduction to Robotics: Analysis, Systems, Applications, Prentice Hall, 2001.
2. K. S. Fu et al, 1987. Robotics: Control, Sensing, Vision and Intelligence, International Edition 1987, McGraw-Hill Inc. John J. Craig, 2005. Introduction to Robotics – Mechanics & Control, 3rd Edition, Pearson, Prentice Hall.
3. Schilling R J, 1990. Fundamentals of Robotics - Analysis & Control, Prentice Hall. Keramas J. G. 1998. Robot Technology Fundamentals, Delmar Publishers.

KE49223 DIGITAL CONTROL SYSTEMS AND SCADA

This course will introduce basic concepts of digital control systems within the constraints of linear time invariant systems. Students are first introduced to terminologies and system modeling in the digital domain. The z-transform is reviewed to show the transformation of analog transfer function to the digital equivalent for the purpose of analysis and design. The relationship of digital and analog domains will be discussed with reference to classical analysis and controller design. State space design of digital controllers is also included.

References

1. Gene F. Franklin, J David Powell and Michael Workman 1998. Digital Control of Dynamic Systems, Addison-Wesley 3rd Edition.
2. Norman S. Nise 2008. Control Systems Engineering, 5th Edition. Wiley.
3. J. H. McClellan, R. W. Schafer and M. A. Yoder 2003. Signal Processing First, Pearson Prentice Hall.

KE49233 STATE SPACE ANALYSIS AND CONTROL

This is an advanced course for electrical and electronics engineering program. It provides students with knowledge concerning state space modeling in addition to related methods of analysis. Relationship of state space modeling and analysis to classical control systems theories will also be included in the discussion. The concepts of controllability and observability in addition to the design of state space based controllers are also introduced in this course.

References

1. Norman S. Nise 2008. Control Systems Engineering, 5th Edition.
2. Wiley. K. Ogata 1997. Modern Control Engineering, Prentice Hall.
3. K. Dutton, S. Thompson and B. Barraclough 1997. The Art of Control Engineering, 1st Edition. Addison Wesley

KE49243 MACHINE INTELLIGENCE

This course introduces techniques applied for vision-based applications. The techniques include image processing fundamental techniques as well as 3D imaging techniques. The techniques are implemented for the purpose of practical implementation in the industrial environment or for applications to machines such as automated welding robots, automated faulty IC chip detection and hand gesture recognition system. Programming language such as MATLAB or C++ will be introduced to facilitate the practical solutions of the vision-based problems.

References

1. R. Jain, R. Kasturi and B. G. Schunck, 1995. Machine Vision, McGraw-Hill, Inc.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, 1999. Image Processing, Analysis, and Machine Vision, Second Edition, PWS Publishing.
3. J.R. Parker, 1997. Algorithms for image processing and computer vision. USA: Wiley Computer Publishing.
4. L.G. Shapiro and G.C. Stockman, 2001. Computer Vision, USA: Prentice Hall Inc.
5. Horn, Berthold K. P. Robot Vision. Cambridge, MA: MIT Press /McGraw-Hill, March 1986.
6. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 2nd Edition, Prentice Hall, 2001

KE49313 INDUSTRIAL DRIVES

This course introduces to the students the fundamentals of electric drives including the block diagram of electric drives , parts of electric drives , dynamics of electric drives , torque equations , speed torque conventions, loads with rotational motion, components of load torque, drive modeling and closed loop control. Dc motor drives under constant torque and constant power control, fed from single phase controlled rectifiers under various modes of operation and closed-loop control schemes are discussed in detail. Three phase induction motor drives under AC voltage control, variable frequency control , VSI and CSI control are described. Slip-power recovery scheme , rotor frequency control and Space vector modulation technique and vector control are also presented.

References

1. Bose B.K ,2001, Modern Power Electronics and AC Drives, Prentice Hall
2. PTR. Krishnan R, 2001, Electric Motor Drives: Modeling, Analysis and Control, Prentice Hall.
3. Rashid MH,2004, Power Electronics: Circuits, Devices and Aplications, Prentice Hall. Sen P.C, Thyristor DC Drives, John Wiley.
4. Pillai S.K, *Analysis of Thyristor Power Conditioned Motor,* University Press.

KE49323 POWER SYSTEM STABILITY AND PROTECTION

This course gives more advanced topics on power flow problem formulation and transient stability of power system. Steady-state and transient power of generators connected to infinite bus are discussed in detail. Power system control and protection schemes as well as high voltage DC power transmission systems are also discussed. Fault clearing angle and relay time setting are investigated. Application of software packages such as ETAP, Power World, PSAT and MATLAB for power flow is introduced

References

1. *Power System Analysis and Design*, by J. Duncan Glover, M.S. Sarma and T.J. Overbye, Thomson, Fourth Edition ISBN 0071343237, John Willey & sons, London, 1996
2. *Power System Analysis*, by Hadi Saadat, Mc. Graw Hill, Singapore 2004
3. *Electric Power Systems* by B.M. Weedy, John Wiley & Sons, IEEE 2006
4. *HVDC Power Transmission System Technology and System Interaction*, by Padiyar K. R., New age international publishers 2088, ISBN 13-978-81-224-0102-8

KE49333 ELECTRICAL MACHINE DESIGN

This course describes the design principles of electric machines and transformers. The topic covered under the design of machines are output equation - main dimensions - choice of specific electric and magnetic loadings - choice of speed and number of poles - design of armature conductors, slots and winding - design of air-gap, field system and damper winding - prediction of open circuit characteristics of DC machines, alternators and induction motors. The students are also exposed to the design principles of single-phase and three-phase transformers covering output equation - main dimensions - choice of specific electric and magnetic loadings- design of core, LV winding, HV winding, tank and cooling tubes - prediction of no load current, forces on winding during short circuit, leakage reactance and equivalent circuit based on design data - design examples - continuous and intermittent rating

References

1. Clayton & Hancock, *Performance and Design of DC Machines.*
2. ELBS. Sawhney, Electrical Machine Design, Dhanpath Rai.
3. Say M.G., *Performance and Design of AC Machines,* Pitman, ELBS.
4. Cathey, Jimmie J, Electric Machines: analysis and design applying Matlab, McGraw-Hill, 2001. Boldea, I, Electric machines: steady state, transients, and design with MATLAB, Taylor & Francis, 2009

KE49343 SUBSTATION ENGINEERING

This course, to introduce aspects of the fundamentals and considerations of substation design, configuration and design of busbar and safety requirement. This course describe the functions of various substation main equipments, substation auxiliary included protection design against internal and external fault. The students also learn how to measure soil resistivity and resistance grounding, substation grounding design, furthermore calculation of the ground grid substation. Latter in this course, students will learn and practice how to test and to do maintenance of the substation equipment parts.

References

1. John MC Donald. (2007). Electrical Power Substations Engineering. 2nd Ed. CRC Press.
2. Rao, S. (2003). Electrical Substation Engineering & Practice. Khana Publishers, New Delhi.
3. Colin Bayliss. (2002). Transmission and Distribution electrical engineering. Newness, Great Britain.
4. Garzon Ruben D. (2002). High Voltage Circuit Breaker. Marcel Decker Inc, USA.
5. H. Lee Willis. (2000). Power Distribution Planing. Dekker/CRC Press.

KE49413 NANOELECTRONICS

The purpose of this course is to introduce and give an update of the current state of the art in the field of nanoelectronics. Nanoelectronics will be the main research area of electronics, at least in the near future. Nanoelectronics is the successor of today's microelectronics, which has produced an unprecedented revolution in communication and computing during the last 20 years. The recent evolution of nanotechnology may provide opportunities for novel devices such as single-electron devices, carbon nanotubes, Si nanowires, and new materials. Among various candidate materials for nanometer scale devices, silicon nanodevices are particularly promising because of the existing silicon process infrastructure in semiconductor industries, the compatibility to CMOS circuits, and nearly perfect interface between the natural oxide and silicon.

References

1. Oda Shunri & Ferry David, 2006, Silicon Nanoelectronics, Taylor & Francis Group.
2. N.H.E Weste & K. Eshraghian. 1994. *Principles of CMOS VLSI Design - A Systems Perspective.* (Second Edition). Addison-Wesley Publishing Company.
3. Rabaey JM, A. Chandrakasan & B. Nikolic. 2003. *Digital Integrated Circuits- A Design Perspective* (Second Edition), Prentice Hall.
4. C.G.Sodini & R.T Howe, 1997. *Microelectronics - An Integrated Approach*. International Edition. Prentice Hall.
5. Rudra Pratap, 2006, G*etting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers,* New York, Oxford University Press.
6. Ben G. Streetman & Sanjay Kumar Banerjee, 2006. *Solid State Electronic Devices*, Pearson, N. J.

KE49423 VLSI TECHNOLOGY

This course requires the knowledge of semiconductor material physics properties and its chemical reactions in making a device. The following topics are covered: Crystal structure, crystal growth, epitaxial techniques, CVD, oxidation, diffusion, ion implantation, photolithography, transistor fabrication process of MOS, BJT and others. Backend technologies. CAD tool will be used to simulate the fabrication process.

References

1. Richard C. Jaeger, I*ntroduction to Microelectronic Fabrication: Volume 5 of Modular Series on Solid State Devices* (2nd Edition), 2001. Prentice Hall.
2. Stephen A. Campbell, 2001, *The Science and Engineering of Microelectronic Fabrication.* Oxford University Press. Gary S. May & Simon M. Sze, 2004, *Fundamentals of Semiconductor Fabrication,* USA, Wiley International Edition.
3. S.M. Sze, 1981, *Physics of Semiconductor Devices,* 2nd Edition, Wiley Inter-Science.
4. Rudra Pratap, 2006, *Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers*, New York, Oxford University Press.
5. Betty L. Anderson & Richard L. Anderson, 2005, *Fundamentals of Semiconductor Devices,* McGraw Hill International Edition.

KE49433 PHOTONICS AND OPTICAL SYSTEMS

Photonics engineering course reviews electromagnetic field theory, addressing essential concepts from geometrical and wave optics followed by an investigation of the interaction of photons with materials. Building upon these fundamental principles, the students then study the operating principles and design considerations of photo emitters, photo detectors, optical waveguides, and optical modulators, amplifier and optical IC.

References

1. Bahaa E.A. Saleh, Malvin Carl Teich, *Fundamentals of Photonics,* Wiley-Interscience (1991).
2. Clifford Pollock, Michal Lipson, *Integrated Photonics,* Kluwer Academic Publishers, 2003.
3. Harry J. R. Dutton, *Understanding Optical Communications*, Prentice Hall Series in Networking. 1998.
4. Fawwalz T. Ulaby, *Fundamentals of Applied Electromagnetics*, Prentice Hall, 2001.
5. Eugene Hecht, *Optics,* Addison Wesly, 4th edition, 2002.
6. Stamatios V. Kartalopoulos, *DWDM, Networks, Devices and Technology,* IEEE press and Wiley Interscience, 2003

KE49443 DITIGAL IC SYSTEM DESIGN

This course elaborate and expand the knowledge of logic design into system design using EDA tools known as Verilog Hardware Description Language (HDL). This course requires the knowledge of combinational and sequential logic design as a starting platform to design any digital system.

References

1. Rabaey M.J, Chandrakasan A, Nikolic B. 2003. *Digital Integrated Circuits – A Design Perpective*, 2nd Edition.
2. N.H.E Weste & K. Eshraghian. 1994. *Principles of CMOS VLSI Design - A Systems Perspective.* (Second Edition). Addison-Wesley Publishing Company.
3. C.G.Sodini & R.T Howe, 1997. *Microelectronics - An Integrated Approach.* International Edition. Prentice Hall.
4. Rudra Pratap, 2006, *Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers,* New York, Oxford University Press.
5. Ben G. Streetman & Sanjay Kumar Banerjee, 2006. *Solid State Electronic Devices,* Pearson, N. J.
6. M. Zwolinski, 2000. *Digital System Design with VHDL* - Prentice Hall.

KE49513 IMAGE PROCESSING

This course gives an overview of image processing techniques with an emphasis in real world applications. The techniques covered highlight industrial applications as well as specifically for information technology application. The application of computing language, MATLAB, will be introduced to implement the techniques discussed and thus, applying the implemented techniques to solve problems for real world applications use.

References

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 2nd Edition, Prentice Hall, 2001.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, 1999. Image Processing, Analysis, and Machine Vision, Second Edition, PWS Publishing.
3. J.R. Parker, 1997. Algorithms for image processing and computer vision. USA: Wiley Computer Publishing. R. Jain, R. Kasturi and B. G. Schunck, 1995. Machine Vision, McGraw-Hill, Inc.
4. L.G. Shapiro and G.C. Stockman, 2001. Computer Vision, USA: Prentice Hall Inc.
5. A.K. Jain, 1989. Fundamentals of Digital Image Processing, USA: Prentice Hall Inc.

KE49533 VIDEO CODING AND TRANSMISSION

This course explores the ideas behind modern-day image- and video-coding systems, considering compression and coding techniques employed for still images as well as motion video. Compression fundamentals are covered, and a variety of standards for image- and video-coding are examined in detail. The student will learn to design image- and video-compression systems, read and digest appropriate literature in the field of compression, and evaluate compression systems according to their performance, robustness, and computational complexity.

Refrences:

1. Yao Wang, Jorn Ostermann, Ya-Qin Zhang, 'Video Processing and Communications', Prentice Hall, 2002
2. Alan C. Bovik, 'The Essential Guide to Video Processing', Elsevier Science, edition 2, 2009
3. Sun, Huifang, Tihao Chiang, and Xuemin Chen. Digital video transcoding for transmission and storage. CRC press, 2004.
4. Ohm, Jens-Rainer. Multimedia signal coding and transmission. Springer, 2015.
5. Chakrabarti, Indrajit, Batta, Kota Naga Srinivasarao, Chatterjee, Sumit Kumar, 'Motion Estimation for Video Coding' springer 2015.
6. Fan Zhai 'Joint Source-Channel Video Transmission' Morgan & Claypool Publishers, 2006

KE49543 ADVANCE DIGITAL SIGNAL PROCESSING

This course will examine a number of advanced topics and applications in one-dimensional digital signal processing, with emphasis on adaptive signal processing techniques. Topics will include discrete-time random signals, spectrum estimation, linear estimation and prediction, adaptive filters and wavelet transform.

References

1. Simon Haykin, 2001. Adaptive Filter Theory – Prentice Hall.
2. Emmanuel Ifeachor, Barrie Jervis, 2001. *Digital Signal Processing:* A Practical Approach – Prentice Hall.
3. Steven M. Kay, 1993. *Fundamentals of Statistical Signal Processing, Volume I: Estimation Theory (v. 1)* – Prentice Hall Steven.
4. M. Kay, 1998. *Fundamentals of Statistical Signal Processing, Volume 2: Detection Theory (v. 2)* – Prentice Hall Dimitris Manolakis.
5. Vinay K. Ingle, Stephen M. Kogon, 2005. Statistical and Adaptive Signal Processing: Spectral Estimation, *Signal Modeling, Adaptive Filtering and Array Processing* – Artech House Publishers.
6. Truong Nguyen Gilbert Strang, 1996. Wavelets and Filter Banks –Wellesley College.

KE49613 ALTERNATIVE ENERGY SOURCES

This course provides an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternate energy sources and their technology and application. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro. Energy conservation methods will be emphasized.

References :

1. Godfrey Boyle, 2004, *Renewable Energy*, 2nd edition, Oxford University Press.
2. Bent Sorensen, Bent Srensen, 2004, *Renewable Energy : 3rd Edition*, Academic Press.
3. Marcelo Godoy Simoes, Felix A. Farret, 2004, *Renewable Energy Systems: Design and Analysis with Induction Generators*, CRC Press.
4. Godfrey Boyle, Bob Evereet, Janet Ramage 2003, *Energy Systems and Sustainability*, Oxford University Press.

KE49643 ADVANCE ENERGY MATERIAL

Green energy technology as a new paradigm in energy technology is important for advancement of modern energy based society. The aim of the course is to develop understanding about low-carbon sources and experience about the advance materials and systems for solar photovoltaic (SPV) technology. Basic principles of for non-heating, energy efficient materials and devices knowledge for solid state lighting and green energy engineering leading to understanding of advance semiconductor based photo emitters, SPV system or devices and other energy materials for electromagnetic system applications will be addressed. Solar energy concentrators and illumination optics are supportive technologies for green energy engineering will be deliberated in this passage. The properties of nanostructured oxide materials, metallic-dielectric materials or dielectrics, including engineered anti-reflection coatings and passivators for efficient, economical green energy technology based on research experience will be taught in this course

References:

1. Honsberg, C., and S. Bowden. *Photovoltaics: Devices, Systems and Applications CD-ROM*
2. Gilbert M. Masters, Renewable and Efficient Electric Power Systems, 2nd Edition, Wiley, ISBN 978-1-118-14062-8
3. R.F. Pierret Semiconductor Device Fundamental test books, 2013, -Nono-hub(online) edited the Addison-Wesley
4. Materials Science and Engineering-An integrated approach—2007, by W.D.Callister Jr.
5. Schubert, E. Fred, Light-emitting diodes. Cambridge Univ. Press, 2003.
6. Nelson, J. *The Physics of Solar Cells*. Imperial College Press, 2003. ISBN: 9781860943409.
7. Nalwa Hari Singh, Handbook of luminescence, display materials, and devices, American Scientific Publishers, Vol I, II and III 2003
8. Applied photovoltaics, S.R. Wenham, 2007
9. Optoelectronics-IR-V-VU-Devices and applications-D. Birtalan & W. Nunley, 2007, Oxford University Press

CHEMICAL ENGINEERING PROGRAMME (HK03)

KC04403 CALCULUS

The purpose of this course is to equip students and understanding, appreciation, and application of calculus as well as introduction to solving a variety of engineering problems using calculus.

References

Thomas G. B., Weir, M.D. and Hass, J. (2016). Thomas' Calculus. 13th Edition. Pearson Higher Ed. USA.
Weir, M.D., Hass, J., and Giordano, F. R. (2008). Thomas' Calculus. 11th Edition. Pearson Addison Wesley.
Boston. Kreyszig, E. (2006). Advanced Engineering Mathematics. Wiley. Singapore.
Vraberg, D., Purcesll, E.J., and Rigdon, S.E. (2007). Calculus. Pearson Prentice Hall. New Jersey.

KC05503 MULTIVARIABLE CALCULUS

The intent of this course is to provide an in-depth appreciation of advance differential and integral applications involving complex algebraic and trigonometric phenomena. Application of dot and cross products in vector value function, TNB frame, vector analysis in projectile motion and polar curves, and multiple integral in calculating area, volume and vector fields are among the major topics in this course.

References

M.D. Weir, J. Hass, and F.R. Giordano. 2005. Thomas' Calculus, 11th Edition. Addison Wesley. [ISBN-0-321-18558-7]. Strauss, Monty J., Bradley, Gerald L., Smith, Karl J. 2002. Calculus, 3rd Edition. Prentice Hall: USA. [ISBN: 0-13-095005-X]. Stewart, James. 2003. Calculus, 5th Ed. Thomson Learning: USA. [ISBN: 0-534-39339-X].

KC06603 ENGINEERING PROBLEM SOLVING AND PROGRAMMING

This course introduces the concept of computer programming based on FORTRAN language and MATLAB. The programing practice will include application on menu development, solving numerical analysis, statistics and matrices. Syllabus will be divided into two parts for FORTRAN programming and MATLAB programming, Salford FORTRAN compiler and MATLAB package will be used for assisting the programming practice.

References

William E. Mayo and Martin Cwiakala, (n.d.). Programming with Fortran 77. McGraw-Hill.
Michael Metcalf, John Reid, Malcolm Cohen. (2011) Modern Fortran explained. Oxford University Press. 4. ISBN: 0199601429
Stephen J. Chapman (2004) Fortran 90/95 for Scientists and Engineers, International edition, 2nd ed. McGraw-Hill. ISBN 007-123233-8
Gene Zirkel and Eli Berlinger (1994) Understanding Fortran 77 & 90. International Thomson Publishing. ISBN 0-534-93447-1
Loren P. Meissner (1995) Fortran 90 PWS Publishing Co, ISBN 0-534-93372-6

KC08803 ETHICS AND LAW FOR ENGINEERS

The course is a combination of two areas of studies, ethics and law. However ethics subject will be taught at more depth and length whilst the subject of law at "awareness and mindful" levels. Further only laws frequently impacted by the engineering profession will be taught. The course covers both business and engineering ethics.

References

Beuchamp, L. Tom; Bowie, E. Norman; Ethical theory in business, 7th Edition Pearson Education/Prentice hall, 2004. Jenning, M. Marianne, Business ethics, 4th edition, Thomson Learning, 2003.
Betty, F. Jeffry; Samuelson, S. Susan; Business law and the legal environment, Alt. edition, Thomson Learning, 2002. Donaldson, Thomas; Werhen, H. Patricia; Cording, Margaret; Ethical issues in business, 7th edition, 2002.
Hartman, P. Laura; perspectives in business ethics, 3rd Edition, McGraw Hill, 2005.

KC09903 MANAGEMENT AND ACCOUNTING FOR ENGINEERS

This course is a prerequisite for the completion of the degree Kejuruteraan Universiti Malaysia Sabah. It touches on manufacturing management aspects from the management accounting perspective. An engineer needs to understand different approaches in planning, organisation, control and performance measurement as support in the process of product manufacturing and the provision of services. This course will also take a general approach in introducing the function of financial statements, taxation and audit, as well as financial information analysis and its relevance to the engineering discipline and professional environment. Emphasis is given to cost management techniques, decision-making techniques and the provision of engineering information in a financial format as a form of management support.

References

Horngren, C.T., Sundem, G.L. and Stratton, W.O. (2005). Introduction to Management Accounting (13th ed.). Pearson Prentice Hall:New Jersey.
Lucey, T. (2002). Costing. (6th ed.) DP Publications Ltd.
Atkinson, A.A, Kaplan, R.S. and Young, S.M. (2004). Management Accounting. (4th ed.). Pearson Prentice-Hall: New Jersey. Garrison, R.H., Noreen, E.W. and Brewer, P.C. (2006). Managerial Accounting (11th ed.) McGraw-Hill.
Various journal articles to be provided from time to time.

KC12101 PHYSICAL CHEMISTRY LAB

This laboratory course is the first in a sequence of two-laboratory courses on experimental aspects of chemistry. The experimental work includes projects dealing with acid-base titration, gravimetric analysis and kinetic chemistry. In addition to techniques, safety, written and oral communication skills, and effective teamwork are emphasized.

References

Textbook and reference books used for KC12302 (Physical Chemistry)

KC12201 ORGANIC AND ANALYTICAL CHEMISTRY LAB

This course is the second in a sequence of two-laboratory courses on experimental aspects of chemistry. The experimental work includes projects dealing with alkaline hydrolysis, polymerisation, solvent extraction and steam distillation. In addition to techniques, safety, written, and oral communication skills, and effective teamwork are emphasized.

References

Laboratory Manual for KC12201
Smith, G. S. (2008) *Organic Chemistry,* 2nd Edition, Mc Graw Hill. Wade, L. G. (2006) *Organic Chemistry,* 6th Edition, Prentice Hall. Carey, F. A (2008) *Organic Chemistry,* 7th Edition, Mc Graw Hill. Bruice, P. Y (2007) *Organic Chemistry,* 5th Edition, Prentice Hall
McMurrey. J, Simanek. E, (2007) Fundamental of Organic Chemistry, Thomson Books.

KC12302 PHYSICAL CHEMISTRY

To provide students with the basic knowledge of gases, kinetics theory of gases, molecular collisions, transport phenomena of gases, chemical kinetics and chemical thermodynamics of zero and first law as well as the basic concept of reaction kinetics. This course also provide the student with basic principle element, compound and mixture, ionic bonding, properties of element in periodic table and the relationship between the mol, mass and Avogadro's number and use them in solving stoichiometric problems. Further, it also provides the knowledge of complex formation. This course also deals with physical and inorganic chemistry related to development of new materials or products. Typical usage of this physical and inorganic chemistry knowledge is on colloid materials, pollutions process and control, electrochemistry and Green chemistry.

References

Wade, L. G. 5th Edition. *Shreve's Chemical Process Industries.* McGraw-Hill, New York. Wynne, M. D. 1970. *Chemical Processing in Industry.* Royal Institute of Chemistry, London. Heaton, A. 1994. *The Chemical Industry.* Blackie Academic & Professional, London.
Lee, B. I. and Pope, E. J. A. 1994. *Chemical Processing of Ceramics.* Marcel Dekker, Inc, New York.

KC12403 ORGANIC CHEMISTRY

This course provides student with the basic knowledge of the structure and properties of organic chemistry, structure and stereochemistry, chemical reactions, stereochemistry, alkyl halides (nucleophilic substitution and elimination), structure, basic synthesis and reactions of alkanes and alkenes. This course also deals with important organic chemical processes and industrial chemical reactions. Typical reactions like esterification/transesterification, polymerization, degradation and oleochemical reaction will be described with emphasis on compounds and reactions of industrial importance. The course also provides student the basic knowledge of analytical instruments, its application and identifications (calculations) that significantly used in chemical industries.

References

Smith, G. S. (2008) *Organic Chemistry,* 2nd Edition, Mc Graw Hill. Wade, L. G. (2006) Organic Chemistry, 6th Edition, Prentice Hall. Carey, F. A (2008) *Organic Chemistry,* 7th Edition, Mc Graw Hill. Bruice, P. Y (2007) *Organic Chemistry,* 5th Edition, Prentice Hall
McMurrey. J, Simanek. E, (2007) Fundamental of Organic Chemistry, Thomson Books. McMurrey. J, (2007) Organic Chemisrty: A Biological Approach, Thomson Books.

KC12603 CHEMICAL AND BIOPROCESS TECHNOLOGY

Introduction and overview of chemical process industry: The role of the chemical engineer in industrial processing, utilities, fuels, safety and pollution aspects of a chemical industry. **Coal chemicals and fuel gases:** Coal and coal chemicals, carbonization, natural gas, producer gas, watergas and LPG. **Industrial gases:** Carbon dioxide, hydrogen, oxygen and nitrogen and raregases. **Ceramic industries:** Cement, clay products, refractories and white wares, types of glass and its manufacture. **Chlor-Alkali industries:** Manufacture of soda ash, chlorine, caustic soda and their derivative compounds. **Phosphorous and potassium industries:** Manufacture of phosphoric acid, compounds of potassium and fire retardant chemicals. Manufacture of sulphuric acid, hydrochloric acid, nitric acid and explosives. **Pulp and paper industries. Industries based on biotechnology:** Production of alcohol and other products. **Plastic and polymer industries:** Manufacture of man made fibres, resins and other polymer products. **Pharmaceutical industries:** Production of drugs and antibiotics. **Oils and fats and related products. Sugar and starch related products. Petrchemical industries. Food and food byproduct processing industries.**

References

Austin, G. T. 5th Edition. *Shreve's Chemical Process Industries.* McGraw-Hill,
New York. Wynne, M. D. 1970. *Chemical Processing in Industry.* Royal Institute
of Chemistry, London. Heaton, A. 1994. *The Chemical Industry.* Blackie
Academic & Professional, London.
Lee, B. I. and Pope, E. J. A. 1994. *Chemical Processing of Ceramics.* Marcel Dekker, Inc, New York.
Coulson, J.M. and Richardson, J.F., *Chemical Engineering, Vol. 1, Fluid Flow, Heat Transfer and Mass Transfer,* Butterworth-Heinemann, 6th Edition, Oxford.
Coulson, J.M. and Richardson, J.F., *Chemical Engineering, Vol. 2, Particulate systems, and Separation Processes,* Butterworth-Heinemann, 5th Edition, Oxford.
Richardson, J.F. and Harker, J.H., Chemical Engineering, Vol. 3, *Chemical and Biochemical Reactors and Process Control,* Butterworth-Heinemann, 3rd Edition, Oxford.
Sinnott, R.K., 1999. *Coulson and Richardson's Chemical engineering: Chemical Engineering Design,* Volume 6. Butterworth-Heinemann, 3rd Edition, Oxford.

KC22002 ELECTRICAL TECHNOLOGY

The course provides basic understanding of electric elements of common practices for non-electrical engineers at the undergraduate level. It serves as a foundation course in electrical concepts to teach the mathematics and analysis of simple electrical systems. The course will expose students to standard units, concepts of voltage, current and resistance, dc circuits and analysis theorem, capacitors, inductors, transformers and ac circuits and 3 phase systems in power applications. Circuit programming software will also be introduced as a tool to simulate and verify the solutions to given problems.

References

Thomas L. Floyd., 2007. Principles of Electric Circuits. Conventional Current Version. Eighth Edition. Pearson Education, Inc., (Prentice Hall).
Edward Hughes, 2002. Hughes Electrical & Electronic Technology. Eighth Edition. Pearson Prentice Hall. Robert L. Boylestad. 2003. Introductory Circuit Analysis, Tenth Edition. Pearson, Prentice Hall.

KC22202 PROCESS EQUIPMENT DESIGN

The aim of this course is to provide an introduction to chemical engineering students of the underlying principles that guide on preliminary design of chemical process plant.

References

Sinnot, R. K. (2005) Chemical Engineering Design Volume 6, 4th Edition, Elsevier
Geankoplis, C. J. (1995) Transport Process and Unit Operations, Prentice Hall, 3rd Edition.
Felder, R.M. and Rousseau, R.W. (2005) Elementary Principles of Chemical Processes. Wiley International Edition.
McCabe, W.L, Smith, J.C., and Harriot, P. (2005) Unit Operations of Chemical Engineering. McGraw-Hill. 7th Edition

KC22203 MATERIAL TECHNOLOGY

This course includes the four components of the discipline of material science and engineering and their linear interrelationship, which are processing, structure, properties and performance.

References

William F. Smith and Javad Hashemi. (2006). *Foundations of Materials Science and Engineering, 4th Edition,* McGraw Hill, New York.
William D. Callister, Jr. (2007). Materials Science and Engineering, An Introduction, 7th Edition, Wiley International Edition, New York.
James F. Shackelford (2008) *Introduction to Materials Science for Engineers. 7th Edition,* Prentice Hall.

KC22303 DIFFERENTIAL EQUATIONS

This course comprises of analytical solution of differential equations. Students will be evaluated on the basis of the application of differential equations and solving skills. Students will be exposed to the application of Lapalce transforms in solving the differential equations.

References

Ervin Kreyszig , 1999, Advanced Engineering Mathematics, ed 10,
Wiley. Thomas G.B., 2001, Calculus, ed 10, Addison Wesley.
Glyn James, 2001, Modern engineering Mathematics, ed 3 Prentice Hall. Edward nd Penney,2002, Calculus, Prentice Hall.
Boyce W.E, and Diprima R.C. 1995, Elementary Differential Equations and Boundary value Problems, John Wiley.

KC22403 HEAT TRANSFER

This course introduces the basic concept of heat transfer, mainly focussing on conduction and convection. The principles and calculation of process heat transfer including heat exchanger and evaporators will also be covered.

References

Holman, J.P. 2010. Heat Transfer. 10th Ed. McGraw Hill, Singapore.
Incorpera, F.P., Dewitt, D.P., Bergman, T.L. and Lanive, A.S. 2013. Introduction to Heat Transfer, 7th Ed. John Wiley & Sons, N.J.
Cengel, Y.A. 2015. Heat and Mass Transfer: Fundamentals and Applications. 5th Ed. McGraw Hill, Singapore.
Geankoplis, C. J. 2014. Transport Processes and Separation Process Principles. 4th Ed. Prentice Hall, N.J.
McCabe, W.L., Smith, J.C., Harriott, P. 2001. Unit Operations of Chemical Engineering. 6th Ed., McGraw Hill, Singapore.

KC22503 CHEMICAL PROCESS PRINCIPLES

This course comprises of Chemical Process Principles which are relevant to chemical engineers. Students will be exposed to Chemical Process Principles issues and problems.

References

R.M. Felder and R.W. Rousseau, Elementary Principles Of Chemical Processes,3rd Edition 2005 Edition Integrated Media + Study Tools + Student Workbook,John Wiley and Sons, NY, 2005 (ISBN 0471720631).

KC22603 CHEMICAL ENGINEERING THERMODYNAMICS II

The course is a study of basic thermodynamics principles and thermodynamic processes including the analysis using thermodynamic laws in flow processes, gas power and refrigeration cycles, and emphasizes processes in the chemical and processing industry involving composition change.

References

Kevin D. D., and Donald P. V. Jr., Fundamentals of Chemical Engineering Thermodinamics, Cengage Learning, US (2015).
Smith J.M., Van Ness H.C., and Abbott, M. M, *Introduction to Chemical Engineering Thermodynamics,* 7th Edn.,McGraw-Hill, Singapore (2005).
Cengel, Y. A. and Boles, M. A. (2015) Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill, Singapore.
Doubert T.E., , *Thermodynamics Kejuruteraan Kimia,* Terjamahan oleh Mastiha Hassan, DBP, Kuala Lumpur(1990). Klotz I.M., and Rosenberg R.M., Chemical Thermodynamics, Longman, Singapore(1994).

KC22703 ENGINEERING THERMODYNAMICS

This course covers the fundamental of thermodynamics namely the zero, first, second, and third thermodynamics laws. Basic of entropy is also covered. Understanding on fundamental concepts such as open and closed systems, property, state, equilibrium, phase diagram etc. are emphasized. Chemical engineering applications of thermodynamics are also taught such as gas power cycles and refrigeration cycles in steady state and unsteady state processes.

References

Cengel Y.A. and Boles M.A. 2007. *Thermodynamics: An Engineering Approach,* 6rd Ed. McGraw-Hill: USA
Moran, M. J. and Shapiro, H. N. 2008. Fundamentals of Engineering Thermodynamics, 6th Ed. John Wiley & Sons: USA.
Potter, M. C. and Scott, E. P. 2004. *THERMAL SCIENCES An Introduction to Thermodynamics, Fluid Mechanics, and Heat Transfer,* Thomsons Brooks/Cole: USA.
Russell, L. D. and Adebiyi, G. A. 1993. *Classical Thermodynamics,* International Ed. Saunders College Publishing: USA. Sonntag, R. E., Borgnakke, C., and Wylen, G. C. V. 1998. F*undamentals of Thermodynamics,* 5th Ed. John Wiley & Sons: USA.
Granet I. 1996. *Thermodynamics and Heat Power,* 5th Ed. Prentice-Hall: USA.
Howell J. and Buckius R. 1992. *Fundamentals of Engineering Thermodynamics,* 2nd Ed. McGraw-Hill: USA. Rogers G.F.C. and Mayhew Y.R. 1992. *Engineering Thermodynamics, Work & Heat Transfer,* 4th Ed. Longman: UK. Black W.Z. and Hartley J.G. 1996. *Thermodynamics,* 3rd Ed. SI Version. Addison Wesley: USA.

KC22802 CHEMICAL AND APPLIED ENGINEERING LAB

This laboratory course covers experiments to highlight the concepts taught in Fluid Mechanics, Heat Transfer and Thermodynamics. Students are evaluated based on the reports written for each experiment and mini project.

References

Noel de Nevers. 1994. Fluid Mechanics for Chemical Engineers. Mc-Graw Hill, London.
Crowe, C. T., Elger, D. F. and Roberson, J. A. 2005. Engineering Fluid Mechanics. John-Wiley & Sons, New Jersey.
Muson, B. R., Yound, D. F. and Okiishi, T. H. 2006. Fundamentals of Fluid Mechanics. John Wiley & Sons, New Jersey.
Holman, J.P. 2010. Heat Transfer. 10th Ed. McGraw Hill, Singapore.
Cengel, Y.A. 2015. Heat and Mass Transfer: Fundamentals and Applications. 5th Ed. McGraw Hill, Singapore.
Geankoplis, C. J. 2014. Transport Processes and Separation Process Principles. 4th Ed. Prentice Hall, N.J.
Kevin D. D., and Donald P. V. Jr., Fundamentals of Chemical Engineering Thermodinamics, Cengage Learning, US (2015).
Cengel, Y. A. and Boles, M. A. (2015) Thermodynamics: An Engineering Approach, 8th Edition, McGraw Hill, Singapore.

KC22903 FLUID MECHANICS

The course provides preliminaries and background for understanding fluid flow studies, mainly focuses on flows of one-dimensional as well as introducing common turbo machineries applied in process industries..

References

De Nevers, N. Fluid Mechanics for Chemical Engineers, 3rd Ed., McGraw Hill, Singapore (2005).
Additional references supporting the course
Cengel, Y.A. and Cimbala, J.M. Fluid Mechanics-Fundamentals and Applications, 2nd Ed., McGraw Hill, Singapore, 2010.
Munson B, Young, D, Okiishi, T and Huebsch,W. Fundamentals of Fluid Mechanics, 6th Ed., John Wiley & Sons Inc., New Jersey, 2010.
3. Mc Cabe and Smith, Unit Operations of Chemical engineering.McGraw hill, New York, 2007.
4. Geankoplis, C.J., Transport Processes and Separation Process Principles, 4th Ed. Prentice Hall, New Jersey, 2003.

KC30005 INDUSTRIAL TRAINING

Industrial Training is a required course for all the students in the Fuculty of Engineering (FKJ). It is compulsory for students who have completed their 6 semesters of study to undergo their industrial training. This industrial training is a full time attachment with the industry or any government body. It is 5-credit hour course for Engineering students. At the completion of their industrial training, students will be awarded a Pass/Fail grade. However, awards will be given for those who excel and perform praiseworthily.

KC32103 APPLIED STATISTICS FOR CHEMICAL ENGINEERS

This course is an introduction of basic concept of statistics and probability; and its applications in science and engineering. Students are also taught how to form hypothesis statement, select appropriate test method, perform hypothesis testing and write conclusion statement from the hypothesis test.

References

Bluman, A.G., (2007). Elementary Statistics. 6th Edition. Mc Graw Hill International Edition.
Larson, R., and Farber, B., (2009). Elementary Statistics. Pearson Prentice Hall., 4th Edition
Navidi, W., (2006). Statistics for Engineers and Scientist. Mc Graw Hill International Edition
Montgomery,D and Runger (2007). Applied Statistics for Engineers. Wiley, 4th Edition.

KC32303 BIOPROCESS PRINCIPLES

Bioprocess principles involves a study of the biological and biochemical principles supporting the field of bioprocess engineering.It will be expected that students develop an understanding of the science and engineering principles underlying modern industrial practice in bioprocessing. For an engineer to solve problems in bioprocesses, the understanding of microbiology and its related technology is prerequisite. Hence, this course is aligned to equip engineering students with basic microbiology.

References

Shuler, ML and F Kargi. Bioprocess Engineering: Basic Concepts.TP248.3.S58.1992.
Blanch, H.W., D.S. Clark. Biochemical Engineering. TP248 .3 .B625 1997.
Atkinson, B. Biochemical Engineering and Biotechnology Handbook. TP248 .3 .A853 1991.
Bailey, J.E., D.F. Ollis. Biochemical Engineering Fundamentals. TP248 .3 .B34 (1997).
Doran, P. Bioprocess Engineering Principles.TP248 .3 .D672 1995t.
Pirt, S., Principles of microbe and cell cultivation. QR66 .P5 1975b.
Wang, D.I.C. et al.. Fermentation and enzyme technology.TP156 .F4 F45
(1979). Peppler, H.J. Microbial Technology. QR53 .P45 1979.

KC32403 PROCESS DYNAMICS AND CONTROL

The purpose of this course is to equip students with the understanding, appreciation and essence of chemical process control from process modelling to control system analysis and design.

References

Seborg, D. E. Edgar, T.F. and Mellichamp, D.A. 2004. Process Dynamics and Control, 2nd ed. John Wiley.
Smith, C.A. and Corripio, A.B. 2006. Principles and Practice of Automatic Process Control, 3rd ed. John Wiley.
Coughanowr, D.R. LeBlanc, S.E. 2006. Process Systems Analysis and Control, 3rd Ed. McGraw Hill.

KC32503 MASS TRANSFER AND SEPARATION PROCESS

This course is an introduction to fundamental of mass balance and separation processes. The course will introduce to students how to apply mass transfer principles in the design of separation process equipment. The topics covered include diffusion, convective mass transfer, flash distillation, binary distillation, column distillation, absorption, stripping and economic evaluation of process design.

References

Geankoplis, C.J., 2014, Transport Processes and Separation Process Principles, 4th Edition (New International Ed.), Pearson Education Ltd.
Wankat PC. 2014, Separation Process Engineering,3rd Edition, Prentice Hall.
McCabe, W. L. and Smith, J. C. 2001. Unit operations of chemical engineering, 4th Ed.New York: McGraw-Hill.
Sinnott, R.K., 1999. Coulson and Richardson's Chemical engineering: Chemical Engineering Design, Volume 6. Oxford: Pergamon Press.

KC32603 PROCESS SIMULATION AND INTEGRATION

The course is consisting of Processes Simulation, Process optimization and computer programming. Software packages are used for assisting of the teaching of this course. Process simulation is using ASPEN HYSYS simulation package, process optimization is using DESIGN EXPERT package and Computer programming is using SALFORD FORTRAN Compiler. The topics covered by process simulation subject are fluid packages, energy and material streams and unit operations. Major unit operations chosen are; fluid handling equipment and piping, solid handling and solid separation, gas scrubber, flash distillation, distillation column and reactors. Optimization subject will discussed two case studies for each topic of product formulation and process optimization. Computer programming will include the topics of decision making, loop, arrays and subprogram.

References
William E. Mayo and Martin Cwiakala, 1995, "Programming with Fortran 77", Schaum's Outline Series, McGraw Hill Innternational
Luyben W. L., 1990, Process Modeling, Simulation and Control for Chemical Engineers, McGraw-Hill International, Singapore
Ceney W., Kincad D., 1985, Numerical Mathematics and Computing, 2nd Ed., Brooks-Cole Publ., California.
Awang Bono, Duduku krishnaiah and Mariani Rajin, 2008, "Products and Process Optimization using Response Surface Methodology", Penerbit UMS,Malaysia
5. Coker A. K., 1995, Fortran Programs for Chemical Process Design, Analysis and Simulation, Gulf Publ. Co., London.
6. Husu M., Niemela I., Pyotsia J., Simuls M., Hauhia M., Riihilahti J., 1997, Flow Control Manual, Neles-Jamesbury, Finland
7. Peters M. S., Timmerhaus K. D., 1991, Plant Design and Economics dor Chemical Engineers, McGraw-Hill International, Singapore
8. Ceney W., Kincad D., 1985, Numerical Mathematics and Computing, 2nd Ed., Brooks-Cole Publ., California.
9. Babu B. V., 2015, Process Plant Simulation, Oxford Univ Press

KC32703 MEASUREMENT AND INSTRUMENTATION TECHNOLOGY

Principles of Measurement & Instrumentation Systems: Static Characteristics, Dynamic Characteristics, Accuracy, Precision, Non Linear Substitution, Effects of Load and Signal-Noise Ratio. Measurement System Elements: Sensor Element: Resistive Sensors, Capacitive Sensors, Induction Sensors and Electromagnetic sensors, Thermo-Electric Sensors, Piezo-Electric Sensors, Piezo-Resistive Sensors & Electrostatic Sensors. Signal Determination and Element processing: Deflection Bridge, Amplifier, Transmitter, Sample and Quantization, A-D and D-A Transfers, Signal processing Calculations and Filtering. Data Presentation Element : Choice, Analogue & Digital Recorders, Small & Large Scale Indicators, Data Acquisition through the PC and its Applications. Special measurement Systems: Flow Measurement, Torque measurement, Heat measurement, Optical measurement and Ultrasonic measurement. Introduction to Gas Chromatography. Chemical process Measurement Systems: Pressure, Flow, Temperature, Level, Density and Viscosity.

References
J.P. Benttley (1995), Principles of Measurement Systems , Longman, Essex.
E.O. Doeblin (1995), Measurement Systems , Applications and Design, McGraw Hill, NY
M.J. Usher (1994), Sensors and Transducers , MacMillan, London.
C.F. Coombs (1995), Electronic Instrument Handbook , McGraw Hill NJ.
A.L. Ahood and H. Mohamud (1993), Pengenalan, Peralatan Elektrik dan Sistem Sukatan , DBP, KL.
V.R Radhakrishnan (19 97), Instrumentation and Control for the Chemical, Mineral and Metallurgical Processes . Allied Publishers, New Delhi.

KC32803 ENVIRONMENTAL ENGINEERING

This course introduce environmental engineering with sufficient depth of knowledge in water resources engineering, water treatment, water pollution, wastewater treatment, air pollution, noise pollution, solid waste management, hazardous management and sustainability and green engineering. Ethics and introduction of laws and legislations on practicing engineering pertaining environment was also included in this course .This course apply sciences and mathematics to utilize the properties of matter and source of energy in the solution of environmental problems.

References
Davis, M.L. & Cornwell, D.A. (2008) Introduction to Environmental Engineering. WCB/McGraw-Hill. 4th Edition.
Metcalf & Eddy.(2004) Wastewater Engineering Treatment & Reuse. McGraw-Hill. 4th Edition.
Noel De Nevers. (2000) Air Pollution Control Engineering. McGraw-Hill. 2nd Edition. Tchobanouglas, Theisen & Vigil. (1993) Integrated Solid Waste Management. McGraw-Hill.
Akta Kualiti Alam Sekeliling 1974 (Akta 127) & Peraturan-peraturan & Perintah-perintah. International Law Book Services.

KC32903 SAFETY AND LOSS PREVENTION

This course is to deliver the knowledge and understanding to the student in the area of Health, Safety and Environment (HSE). This course cover the element of hazard register, HSE case, job hazard analysis (JHA) and permit to work (PTW) system. All of these are the basic and common procedures or practices that need to apply in the oil and gas related work. This is to ensure student will have the sufficient knowledge and input before they step into working environment.

References
Crowl D.A., and Louvar J.F., Third Edition, 2012, Chemical Process safety: Fundamentals with Applications, Prentice Hall, New Jersey.
David L. Goetsch. 8th edition, 2014 Occupational Safety & Health for Technologist, Engineers & Managers. Pearson.
Guidelines for Hazard Evaluation Procedures, 3rd edition, 2011, John Wiley and Sons
Constantin Stephan, 3rd edition 2012, Industrial Health, Safety and Environmental Management, MV Wissenschaft, Muenster.
Occupational Safety and Health Act (OSHA) and Regulations 1994, Fifteenth Edition 2013, MDC Publishers Sdn. Bhd.
Jayakumar & Retneswari, Occupational Health for Health Care Professionals- Caring for the Careers, Malaysia Medical Association, Kuala Lumpur, 2009.

KC33002 PROCESS DESIGN

This course focuses on designing a chemical process unit operation by applying the learned principles in process simulation and optimization, reaction engineering, separation process and process control. A unit operation will be selected and students will be evaluated on the basis of the design works.

References
Sinnott, R.K. and Towler, G., 2009. Coulson and Richardson's Chemical engineering: Chemical Engineering Design, Volume 6, 5th Edition, Oxford: Pergamon Press.
Seider, W.D., Seader, J.D. and Lewin, D.R., 2004, Product and Process Design Principles: Synthesis, Analysis and Evaluation, Wiley & Sons.
Peters, M. S., Timmerhaus, K. and R. E. West, 2004. Plant design and economics for chemical engineers. 5th Edition, New York: McGraw Hill.
Geankoplis, C.J., 2003, Transfer Processes and Unit Operations, 4th Edition, Prentice
Hall. Hewitt, G. Shires G.L. and Bott T.R., 1994, Process Heat Transfer, CRC.
Smith, J.M., 1981, Chemical Engineering Kinetics, McGraw-Hill.
McKetta, J.J., Executive Editor, 1995, Encyclopaedia of Chemical Processing and Design, Marcel
Dekker. Elvers, B. and Hawkins, S., Editors, 1996, Ullmann's Encyclopaedia of Industrial.
Chemistry, VCH Verlagsgesellschaft mbH.
Kroschwitz, J.I., Executive Editor, 1998, Kirk-Othmer Encyclopaedia of Chemical Technology, 4th Edition, John Wiley. Crowl D.A., and Louvar J.F., 1990, Chemical Process safety: Fundamentals with Applications, Prentice Hall, New Jersey Charles A. Wentz 1998. Safety, Health & Environmental Protection. Mcgraw Hill.

KC32103 PROJECT MANAGEMENT AND PROCESS ECONOMICS

This course will help the students to grasp the required concepts in developing and managing a project. These include understanding the life of a project, project planning and control and the workforce behind a successful project. Students will also be exposed on a proper project planning and scheduling as well as project communication and documentation. Topics such as project manager and project team will provide an overview of leadership ability and management skills to students.

References
Gido, J. and Clements, J.P. (2003) Successful Project Management. Thomson-South-Weston, 2nd Edition. (Text book)
Ghattas, R. G. and McKee, S. L. (2001) Practical Project Management. Prentice Hall, 1st Edition.
Klastorin, T. (2004) Project Management. John Wiley & Sons, Inc, 1st Edition.
Harvey Maylor (2003) Project Management. Prentice Hall, 3rd Edition
Robbins S.P. and Coulter M. (1999) Management. Prentice Hall, 6th Edition.
Ainon Mohd (2004) Psikologi Kejayaan. PTS Publications & Distributors Sdn Bhd.
Nik Rahimah Nik Yaakob, 1992, Perancangan dan Pengurusan Keluaran, Fajar Bakti, Malaysia.
Lockyear, F. 1981, Production Management, ELBS London.

KC33202 PROCESS ENGINEERING LAB

This laboratory course covers experiments to highlight the concepts taught in Environmental Engineering, Mass Transfer, Instrumentation, Bioprocess, Chemcal Engineering Reaction, Process Control and Separation.

References

Laboratory manual used for KC33202
Additional references supporting the course
Geankoplis, J.G. 2003. Transport Processes and Separation Process Principle. Prentice-Hall Inc., New Jersey.
McCabe, W. L. and Smith, J. C. 1967. Unit operations of chemical engineering. New York: McGraw-Hill.
Peavy, H.S., Rowe, D.R. & Tchobanoglous, G. (1985) Environmental Engineering. McGraw-Hill International Edition.
Davis, M.L. & Cornwell, D.A. (2008) Introduction to Environmental Engineering. WCB/McGraw-Hill. 4th Edition.
Seborg, D.E., T.F. Edgar, and D.A. Mellichamp,. Process Dynamics and Control 3rd Ed. New York: Wiley, 2010
Levenspiel, O. (1999). Chemical reaction engineering, 3rd Edition: Wiley.
Doran, P. M. (1995). Bioprocess Engineering Principles: Elsevier Science.

KC33403 CHEMICAL REACTION ENGINEERING

This course comprises of chemical kinetics and reactor design. Students will be evaluated on the basis of the application of chemical kinetics in the design of rectors and solving skills. Students will be exposed to the various rectors and effect of temperature and pressure.

References

Fogler, H.S., 2006, Elements of Chemical Reaction Engineering, 4th Edition. Pearson Education Limited 2014.
Levenspiel, O.,1999, Chemical Reaction Engineering , Wiley International.
Smith J.M., 1981, Chemical Engineering Kinetics, McGraw Hill.
Richardson, J.F. and Harker, J.H., 2003, Chemical Engineering, Vol. 3, Chemical and Biochemical Reactors and Process Control, 3rd Edition. Butterworth-Heinemann, Oxford.
Sinnott, R.K., 2005, Coulson and Richardson's Chemical engineering: Chemical Engineering Design, Volume 6. 4th Edition. Butterworth-Heinemann, Oxford..

KC40003 RESEARCH PROJECT I

Projects involving research for etching in the knowledge of the students obtained in the programme courses. The emphasis will be given to creative resource, analytical thinking, team work and ability for producing results from theories taught in the courses. The course provides a basic foundation in research methodology. Scientific method will be applied so that a logical and systematic sequence to carry out a scientific research project will be developed. Among the topics are formation of a research problem, hypothesis, objectives, definitions, experimental design, gathering of data, analysis of data, test of hypothesis and developing conclusions.Students will be requested to submit a project report as soon as the objective is achieved.

References

Journals, articles, books, and other sources related to research work can be used as references.

KC40004 RESEARCH PROJECT II

Projects involving research for etching in the knowledge of the students obtained in the programme courses. The emphasis will be given to creative resource, analytical thinking, team work and ability for producing results from theories taught in the courses. Students will be requested to submit a project report as soon as the objective is achieved.

References

Journals, articles, books, and other sources related to research work can be used as references.

KC42103 PLANT DESIGN PROJECT I

This course comprises of plant design together with elements of economics and optimization process. A process will be selected to form a chemical plant. Students will be evaluated on the basis of whether the design works and on economics, environmental and societal impact. Students will be exposed to the application of CAD to assess their designs.

KC42404 PLANT DESIGN PROJECT II

This course comprises of plant design together with elements of economics and optimization process. A process will be selected to form a chemical plant. Students will be evaluated on the basis of whether the design works and on economics, environmental and societal impact. Students will be exposed to the application of CAD to assess their designs.

References

Sinnott, R.K. and Towler, G., 2009. Coulson and Richardson's Chemical engineering: Chemical Engineering Design, Volume 6, 5th Edition, Oxford: Pergamon Press.
Seider, W.D., Seader, J.D. and Lewin, D.R., 2004, Product and Process Design Principles: Synthesis, Analysis and Evaluation, Wiley & Sons.
Peters, M. S., Timmerhaus, K. and R. E. West, 2004. Plant design and economics for chemical engineers. 5th Edition, New York: McGraw Hill.
Geankoplis, C.J., 2003, Transfer Processes and Unit Operations, 4th Edition, Prentice
Hall. Treybal, R.E. 1981, Mass Transfer Operations, McGraw Hill.
Hewitt, G. Shires G.L. and Bott T.R., 1994, Process Heat
Transfer, CRC. Smith, J.M., 1981, Chemical Engineering
Kinetics, McGraw-Hill.
McKetta, J.J., Executive Editor, 1995, Encyclopaedia of Chemical Processing and Design, Marcel
Dekker. Elvers, B. and Hawkins, S., Editors, 1996, Ullmann's Encyclopaedia of Industrial.
Chemistry, VCH Verlagsgesellschaft mbH.
Kroschwitz, J.I., Executive Editor, 1998, Kirk-Othmer Encyclopaedia of Chemical Technology, 4th Edition, John Wiley.

KC42202 PLANT OPERATION AND MAINTENANCE

This course covers the entire chemical process, process modifications, troubleshooting and implementing operational strategies for plant retrofit design, operation and maintenance. This is designed for the operation of modern plant to improve the operational efficiency. Further, this course addresses the problems of including some aspects of uncertainty in process parameters and product demands at the design stage of multi product/multipurpose batch plants. The formulation, featuring a relaxation of the feasibility requirement with respect for economic optimality and plant feasibility are highlighted in this course. Apart from that, the course focuses on understanding the safety of the plant and regulatory oversight. Focus on the environmental and waste management of plant is also being introduced.

References

Sinnott, R. K. Chemical engineering design: SI Edition. Elsevier, 2009.
Sutton, I. Plant Design and Operations, 1st Edition, Gulf Professional Publishing, 2014
Wierenga, G., and J. T. Holah. "Hygienic plant design." Edited by Lelieveld HLM, Mostert MA, Holah J and White B. Woodhead, Cambridge, UK, 2003.
Scott, D., & Crawley, F. Process Plant Design and Operation: Guidance to Safe Practice. Institution of chemical engineers. 1992
Seferlis, P., & Georgiadis, M. C. (Eds.). The integration of process design and control (Vol. 17). Elsevier. 2004.
Smith, R. Chemical process design. John Wiley & Sons, Inc.. 2005.

KC44103 BIOCHEMICAL ENGINEERING

To develop understanding of the principles in biochemical engineering and to provide a strong base in biosystems.

References

M. L. Shuler, F.Kargi. Bioprocess Engineering, Basic Concepts. Prentice Hall (2002). J.E: ,
Bailey, F. Ollis. Biochemical Engineering. Mcgraw Hill. New York (1996).
Lee, J.M. Biochemical Engineering. Englewood, Prentice Hall. New Jersey (1982).
Harvey W. Blanch & Douglas S. Clark. Biochemical Engineering. Marcel Dekker, Inc.New York (1997). Scragg A.H. Bioreactors in Biotechnology : A Practical Approach. New York: Ellis Horword (1991).

KC44203 FOOD PROCESS ENGINEERING

Food Technology is a course which applies basics from various subject areas in chemical engineering. Those areas are mixing, separation, heat transfer, mass transfer and bioprocessing. This course will cover these subject areas from a food processing aspect. In addition to that the importance of Malaysian food law, the Food and Drug Administration (FDA) regulatory body and food safety will be highlighted. In this course the significance of HACCP and GMP will be emphasized. This course will be wrapped up by an appreciation the overall food plant design, environmental concerns and future trends.

References
Fellows, P.J. 1990, Food Processing Technology: Principles and Practice, Ellis Horwood, Chester. Smith, P.G. 2003, Introduction to Food Engineering, Kluwer Academic. New York
Lopez-Gomez, A. and Barbosa-Canovas, G.V., 2005. Food Plant Design. Taylor and Francis, New York. Singh, R. P. and Helman,. 1986. Food Processing engineering. Mc Grawhill.
Owen R. F.. 1993. Food Chemistry: II, Marcel Dekker Inc.
Sharma, S.K. et al. 2000, Food Process Engineering, Wiley-Interscience.
Murano P.S., 2003, Understanding Food Science & Technology, Thompson Wadsworth.

KC44303 AIR POLLUTION

This course covers air pollution, impact of air pollution, air pollution law, meteorology and air quality, measurement and air quality, particulate pollution control, gaseous pollution control and air pollution model.

References
Nevers, N.D.(2000) Air Pollution Control Engineering. William C. Brown Pub.. 2nd Edition.
Wark, K., Warner, C.F. & Davis, W.T.(1997) Air Pollution : Its Origin and Control. Prentice Hall. 3rd Edition.
Akta Kualiti Alam Sekeliling 1974 (Akta 127) & Peraturan-peraturan & Perintah-perintah. International Law Book Services.

KC44403 WASTE TREATMENT AND PROCESSING

This course is about overview of solid waste management in Malaysia, solid wastes sources, nature and characteristics, quantities and qualities, rates of generation and factors affecting them due to solid wastes, and methods to handle the waste. This course covers the introduction to solid waste regulation, solid waste management, transfer station disposal and processing techniques, solid wastes resource and recovery, and sanitary landfill. This course covers chemical, biological and thermal treatment of hazard waste, storage and incineration of hazardous waste, land disposal, and management of hazardous waste leachate system.

References
Tchobanouglas, Theisen & Vigil. (1993) Integrated Solid Waste Management. McGraw-Hill.
Akta Kualiti Alam Sekeliling 1974 (Akta 127) & Peraturan-peraturan & Perintah-perintah. International Law Book Services.

KC44503 CHEMICAL PRODUCT DESIGN

Introduction to chemical product design; Costumer needs; Ideas of product development; Selection of products based on thermodynamics, and kinetics; Product manufacture; Specialty chemical manufacture; Economic concerns.

References
E.L. Cussler and G.D. Moggridge, Chemical Product Design, Cambridge University Press, U.K, 2001.
J.M. Douglas, Conceptual Design of Chemical Processes, McGraw-Hill, New York, 1988.
K. T, Ulrich, and S. D. Eppinger, Product Design and Development , 2nd Edn, McGraw-Hill, New York, 2000.

KC44703 OIL AND GAS UPSTREAM

The course is aimed at introducing to new students the various aspects of the oil and gas industry, specifically on upstream process, and makes them aware of the role of various disciplines throughout the life cycle of petroleum. The course will be taught in several modules by specialists in the various disciplines involved in each step of the petroleum life cycle, starting with geoscientists who will introduce acreage basin analysis, prospect evaluation, exploration techniques, and discovery appraisal; petroleum engineers who will elaborate on the field development planning, drilling, reservoir engineering and production technology; chemical, mechanical and electrical engineers who will introduce manufacturing of petroleum products. This course also covers concepts of reservoir fluids, phase behaviour of hydrocarbon system, rock properties, pressure regime, reserve estimation, drive mechanism, material balance equation and applications

References
William D McCain (2000), The Properties of Petroleum Fluids, 2nd Edition, Pennwell Corporation.
L.P Dake (2001), Fundamentals of Reservoir Engineering, 8th impression, Elsevier Science.
Hyne N. J. (2001). Nontechnical guide to petroleum geology, exploration, drilling and production, 2nd ed. Penn Well Corporation.

KC44903 SUSTAINABLE AND RENEWABLE ENERGY

This course will discuss the issues of sustainable, renewable and non renewable energy along with their types and sources. The course will also bring the students inside active discussion on world energy scenario and potential energy for Malaysia. The course will analyze in terms of cost benefit, energy solutions and cost comparison. The analysis will be project based and will provide solution in terms of nature of energy, its resources, energy conservation and efficiency. The impact of energy use towards the economy and environment will be looked at as well.

References

Sorensen, B; 'Renewable Energy', 3rd Edition, Academic Press, 2004.
Kruger, Paul; 'Alternative Energy Resources: The quest for Sustainable Energy', Wiley, NY, 2006. Aldo, V., deRosa; 'Fundamentals of Renewable Energy Processes', Academic Press, 2005.

KC45103 PARTICLE TECHNOLOGY

This course introduces the chemical engineering student to particle technology. Knowledge in this subject is important for processing and handling of particulate solids. This is because over 50% of chemical products pass through a particulate stage. For example in the design of a catalytic cracking reactor which produces gasoline from oil or in storage and transport of particulate solids to processing (fertilizer in bulk solid for further processing) or from processing (production of urea fertilizer. In this course, the students will be introduced to characterization of particulate solids (single particles, bulk solids, single particles in a fluid), storage and transport (hopper design, pneumatic conveying), granulation process (size reduction, size enlargement, granulation, fluidization), separation (sieving, filtration, cyclones) and safety (health hazards, fire and explosion hazards). This course also touches on nanoscience and nanotechnology from the chemical engineering perspective. Knowledge in this subject is important for development and manufacturing of new materials and products enhanced by the properties of nanomaterials. This course will cover the basic understanding of nanoparticles, the chemistry, physics and biology behind it.

References

Rhodes, M, "Introduction to Particle Technology", John Wiley Sons, New York (2008).
Mc Cabe and Smith. 2004. Unit Operations of Chemical engineering.7 ed. McGraw hill, New YorkJ P K Seville, U Tüzün and R Clift, "Processing of Particulate Solids", Chapman and Hall, London (1997).Nedderman, R. M. , Static and Kinematics of Granular Materials; Cambridge University Press: Cambridge, 1992.Boon-Beng Lee, Pogaku Ravindra, Eng-Seng Chan (2009) New Drop Weight Analysis for Surface Tension Determination of Liquids. Colloids and Surfaces A: Physicochemical and Engineering Aspects (Elsevier Publisher) 332:112-120 Eng-Seng Chan, Boon-Beng Lee, Pogaku Ravindra, Poncelet Denis. (2009) Prediction Models for Shape and Size of Calcium-Alginate Macrobeads Produced Through Extrusion Technique. Journal of Colloids and Interface Science.
(Elsevier Publisher) (DX.DOI.ORG/10.1016/J.JCIS.2009.05.027)Gabor L. Hornyak, John J. Moore & Joydeep Dutta, "Fundamentals of nanotechnology", CRC Press, Taylor & Francis Group, Boca Raton, (2009).
William A. Goddard III, Donald W. Brenner, Sergey E. Lyshevski & Gerald J. Iafrate, "Handbook of nanoscience, engineering and technology", 2nd Edition, CRC Press, Taylor and Francis Group, Boca Raton (2007).
Masuo Hosokawa, Kiyoshi Nogi, Makio Naito & Toyokazu Yokoyama, "Nanoparticle Technology Handbook", Elsevier, Amsterdam (2007).
Michael Köhler & Wolfgang Fritzsche, "Nanotechnology: An introduction to nanostructuring techniques", Wiley-VCH, Grünstadt (2004).
Charles P. Poole Jr. & Frank J. Owens, "Introduction to nanotechnology", Wiley-Interscience, New Jersey (2003).
Mark Ratner & Daniel Ratner, Nanotechnology: A gentle introduction to the Next Big Idea, Prentice Hall, New Jersey, (2003).

KC45403 ADVANCED PROCESS CONTROL

This course further expands on chemical process control to include multivariable dynamic modelling and simulation with MATLAB, enhanced single loop tuning, multivariable control, and plant wide control. Teaching will include lectures and in class computer assignments.

References

Seborg, D. E. Edgar, T.F. and Mellichamp, D.A. 2004. Process Dynamics and Control, 2nd ed. John Wiley.
Smith, C.A. and Corripio, A.B. 2006. Principles and Practice of Automatic Process Control, 3rd ed. John Wiley.
Umez-Eronini, E. 1999. System Dynamics and Control. PWS.
Chau, P.C. 2001. Process Control: A First Course with MATLAB. Cambridge University Press.

KC45603 ADVANCED HEAT TRANSFER

This course is an advanced study of heat exchangers in their traditional to modern innovative forms and configurations. Students need a good grounding in heat transfer and fluid mechanics to take advantage of this course for applications in chemical and processing industry. Case studies using commercial software including CFD for simulation of shell-and-tube, plate-fin, tube-in-plate, air-cooled heat exchanger and fired heaters will be carried out by students working on their own.

References

Hewitt, G. Shires G.L. and Bott T.R., 2000, Process Heat Transfer, New York ; Wallingford.
Seider, W.D., Seader, J.D. ,Lewin, D.R. and Wigado, S., 2010, Product and Process Design Principles: Synthesis, Analysis and Evaluation, 3rd Ed., Wiley & Sons.
Shah, R.K. and Sekulić, D.P., 2003, Fundamentals of Heat Exchanger Design, Wiley and Sons.
Sinnott, R.K., 2005. Coulson and Richardson's Chemical engineering: Chemical Engineering Design, Volume 6, 4th Edition, Oxford: Pergamon Press.
Peters, M. S., Timmerhaus, K. and R. E. West, 2004. Plant design and economics for chemical engineers. 5th Edition, New York: McGraw Hill.
McKetta, J.J., Executive Editor, 1995, Encyclopaedia of Chemical Processing and Design, Marcel Dekker.

KC45803 ADVANCED PROCESS SIMULATION

This course is to equip the students with sound concepts on how to develop models of chemical engineering processes and unit operations for simulation using the latest programming tools.

References

Capra, S dan Canale (1998) Numerical Methods for Engineers, McGraw Hill, New York.
Etter, D.M. (1990) Structured FORTRAN 77 for Engineers and Scientists, 3rd ed, Benjamin Cummins, New York.
Holland, C.D (1981) Fundamentals of Multicomponent Distillation, McGraw Hill, New York.
Ozisik, M N (1985) Heat Transfer A Basic Approach, McGraw Hill, New
York. Smith, J.M (1985) Chemical Engineering Kinetics, McGraw Hill, New
York.

KC46003 MEMBRANE ENGINEERING

This course covers membrane technology used in separation processes. Topics include basic understanding of membrane separation process, membranes modules and operation modes, membrane manufacturing, membrane fouling and cleaning, ultrafiltration, microfiltration, nanofiltration, reverse osmosis as well as gas separation membranes.

References

Baker R.W.(2004) Membrane Technology and Applications. Wiley. 2nd Edition. Mulder J.M.(1996) Basic Principles of Membrane Technology. Springer. 2nd Edition.

KC46203 PHYTOCHEMICAL PROCESSING

This course will cover the effect of proceeding methods on phytochemicals in food, nutraceutical and herbal products. An overview of phytochemistry, health benefits of phytochemicals and processing methods will be covered in this course. The primary focus will be the

References

List, P. H and Schmidt, P. C. (1989). Phytopharmaceutical Technology. Boca Raton: CRC Press.
Houghton, P. J. and Raman, A. (1998). Laboratory Handbook for the Fractionation of Natural Extracts. London: Chapman and Hall.
Harborne, J. B. (1984). Phytochemical Methods, 2nd ed. London: Chapman and Hall.

KC46403 BIOENGINEERING

To develop understanding of the principles of bioengineering and to provide a strong base in biosystems.

References

Y. C. Fung, 1993, Biomechanics: Mechanical Properties of Living Tissues, Springer , New York.
C. Ross Ethier, Craig A. Simmons, 2007, Introductory Biomechanics: From Cells to Organisms. Cambridge University Press, London.
Fersht, Alan, 1984, Enzyme Structure and Mechanism, W.H.Freeman & Co Ltd. New York
Gary W. E, Lynne M, Christina S. 1999.Biotherapeutic Agents and Infectious Diseases, Humana Press. New Jersey. Joon B. P, Joseph D. B. 2003. Biomaterials: Principles and Applications. CRC Press. London.

KC46603 ENZYME ENGINEERING

To develop understanding of the principles of the enzymes and to provide a framework for more advanced aspects of enzyme enginneering.

References
J.E. Bailey and D.F. Ollis: Biochemical Engineering Fundamentals, 2nd Edition, McGraw-Hill, 1986.
H.W. Blanch and D.S. Clark,: Biochemical Engineering, Marcel-Dekker, 1996
M.L.Shuler & F. Kargi: Bioprocess Engineering – Basic Concepts, Prentice Hall (Second Edition 2002) Lee, J.M. 1982. Biochemical Engineering. Englewood, Prentice Hall. New Jersey.
Scragg A.H. 1991. Bioreactors in Biotechnology : A Practical Approach. Ellis Horword. New York.

KC46803 NUCLEAR TECHNOLOGY

Nuclear Technology (KM42503) is offered by the Chemical Engineering program as an introductory course to nuclear science and technology. The course provides an overview of a broad range of topics regarding nuclear energy. The goal is to be informed of the background history and technical issues of nuclear energy so as to know how best to deal with them in the future. The course will focus on understanding the complete nuclear reactor system including the balance of plant, support systems and resulting interdependencies affecting the overall safety of the plant and regulatory oversight. Apart from that this course will also introduce the basic concepts of nuclear physics with emphasis on nuclear structure and radiation interactions with matter. Focus on the environmental and governance aspects of the decommissioning of civil nuclear facilities and radioactive waste management will also be introduced.

References
Samuel Glasstone & Alexande Sesonske (1994), Nuclear Reactor Engineering: Reactor systems engineering, New York : Chapman and Hall.
Joseph A. Angelo (2004), Nuclear Technology, Greenwood Press.
Raymond L. Murray (2009), Nuclear Energy: An Introduction to the concepts, systems and applications of nuclear processes, 6th Edition, Elsevier Inc.
J. Kenneth Shultis, Richard E. Faw (2008), Fundamentals of nuclear science and engineering, 2nd Edition, CRC Press.

KC47003 WATER POLLUTION AND WASTE WATER TREATMENT

This course will discuss in depth the world water stress and relates it with the type and source of water available. The conventional waterwaste treatments of physical, chemical and biological treatment will also be discussed. The course will also look at the new advanced techonology (membrane treatment) that can work to help reduce the pollution loading to the fresh water sources through reuse and recycle techniques by giving a specific example of palm oil mill.

References
Metcalf & Eddy. (2004) Wastewater Engineering Treatment & Reuse. McGraw-Hill. 4th Edition. Environment Quality Act 1974 (Act 127) & Regulations & Rules. International Law Book Service.

KC47203 PETROLEUM DOWNSTREAM PROCESSING

This course is focused on the downstream activities of the oil refinery . It is designed to familiarize the students in the development of petroleum products. The purpose of this course is to explain the need for petroleum refining and provide a basic understanding how a petroleum refinery works . It also introduces and reviews the physical and chemical processes used to convert crude oil into desired products. In addition the course also looks into the future prospects of oil refinery with its implications on environmental, technical, and economic constraints.

References
Meyers , A . Robert , Handbook of Petrochemicals Production Processes , 1 st Edition, McGraw Hill , 2005 .
Meyers , A . Robert ; Handbook of Petroleum Refining Processes , 2 nd Edition , McGraw Hill , 1996 . McKetta , J. John , Petroleum Processing Handbook , Mercel Dekkar Inc. , 1992 .

MECHANICAL ENGINEERING PROGRAMME (HK08)

KM10203 ENGINEERING MATERIALS

An introductory course in applied science examining the fundamentals of Atomic structure, crystal structures, defects in metallic structure, plastic deformation of metals, binary alloys, constitution and equilibrium diagrams, the iron-carbon equilibrium diagram. Ferrous and non-ferrous alloys, their manufacturing and engineering applications. Mechanical behaviour of engineering materials, testing of materials, heat treatment of steels, surface modification of metals for specific engineering applications, tribological properties of metals and non-metals.

References

W. D. Callister, maeterials Science and Engineering, John Wiley & Sons, Inc.
D.R. Askeland and P.P. Phule, The Science and Engineering of Materials, Thomson.
J.F. Shackelford, Introduction to Materials Science for Engineers, Pearson Prentice Hall.
W. F. Smith, Foundations of Materials Science and Engineering, Mcgraw-Hill.

KM10303 CALCULUS I

The purpose of this course is to equip students with understanding, appreciation, and application of calculus as well as introduction to solving a variety of engineering problems using calculus.

References

Stewart. 2015. Stewart Calculus: Early Transcendentals, 8th Edition. [ISBN: 9781285741550 / 1285741552]
Thomas. 2014. Thomas' Calculus: Early Transcendentals, 13rd Edition [ISBN: 9780321884077 / 0321884078]
Mercer, Peter R.. 2014. More Calculus of a Single Variable. [ISBN 978-1-4939-1926-0]

KM10403 CALCULUS II

The intent of this course is to provide an in-depth appreciation of advance differential and integral applications involving complex algebraic and trigonometric phenomena. Application of dot and cross products in vector value function, TNB frame, vector analysis in projectile motion and polar curves, and multiple integral in calculating area, volume and vector fields are among the major topics in this course.

References

Thomas. 2014. Thomas' Calculus: Early Transcendentals, 13rd Edition [ISBN: 9780321884077 / 0321884078]
Lax, Peter D, Terrell, Maria Shea. 2014. Calculus With Applications. [ISBN 978-1-4614-7946-8]
Edwards, Harold M. 2014. Advanced Calculus: A Differential Forms Approach. [ISBN 978-0-8176-8412-9]

KM10501 ENGINEERING WORKSHOP

This course covers the use of machine tools such as lathe machine, groove machine / mill, drill press, band saw and grinding as well as tools such as micrometer, caliper Vernier, and equipment and other machines that are commonly used in the workshop or laboratory. This course also covers metal removal, metal forming and welding methods and manufacturing in the workshop. Th course also introduces to the introduction to workshop operations based on CAD, CAM, CIM, and regulations and engine technology and safety in the workshop.

KM10603 STRENGTH OF MATERIALS

This course discusses one main topic: Stress and strain, Stress and strain transformation, Mechanical properties of materials, Axial load, Torsion, Bending, Transverse shear, Design of Beams and Shafts, Deflection of Beams and Shaft, Buckling of Columns and Energy methods. Laboratory sessions are devoted to illustrate various phenomena studied.

References

Hibbeler, R.C. 2016. *Mechanics of Material, 10th ed*. Singapore: Prentice Hall.
J.M. Gere and B.J. Goodno. 2017. Mechanic of Materials, SI edition. 9th Ed. Cengage Learning.
Beer, F.P., Johnston, E.R. & Clausen, W.E. 2014. Vector Mechanics for Engineers: Dynamics, 7th Ed. Singapore: McGraw Hill.
R.R. Graig. 2011. Mechanic of Materials. 3rd Ed. John Wiley & Sons, Inc.Pytel and J. Kiusalaas. 2012. Mechanic of Materials, SI edition. 2nd Ed. Cengage Learning

KM10903 STATICS

This course introduces the principles of statics. The scope of the course covers the basic of the forces and moments, employing vectors for analysis. Kinematics and kinetics of a particle are then discussed to study the dynamic system involving a particle. The understanding of mechanics is required as an Engineer to mathematically model and predict the behaviour of physical systems.

References
R.C. Hibbeler & Kai Beng Yap, 2013. Mechanics For Engineers: Statics, 13TH ed. Singapore: PEARSON.
Meriam, J.L., Kraige, L.G., 2008. Engineering Mechanics: Statics & Dynamics, 6th ed. New Jersey: John Wiley
Bedford, A. & Fowler, W. 2008. *Engineering Mechanics: Statics & Dynamics, 5 ed*. Singapore: Prentice Hall.
Beer, F.P., Johnston, E.R. & Eisenberg, E.R. 2007. Vector Mechanics for Engineers: Statics, 8 ed. Singapore: McGraw Hill
Nelson, E.W., Best, C.L. & McLean, W.G. 1998. Schaum's Outline of Theory and Problems of Engineering Mechanics: Statics & Dynamics, 5th ed. New York: McGraw-Hill

KM11003 DYNAMICS

This course introduces the basic of dynamics, and their applications in engineering. The scope of the course covers the basic concepts of kinematics and kinetics to describe the motion of a particle, and is extended for rigid bodies in 2D and 3D system. Emphasis is placed on being able to formulate the equation of motion for both particle and 2D rigid body.

References
Hibbeler, R.C. 2013. *Engineering Mechanics: Dynamics*, 13 ed. Singapore: Prentice Hall. Bedford, A. & Fowler, W. 2008. *Engineering Mechanics: Dynamics*, *5 ed.* Singapore: Prentice Hall.
Tongue, B.H. & Sheppard, S.D. 2005. *Dynamics: Analysis and Design of Systems in Motion*. New Jersey: John Wiley. Beer, F.P., Johnston, E.R. Eisenberg, E.R. & Cornwell, P.J. 2010. *Vector Mechanics for Engineers: Dynamics, 9 ed*. Singa-pore: McGraw Hill.

KM11103 COMPUTER AIDED DESIGN

This course focuses on the principles and applications of engineering drawing in product design and development processes with aided by the computer aided design application tool (SolidWorks). The course will enable students to learn, explore, understand and apply the fundamental of engineering technical drawing which in depth on 1) Role of Engineering Drawing and CAD in product design and development; 2) Introduction of engineering blue print; 3) Introduction of geometrical elements; 4) Drawing detailing through plane projection; 5) Solid modeling; 6) Engineering blue print development and presentation; 7) Machine elements drawing and presentation; and 8) Preliminary design check and visualization effect. CAD application (SolidWorks) will be apply and provide better understanding and innovation in this course teaching and learning activities.

References
Engineering Drawing and Design -6th ED, David A Madsen & David P. Madsen, Cengage Learning, 2016.
Technical Drawing with Engineering Graphics -15th ED, Frederick E. Giesecke et al., Peachpit Press, 2016
SolidWorks 2014 or latest version, Help contents, SolidWorks Corp.

KM20203 MECHANICS OF MACHINES

This course is the basic course for all Mechanical Engineering Students. This course deals with the mechanisms required for the design of equipment which helps to transmit movement from one or many parts to another parts or from one equipment to other systems.

References
ROBERT L. NORTON "DESIGN OF MACHINERY" McGrawHill, 2004
Khurmi R S and Gupta J K "Theory of Machines" Eurasia Publication House, New Delhi,.
Shigley J E and Uicker J J "Theory of Machines and Mechanisms" McGraw Hill, 1995.
Cleghorn W L "Mechanics of Machines"Oxford University Press, 2005.
David H Myszka "Machines and Mechanisms" Pearson/Prentice Hall, 2005.
A.K. Jain, 1989. Fundamentals of Digital Image Processing, USA: Prentice Hall Inc.

KM20303 FLUID MECHANICS I

This course introduces the fundamentals and techniques of fluid mechanics with the aim of describing and controlling engineering flows. Emphasis is placed on being able to formulate and solve typical problems of engineering importance. This course is intended to provide an introduction to the engineering science of fluid mechanics, especially as it is relevant to mechanical engineering. The scope of the course covers basic fluid properties which is primarily of interest to engineers.

References
Y. A. Cengel and J. M. Cimbala, Fluid Mechanics Fundamentals and Applications, McGraw-Hill.
J.F. Douglas, J. M. Gasiorek and J. A. Swaffield, Fluid Mechanics, Pearson Prentice Hall.
B. R. Munson, D. F. Young and T. H. Okiishi, Fundamentals of Fluid Mechanics, Wiley.
Merle C. Potter and David C. Wiggert, Mechanics of Fluids, Brooks/Cole.
Claton T. Crowe, Donald F. Elger and John A. Roberson, Engineering Fluid Mechanics, Wiley

KM20503 DIFFERENTIAL EQUATIONS

Differential equations and boundary value problem solving. Types and methods of solving differential equations. Focusing on linear differential equations of 1st-order to Higher–order type of problems. Including Laplace transforms; Series solution to linear differential equations; Modelling Spring-Mass-Damper problems, and solving of systems of linear differential equations.

References

William E. Boyce. 2009. Elementary Differential Equations and Boundary Value Problems: International Student Version.
Dennis G. Zill. 2008. A First Course in Differential Equations.
Dennis G. Zill and Michael R. Cullen. 2008. Differential Equations with Boundary-Value Problems.
Stephen L. Campbell and Richard Haberman. 2008. Introduction to Differential Equations with Dynamical Systems.
Richard Bronson & Gabriel Costa. 2006. Schaum's Outline of Differential Equations (3rd edition). McGraw-Hill Companies, Inc., New York.
Dennis G. Zill & Michael R. Cullen. 2006. Advanced Engineering Mathematics (3rd edition). Jones and Bartless Publishers, Inc., London.
John Polking, Al Boggess, and David Arnold. 2005. Differential Equations (2nd Edition)

KM20603 NUMERICAL METHODS

This course serves as an introduction to the numerical methods used to solve mathematical problems in engineering practice and that are often impossible to solve analytically. They are formulated so that they can be solved with arithmetic operations and can be implemented on computers.

References

Chapra, S.C. and Canale, R.P. (2006). Numerical Methods for Engineers. 5th Edition. McGraw Hill. New York.
Chapra, S.C. (2008) Applied Numerical Methods with MATLAB for Engineers and scientists. 2nd Edition. McGraw Hill. New York.
Gerald Recktenwald (2002). Numerical Methods with Matlab.2000, Prentice Hall.
Rao, S.S. (2002). Applied Numerical Methods for Engineers and Scientists. Pearson. New Jersey. Matthews, J.H. and Fink, K.D. (2004). Numerical Methods using MATLAB. Pearson. New Jersey.

KM20701 LAB I

The second year students are required to do 8 labs related to fluid mechanics, strength of materials and materials science, and write two formal reports.

References

W. D. Callister, maeterials Science and Engineering, John Wiley & Sons, Inc.
D.R. Askeland and P.P. Phule, The Science and Engineering of Materials, Thomson.
Y. A. Cengel and J. M. Cimbala, Fluid Mechanics Fundamentals and Applications, McGraw-Hill.
J.F. Douglas, J. M. Gasiorek and J. A. Swaffield, Fluid Mechanics, Pearson Prentice Hall.
R.C. Hibbler, Mechanics of Materials, Prentice Hall.

KM20801 LAB II

This course is designed to develop the ability of the students in practical investigations via experimental work, which involves collection and analysis of the experimental data. This laboratory course includes various experiments that are related to Mechanics of Machines (KM20203) and Advanced Applied Mechanic (KM20403). Through the experiments, it is hoped that the student's understanding of the related courses will improved. The students are required to report their findings in the technical reports.

KM21003 FLUID MECHANICS II

This course is design as continuation to fluid mechanics I, and emphasizes on fluid concepts and problem-solving techniques. Topics to be covered include dimensional analysis, differential analysis (including approximations such as creeping flow, potential flow, and boundary layers), turbomachinery and if time permits, introductions to computational fluid dynamics. Students are expected to read the assigned portions of the text! Students are also expected to be proficient in applying mathematics (e.g., integration and differentiation), statics and dynamics (e.g., free body diagrams), and thermodynamics (e.g., the first law).

References

Y.A. Cengel and J.M. Cimbala, Fluid Mechanics: Fundamentals and Application, 2nd Edition, McGraw-Hill, 2009.
Massey, B. S., 2005, Mechanics of fluids. London: Taylor & Francis.
Gerhart, philip M., 1992.Fundamentals of fluid mechanics. Massachusetts: Addison-Wesley. Doughlas, John F., 1995. Fluid mechanics, Harlow, Essex, England: Longman.
Janna, William S., 1993, Introduction to fluid mechanics. Boston, MA: PWS.

KM21102 ENGINEERING THERMODYNAMICS

The objectives of this course are to provide a foundation for students to produce work from heat by classical application of thermodynamics and to address critical twenty-first century issues such as fossil fuel development and greenhouse gas emissions and air and water pollution. Students also will be introduced to the thermodynamic properties and behavior of substances: internal energy, enthalpy, entropy, real gas, ideal gas and perfect gas behavior. Fundamentals of work and heat transfer, and the ability to apply the First and Second Laws of thermodynamics will be addressed. Students will be exposed to the concepts of theoretical efficiency limits, and introduced to power and refrigeration cycles.

References

Michael J. Moran & Howard N. Shapiro. Fundamentals *of Engineering Thermodynamics.* 6th Edition. John Wiley & Sons: USA.
Cengel Y.A. and Boles M.A. 2007. Thermodynamics: An Engineering Approach, 6th Edition. McGraw-Hill: USA.
Potter, M.C. and Scott, E.P. 2004. Thermal Sciences. An Introduction to Thermodynamics, Fluid Mechanics and Heat Transfer, Thomson's books/Cole:USA
Russell, L.D. and Adebiyi, G. A. 1993. Classical thermodynamics, International Ed. Saunders College publishing; USA
Sonntage, R.E., Borgnakke, C., and wylen, G.C.V.1998. Fundamentals of Thermodynamics, 5th Ed. John Wiley & Sons: USA.
Grant I. and Buckius R. 1992. Engineering Thermodynamics, 5th Ed. Prentice-Hall: USA.
Howell J. and Buckius R. 1992. Fundamentals of Engineering thermodynamics, 2nd Ed. McGraw-Hill: USA.
Rogres G.F.C. and Mayhew Y.R. 1992. Engineering Thermodynamics, Work & Heat Transfer, 4th Ed. Longman: UK.
Black W.Z. and Hartley J.G. 1966. Thermodynamics,3rd Ed. SI Version. Addison Wesley:USA.

KM21303 ENGINEERING PROGRAMMING

This course is an introduction to programming using C++ programming language. It introduces students to design and develop basic program using C++ programming language. The topics cover introduction to computers and C++ programming language i.e. Classes, Objects, Strings, Control statements, Functions, Recursion, Arrays, Vectors, Pointers, File processing, Searching and Sorting.

References

Deitel, P., Deitel, H. and Sengupta, P. (2010). C++ How to Program (8th ed.). Prentice Hall: England.
Malik, D.S. (2011). C++ Programming From Problem Analysis to Program Design (6th ed.). Cengage Learning: USA.
Forouzan, B.A. and Gilberg, R.F. (2004). Computer Science: A structured approach using C++. Thomson: USA.

KM21503 ELECTRICAL TECHNOLOGY

This course is a foundation course for non-electrical and electronics/computer engineering undergraduate students. This course describes the principles of electricity such as current, voltage, resistance and power. These principles are then applied to series, parallel, dc and ac circuits consisting of resistors, capacitors or inductors. This course also covers transformer and three phase systems in power application. Circuit software is used for simulation and verification of the electrical circuits' problems.

References

Thomas L. Floyd and David M. Buchla. 2010. Electric Circuits Fundamentals. Pearson Prentice Hall. Robert L. Boylestad. 2010. Introductory Circuit Analysis. Pearson Prentice Hall.
Edward Hughes. 2005. Hughes Electrical and Electronic Technology. Pearson Prentice Hall.

KM21603 APPLIED THERMODYNAMICS

Applied Thermodynamics is a continuation of Engineering Thermodynamics. This subject is to reinforce the student's understanding of basic thermodynamic principles and emphasizing on the effective use energy resources, giving a general treatment of blade design while still stressing the differences in design procedures for steam and gas turbines, positive displacement machines and reciprocating internal-combustion engines, and on refrigeration.

References

Eastop and McConkey, Applied Thermodynamics for Engineering Technologists,5th ed., Pearson Education Limited, England 1993.
Çengel, Y. A. and Boles, M. A., Thermodynamics: an Engineering Approach, 5th ed., The McGraw-Hill Companies, New York, © 2006.
Michael J. Moran, Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 6th Edition , John Wiley, New York 2007.
Nag P K, Engineering Thermodynamics, 3rd Edition, Tata Mcgraw Hill Publishing Company Limited, India, 2005.
Rogers, G and Mayhew, Y. Engineering Thermodynamics, 4th Edition, Longman Group Limited, Singapore, 1992. David Dunn, Fundamental Engineering Thermodynamics, Pearson Education Limited, London, 2001.

KM30005 INDUSTRIAL TRAINING

Industrial Training is a required course for all the students in the Faculty of Engineering (FKJ). It is compulsory for students who have completed their 6th semester of study to undergo their industrial training. This industrial training is a full time attachment with the industry or any government body. It is 5-credit hour course (equivalent to 10 weeks) for Engineering students. FKJ uses grades of Pass with Distinction (Lulus dengan Cemerlang), Pass (Lulus) or Fail (Gagal) to indicate the level of student achievement in industrial training. This grade will not contribute to the cumulative grade point average (CGPA).

KM30303 MACHINES AND POWER

This course begins with the fundamentals of mechanics, which will provide the students the basic knowledge required to understand electromechanical energy conversion and to relate the speed, power and torque of rotational systems. Electric machine principles, construction, analysis, characteristics, and applications of transformers, dc motors, dc generators, induction motors, and special purpose motors are covered in detail. Fundamentals of power electronic devices and power converters are discussed. The course also deals with the power generation, transmission and distribution systems.

References

Stephen J. Chapman. 2004. Electric Machinery Fundamentals 4th Edition. McGraw-Hill.
Syed A. Nasar. 1995. Electric Machines & Power Systems –Volume 1: Electric Machines. New York. McGraw-Hill Inc. Theodore Wildi. 2002. Electrical Machines, Drives, and Power Systems. 5th Edition. Prentice Hall.

KM30502 ENGINEERING STATISTICS

This course introduces the fundamentals statistical concepts and methods, and their applications in engineering. The scope of the course covers from the basic concepts of descriptive statistics, probability, discrete and continuous distributions to the statistical methods sampling and hypothesis testing, statistical inference, empirical models, and regression analysis. Emphasis is placed on being able to understand and apply some useful statistical methods in empirical research of engineering importance via exercises of collecting, measuring, organising and make use of the data for prediction and control.

References

Navidi, W., 2006. Statistics for Engineers and Scientists. New York: McGraw-Hill. Navidi, W., 2006. Statistics for Engineers and Scientists. New York: McGraw-Hill.
Mendenhall, W. & Sincich, T. 1995. Statistics for Engineering and the Sciences, 4th ed. New Jersey: Prentice-Hall. Kinney, J. J. 2002. Statistics for Science and Engineering. Boston: Addison Wesley.
Devore, J. L. & Farnum, N. R. 1999. Applied Statistics for Engineers and Scientists. Pacific Grove: Duxbury Press. Johnson, R. A. 2005. Miller & Freund's Probability and Statistics for Engineers, 7th ed. New Jersey: Prentice-Hall.

KM30603 MECHANICAL VIBRATIONS

Fundamental Vibration Elements; 1-DoF System; 2-DoF and Higher Order Systems; Analysis of Free, Forced, and Damped Vibration Systems; Vibration Transmission, Isolation, and Measurement; Non-dimensional Analysis; Normal Modes and Methods of Analysis and Solution; Engineering System Design with Human as Integral part of Vibration System.

References

Giancarlo Genta. 2009. Vibration Dynamics and Control. Springer Science+Business Media, New York.
Kenneth G. McConnell. 2008. Vibration Testing – Theory and Practice (2nd edition). John Willey & Sons, Inc., New Jersey. Lawrence N. Virgin. 2007. Vibration of Axially Loaded Structures. Cambridge University Press, New York.
William J., III Palm. 2007. Mechanical Vibration. John Willey & Sons, Inc., New Jersey.
Singiresu S., Rao. 2007. Vibration of Continuous Systems. John Willey & Sons, Inc., New Jersey. Clarence W. de Silva. 2005. Vibration and Shock Handbook. CRC Press, Florida.
Singiresu S., Rao. 2004. Mechanical Vibrations (4th edition – International edition). Pearson Education, Inc., New Jersey.

KM30903 MECHANICAL DESIGN

This course is a basic course to learn about the design of elements, selection of materials for manufacturing considerations,. which requires the knowledge of stresses in the elements, theory of failures generally happens if the data is not taken for the design.

References

RICHARD G. BUDYNAS & J. KEITH NISBETT "SHIGLEY'S MECHANICAL ENGINEERING DESIGN" EIGHT EDITION SI UNITS.
KHURMI R.S. & GUPTA J.K. "MACHINE DESIGN" EURASIA PUBLISHING HOUSE (PVT.) LTD, RAM NAGAR, NEW DELHI 110055, INDIA.
Mott, R "Machine Elements in Machine Design" 3 e, John Willey, 1999.

Junival R C “Fundamentals of Machine components Design” John Willey 2002.
Nortan R L “Machine Design – an integrated approach” 3 e, Pearso’Prentice Hall 2006.
Ansel C Ugural “Machine Design “ McGraw Hill 2003.
Bernard J Hamrock “ Fundamentals of Machine Elements “ McGraw Hill, 2005

KM31003 INTEGRATED DESIGN PROJECT

This course is the extension of KM30903 in which students learn how the power transmission can be estimated, select of gears for reduction of speeds, select of bearings depending on the loads, and other parts which are required to design complete system.

References

Richard G. Budynas & J. Keith Nisbett, 2011. *Shigley’s Mechanical Engineering Design, 9 ed*. Singapore: McGraw Hill.
Robert L. Mott, 2006. *Machine Elements in Mechanical Design, 4 ed*. Singapore: Prentice Hall.
Joseph E. Shigley & Charles R. Mischke, 2001. *Mechanical Engineering Design, 6 ed.* Singapore: McGraw Hill
R.S. Khurmi & J.K. Gupta, 2005. *A Textbook of Machine Design, 14 ed*. Singapore: McGraw Hill
Roboert C. Juvinall, Penterjemah: Badrul Hisham Ismail, 1993. Asas Reka Bentuk Komponen Mesin, Kuala Lumpur: DBP
Robert L. Norton, 2007. *Kinematics and Dynamics of Machinery, 5 ed*. Singapore: McGraw Hill

KM31101 LAB III

This laboratory course covers experiments that highlight the concepts taught in Electrical Technology, Electrical Power and Machines, and Measurement and Instrumentations. Students are evaluated based on the reports for each experiment. Students are required to record the data in the logbook during the experiment.

References

Laboratory manual and textbooks used for subjects within KM31101
References used for subjects within KM31101

KM31401 LAB IV

The third year students are required to do 9 labs related to fluid mechanics, thermodynamics and vibrations , and write two formal reports.

References

Y. A. Cengel and J. M. Cimbala, Fluid Mechanics Fundamentals and Applications, McGraw-Hill. J.F. Douglas, J. M. Gasiorek and J. A. Swaffield, Fluid Mechanics, Pearson Prentice Hall.
Singiresu S., Rao. 2004. Mechanical Vibrations (4th Edition – International Edition). Pearson Education, Inc New Jersey. Singiresu S., Rao. 2007. Vibration of Continuous Systems. John Willey & Sons Inc, New Jersey.
David Dunn. 2001. Fundamental Engineering Thermodynamics, Longman.

KM31503 MEASUREMENT AND INSTRUMENTATION

This course provides students with a fundamental knowledge of the concepts involved in measurement techniques and data analysis. Given the basic concepts of the generalized performance characteristics of instruments, the course will provide the student with the fundamental knowledge of the measuring devices used in the field of the mechanical engineering. In parallel, numerical/analytical models are developed and their predictions are used to compare with the experimental findings. As such, the students learn to interpret the measurements in terms of the fundamental physics of the system.

References

Dunn, F.P. (2005), Measurement and Data Analysis for Engineering and Science, International Edition, McGraw-Hill Nakra, B.C. & Chaudhry, K.K. (2010), Instrumentation Measurement and Analysis, 3rd Edition, Mc Graw Hill
Figliola, R.S. & Beasley, D.E., Theory and Design for Mechanical Measurements, 3rd Edition, John Wiley & Sons, Inc.
Dally, J.W., Riley W.F., & McConnell, K.G. (1993), Instrumentation for Engineering Measurements, 2nd Edition, John Wiley & Sons, Inc.

KM31703 CONTROL ENGINEERING

This course will introduce concepts of control systems. Basic definition and system modeling will be discussed. Laplace Transform is reviewed to show the transformation of time domain to frequency domain. Computer aided design using MATLAB software is introduced. Analysis of control system will be carried out in time and frequency domain. Analysis of time domain is demonstrated using root locus method. While in the frequency domain, techniques such as Bode plot will be used for analysis.

References

Dorf C.D. and Bishop R.H. (2008), *Differential Equations with Boundary Value Problems*, 11th Edition, Pearson.
Norman S. Nise (2004), *Control Systems Engineering*, 4th Edition, McGraw-Hill.
Katsuhiko Ogata, *Modern Control Engineering*, Prentice Hall.

KM32003 FINITE ELEMENT METHOD

Review of solid mechanics fundamentals and of matrix algebra; Elementary derivation of finite element methods by direct, weighted residual, and minimum total potential energy formulations; Finite element interpolation functions; natural and isoparametric coordinates; Derivation of strain- displacement relations and calculation of element stresses; Assembly and solution of system matrices; Application of constraints and local coordinate systems; Introduction to heat transfer and vibration problems, mesh generation and finite element software in engineering applications.

References

Tirupathi R Chandrupatla, Introduction to Finite Elements in Engineering, Third Edition, Prentice Hall, 2002.
Moaveni, Finite Element Analysis, Theory and Application with ANSYS, Third Edition, PrenticeHall, 2008.

KM32203 COMPUTER AIDED ENGINEERING

This course introduce students to computer aided design (CAD), which describe the use of computer systems to assist in the creation, modification, analysis or optimization of design. The course exposes the students to CAD and develops the student's computer skills in using CAD software which roughly includes 2D drafting, 3D modeling and engineering simulation. Students are evaluated based on the assignments given which to be completed on a given time. One complete project reports are expected to be completed and submitted by end of the semester for evaluation.

References

Lecture Notes & Modules.
Saxena, A., and Sahay. B., 2005. Computer Aided Engineering Design. New York: Springer.
Donnie G., AutoCAD 2012 and AutoCAD LT 2012: No experience required. Hoboken, N.J. : Willey.
Lombart, M., 2010, Solidworks 2010 bible. Indianapolis, IN: Wiley Pub.
Jankowski, G., 2008, Solidworks for Dummies. Hoboken, N.J.: Wiley Pub.

KM32403 MICROPROCESSORS AND ELECTRONICS

The course is divided into two sections:
Digital electronics (Digital number systems and its arithmetic operations, Logic gates and combinational logic gates design, and sequential logic circuit)
Microprocessors, which contains of fundamentals of 80386 Intel Microprocessors architecture, programming and hardware.
The first section (Digital electronic part) is referring to practical applications of the theory, as it will be used in the later microprocessor chapters. Both sections are interrelated in terms of the contents and continuously for understanding the basic microprocessor-based system.

References

Thomas Floyd. 2003. Digital Fundamentals. 8th Edition. Prentice-Hall.
Barry B. Brey. 2003. The Intel Microprocessors: 8086/8088, 80186/801088, 80386, 80486 Pentium, Pentium Pro Processors, Pentium II, Pentium III, Pentium 4. 6th Edition. Prentice-Hall.
William Klietz, 2003. Digital & Microprocessor Fundamentals: Theory & Applications. 4th Edition. Prentice-Hall.

KM00303 ETHICS AND LAW FOR ENGINEERS

The course is a combination of two areas of studies: ethics and law. In this course, the subject of ethics will be taught at more depth and length, whilst the subject of law is taught at an "awareness and mindful" level. Further only laws that frequently impact the engineering profession will be taught. The course covers both business and engineering ethics.

References

Beuchamp, L. Tom; Bowie, E. Norman; Ethical theory in business, 7th Edition Pearson Education/Prentice hall, 2004
Jenning, M. Marianne, Business ethics, 4th edition, Thomson Learning, 2003
Betty, F. Jeffry; Samuelson, S. Susan; Business law and the legal environment, Alt. edition, Thomson Learning, 2002.
Donaldson, Thomas; Werhen, H. Patricia; Cording, Margaret; Ethical issues in business, 7th edition, 2002
Hartman, P. Laura; perspectives in business ethics, 3rd Edition, McGraw Hill, 2005.

KM00403 MANAGEMENT AND ACCOUNTING FOR ENGINEERS

The course aims to introduce management and management accounting concepts to the Mechanical Engineering students. As an engineer ability to manage a project is very significant. Therefore, this course starts by introducing the project management concept, then emphasizing on the operations management before finally presenting the management accounting concepts. In the operations management, discussions centers on the 10 strategic operations management decisions; design of good and services, managing quality, process strategy, location strategies, layout strategies, human resources, supply chain management, inventory management, scheduling and maintenance. In the management accounting, emphasis is given to the cost management techniques, decision making techniques and the provision of engineering information in a financial format as a form of management support.

References

HEIZER, JAY & RENDER, BARRY, 2014. OPERATIONS MANAGEMENT: SUSTAINABILITY AND SUPPLY CHAIN MANAGEMENT. 11TH GLOBAL EDITION, BOSTON, PEARSON.
ABDUL AZIZ, ROZAINUN, CHE PUTEH, CHE HAMIDAH, RAJAMANOHARAN, INDRA DEVI & THIRUMANICKAM, NAGARETHNAM, 2015. MANAGEMENT ACCOUNTING. 2ND EDITION, KUALA LUMPUR, OXFORD.
Kamaluddin, Norlida, Hassan, Za'fran, Abdul Wahab, Rabiah & Mohd Hussein, Rohaya, 2014. Principles of Management. 2nd Edition, Kuala Lumpur, Oxford.
Horngren, C.T., Sundem, G.L. And Stratton, W. O. 2005. Introduction to Management Accounting. 13th Edition, New Jersey, Pearson Prentice Hall.
Krajewski, Lee J., Ritzman, Larry P., Malhotra, Manoj K., 2010. Operations Management: processes and supply chains. 9th Edition, New Jersey, Pearson.
McClain, J.B. and Thomas, L.J., 1985. Operations Management. New Jersey, Prentice Hall.

KM40002 PROJECT I

The final year project gives students the opportunity to put into personal practice the knowledge and skills acquired throughout the Mechanical Engineering program. Students gain experience of independent enquiry and investigation of a practical engineering problem, application or topic. Each project is separate, though some projects have teamwork elements - for example, as part of the work of a research group. Personal skills are developed in relation to practical works, project management and technical writing.

KM40004 PROJECT II

This course requires the students to handle a project on their own. Students will gain an experience of problems identification using their engineering knowledge and laying out realistic plan to tackle the problems systematically. In Project 2, students will need to further their research in Project 1 and subsequently finish their project. They will be exposed to various people/tools while working on the project, which require them to communicate and learn on their own. At the end of the course, students are required to present their project in both written (thesis document) and oral (project presentation) forms.

KM42703 MANUFACTURING ENGINEERING AND TECHNOLOGY

This course aims to provide students with an understanding and appreciation of the breadth and depth of the field of manufacturing, and the strong interrelationships between manufacturing processes, product design, material properties and production line system. It will introduce some traditional manufacturing processes such as casting, forming, lathing, milling, polymer injection molding, and emerging manufacturing processes such as layer manufacturing, surface mouth technology, manufacturing and nano-manufacturing. It will also discuss the need of flexibility inside the organization by using computer in manufacturing system, modern digital technologies used in manufacturing such as computer-aided design and engineering, computer-numerical control,Coding system and classification, group technology, Introduction to system and integration FMS, NC, DNC, CNC. Material handling, production management and advance factory system strategy and computer integrated manufacturing. Group projects are designed to prepare the students to gain understanding of how everyday products are designed and manufactured. the difference between conventional machining, universal, NC and special machining. This course also discuss about quality assurance and the quality implementation tools. TQM, TQC, 5S, ISO9000, Taguchi Method.

References

Serope Kalpakjian, 6/e, 2009, Manufacturing Engineering & Technology, Addison Wesley.
John A Scheyt, 2000, Introduction to Manufacturing Process Third Edition, McGraw Hill.
R.L. Timings, 3/e, 1999, Manufacturing Technology Volume 1, Longman.
Serope Kalpakjian, 2003, Manufacturing Process for Engineering Material, Prentice Hall.
David Bedworth, Mark Henderson & Philip Wolfe, International Edition, Computer Integrated Design & Manufacturing, McGraw Hill

R.L. Timings, 1993, Manufacturing Technology Volume 2, Longman
James A. Rehg 1997. Introduction to Robotics In CIM System. Prentice Hall McGrew-Hill
Nanfara, F. Uccello, T. and Murphy D. 2004. The CNC Workshop – A Multimedia Introduction to CNC. Addision-Wesley: USA.
Joseph S. Martinich1997. Production and Operation Management. An Applied Modern Approch. Wiley
Mikell P Groover, 2000, Fandumental of Modern Manufacturing, Materials, Processes and Systems. Prentice Hall

KM42901 LAB V

This laboratory course covers experiments to highlight the concepts taught in Microprocessor and Electronics, and Control Engineering. Students are evaluated based on the reports written for each experiment. Two complete lab reports are expected to be completed and submitted by end of the semester to be evaluated.

KM44203 HEAT TRANSFER

This course discusses the fundamentals of heat transfer including three modes: conduction, convection and radiation. In conduction mode, steady-state and unsteady state heat transfer are covered for one dimension. For a convection mode, it is divided into categories; free and forced convection heat transfer applied in laminar and turbulent flow either external or internal flows. Radiation heat transfer includes the equations for overall emissitivity and view factor (F) for simple planes that are in common geometric relationships with each other. Different types of heat exchangers are also discussed including their designs.

References

Yunus A. Cengel, Afshin J. Ghajar (2015), Heat & Mass Transfer: Fundamentals and Applications, 5th Edition in SI Units, McGraw-Hill Higher Education, Singapore.
Yunus A. Cengel (2008), Introduction to Thermodynamics and Heat Transfer, 2nd Edition, McGraw-Hill Higher Education J.P. Holman (2010), Heat Transfer, 10th Edition, McGraw-Hill Education, Singapore.
Frank Kreith, Raj M. Manglik & Mark S. Bohn (2011), Principles of Heat Transfer, 7th Edition, Cengage Learning, USA.
Dr. Harimi Mohamed (2007/2008), Heat Transfer KM4313: Elective I.

KM42103 INDUSTRIAL AUTOMATION

This course is one of the elective courses for mechanical engineering student who is specializing in Control & Automation. It covers the area of fundamentals of manufacturing and automation which includes the production operations and automation strategies. High volume production system is also introduced which emphasized on automated assembly system. Industrial robotics is also covered in the aspects of robot technology, robot programming and robot applications. Another area covered in this course is the material handling and storage which will expose the students on the aspects of automated materials handling and automated storage systems. The students will also learn the group technology and flexible manufacturing systems encompassing the group technology and flexible manufacturing systems. In the aspect of control system, programmable logic controllers are taught and practical laboratory experiences are provided. This course also coves the area of computer integrated manufacturing. This course will also expose students to the industrial environment in their case study visit to the industry.

References

M. P. Groover, 1992. Automation, Production Systems and Computer Integrated Systems, Prentice Hall, NJ
Frank D. Petruzella, 2005. Programming Logic Controllers, McGraw Hill, NY
John W. Webb & Ronald A. Reis Programmable logic Controllers: principles and applications. Prentice Hall,

KM43903 INDUSTRIAL ENGINEERING

The course aims to introduce industrial engineering techniques and their applications in production or operations. Specifically, the course covers topics on work study and measurement, ergonomics in job design, production planning and control, inventory management, scheduling and forecasting, facilities planning, project management and quality control. In addition, illustrations on the applicability of selected industrial engineering techniques for process improvement are also presented.

References

Panneerselvam, R. 2006. Production And Operations Management, 2nd Edition, New Delhi, Prentice Hall.
Krajewski, Lee J., Ritzman, Larry P., Malhotra, Manoj K., 2010. Operations Management: processes and supply chains. 9th Edition, New Jersey, Pearson.
McClain, J.B. and Thomas, L.J., 1985. Operations Management. New Jersey, Prentice Hall.
Chase, R.B., Aquilano, N. J., 1985. Production and Operations Management, 4th Edition, Richard D. Irwin Inc.
Richard, T. J., 1985. Production Operation Management: Concepts, structure and analysis. New York: McGraw Hill.
Nahmias, Steven 2001. Production and operation analysis. 4th Edition, McGraw-Hill, International.

KM44103 MACHINING PROCESSES

This course provides students with basic knowledge and principles in the modern material removal process. In this course, students use the basic principles of metal cutting into practical applications through various labs using lathe machines, CNC milling machines, grinding machines and so on. Students evaluate the machined workpiece surface finishing and dimension accuracy using metrology equipment, and examine the lubrication and cooling effects of cutting fluid.

References

John A. Schey, Introduction to Manufacturing Process, McGraw-Hill.
E. Paul. Degarmo, J.T. Black and R. A. Kohser, Materials and Processes in Manufacturing, Wiley. S. Kalpakjian and S. Schmid, Manufacturing Engineering and Technology, Prentice Hall.

KM44703 SENSOR AND VISION SYSTEM

This course examines various forms of sensors and machine vision technology commonly used in industry today for automating machinery. Topics covered include overview of industrial automation, mechanical contact sensors, non-contact proximity sensors, photoelectric and ultrasonic sensors, temperature and pressure sensors, voltage and current sensors, position and level sensors, and machine vision. Students must take Engineering Programming (KM21303) and Microprocessors and Electronics (KM31903) before proceeding with this elective course.

References

Rockis, G. and Mazur, G., Electrical Motor Controls, American Technical Publishers Inc., Illnois, 2001
Horn, B.K.P., Robot Vision, The MIT Press, 1986
Boothroyd, G., Assembly Automation and Product Design, Second Edition (Manufacturing, Engineering and Materials Processing), CRC Press, 2005
Groover, M., Automation, Production Systems, and Computer Integrated Manufacturing (3rd Edition), Pearson/Prentice Hall, 2008

KM44903 MECHATRONICS

This course is an introduction to design and develop the mechatronics systems, where mechatronics system is the integration of mechanical and electrical electronic engineering fundamental. The course covered: Introduction to Mechatronics; Modeling Electromechanical Systems; Sensors and Transducer; Data Acquisition and Controller; Actuator; Machine Vision; Case Studies of Mechatronics System: Robotics

References

Robert H. Bishop, 2007. Mechatronic Systems, Sensors and Actuators: Fundamental and Modeling, CRC Press.
Musa Jouaneh, 2012. Fundamentals of Mechatronics, Cengage Learning.
Bagad V.S., 2009. Mechatronics, Technical Publications.

KM41103 TRIBOLOGY

This course covers a solid scientific foundation on tribology and the tribological response of all types of materials, including metals, ceramics and polymers, and fundamentals of surface topography and contact, friction, lubrication, and wear. It also presents up-to-date discussions on the treatment of wear in the design process, tribological applications of surface engineering, and materials for sliding and rolling bearings. It is valuable to engineers in the field of tribology, mechanical engineers, physicists, chemists, materials scientists, and students.

References

J.A. Williams, Engineering Tribology, Cambridge University Press, 2005
I.M. Hutchings, Tribology: Friction and Wear of Engineering Materials. Edward Arnold, 1992.
Bharat Bushan, Introduction to Tribology, John Wiley and Sons, 2002
Gwidon W. Stachowiak and Andrew W. Batchelor, Engineering Tribology, Butterworth-Heinemann, 2005. Bharat Bhusan , Principles and applications of Tribology, Wiley-IEEE, 1999.
Gwidon W. Stachowiak, Wear: materials, mechanisms and practice, John Wiley and Sons, 2005.
K. C. Ludema Friction, wear, lubrication, CRC Press, 1996.

KM44303 COMPOSITE MATERIALS

This course introduces the fundamental descriptions and theories on the fabrication processes, properties, characteristics and applications of composites materials. Main topics include: fabrication processes and properties of reinforcements (mainly on fibers reinforcement), structure and properties of matrix materials, bonding and interfacial reactions between reinforcements and matrices, various fabrication processes, mechanical and functional properties of composite materials, designing composite materials and its applications.

References
D.HULL AND T.W. CLYNE, AN INTRODUCTION TO COMPOSITE MATERIALS, 2ND EDITION, CAMBRIDGE UNIVERSITY PRESS, 1996
M.F. Ashby, Materials Selection in Mechanical Design, 3rd Edition, Elsevier, 2005
J.M. Berthelot, Composite Materials: Mechanical Behavior and Structural Analysis, Springer, 1998
K.K. Chawla, Composite Materials: Science and Engineering, 2nd Edition, Springer, 1998 A.K.Kaw, Mechanics of Composite Materials, 2nd Edition, CRC, 2006
I.M.Daniel and O.Ishai, Engineering Mechanics of Composite Materials, 2nd Edition, Oxford, 2006

KM45103 ADVANCED STRENGTH OF MATERIALS

The objectives of this course is to provide an appreciation of depth of the field of advanced strength of materials and introduce advanced topics in the theory of solid mechanics through the “strength of materials approach”. Although the emphasis will be on applications, students will be tested on their understanding of the theoretical development of all formulas. An advance course in focusing on:

- The use of Goodman, and Gerber And Soderberg analysis to study fatigue fracture.
- The use of energy methods pertaining to deflection analysis.
- The application of finite element method to static structural problems.
- Stress-Strain-Temperature Relations.
- Beams, torsion, pressure vessels, plane stress and strain, stability, and fracture mechanics.
- Analysis of three-dimensional states of stress and strain in materials.

References
R. G. Budynas (1999), Advanced strength and applied stress analysis, McGraw Hill.
Arthur P. Boresi and Omar M. Sidebottom (1985), Advanced Mechanics of Materials, John Wiley and Sons.

KM44503 RENEWABLE ENERGY

This course is an elective course offered for Final Year Mechanical Engineering students to introduce the students to the basic science and terminology of various renewable energy technologies. The course covers energy conversion, utilization and storage for renewable technologies such as hydropower, wind power, solar energy, biomass, biofuel and geothermal. The course also touches upon the environmental consequences of energy conversion and how renewable energy can reduce air pollution and global climate change.

References
Aldo Da Rosa, Fundamentals of Renewable Energy Processes, Elsevier Academic Press. Godfrey Boyle (2004), Renewable Energy, 2nd Edition, OUP Oxford.
Sonntag, R.E., Borgnakke, C., and Wylen, G.C.V. 1998. Fundamentals of Thermodynamics, 5th Edition. John Wiley & Sons: USA.

KM43703 COMPUTATIONAL FLUID DYNAMICS

This course provides fundamental knowledge of computational theory and methods. The first part focuses on fundamental knowledge of numerical methods. The second part explores the application of computational fluid dynamics method in solving problems involving thermal and fluid mechanics.

References
Gautam Biswas, Somenath Mukherjee (2014) Computational Fluid Dynamics
Ku Zilati Ku Shaari, Mokhtar Awang (2015) Engineering Applications of Computational Fluid Dynamics
Dmitri Kuzmin, Jari Hamalainen (2015) Finite Element Methods for Computational Fluid Dynamics: A Practical Guide

KM42303 ACOUSTIC

This course is offered as an elective course for Final Year Mechanical Engineering students to introduce the students to the fundamentals of acoustics and a variety of applications of acoustics in engineering. An introduction to the physical nature of sound, explained in terms of common experience, to mathematical models and analytical results which underlie the techniques applied by the engineering industry to improve the acoustic performance of their products. This course also covers the application of acoustics, the science of sound and vibration, in technology including the acoustical analysis and measurement techniques, with emphasis on design applications for noise and vibration control in machinery and in buildings.

References
Frank Fahy, Foundations of Engineering Acoustics, 2001, Academic Press. L.E. Kinsler, et al., Fundamentals of Acoustics, 4th Edition, 2000, Wiley.
F.Alton Everest & Ken C. Pohlmann, Master Handbook of Acoustics, 5th Edition, 2009, McGraw-Hill. Z. Maekawa & P. Lord, Environmental & Architectural Acoustics, 1994, E & FN Spon.

KM45303 REFRIGERATION AND AIR CONDITIONING

A course in the fundamentals and application of air conditioning and refrigeration. Topics covered are psychometrics, cooling and heat load calculations, duct design, vapor compression and absorption systems, and the principles air conditioning plants and system.

References

Arora C.P, Refrigeration and Air Conditioning (International edition), Tata McGraw-Hill Publishing Company Limited, 2009.
Muthu M. I. and Chellappa S., Refrigeration and Air Conditioning, IBS Buku Sdn. Bhd., Selangor, Malaysia, 2007.
Ameen A., Refrigeration and Air Conditioning, Prentice-Hall of India Private Limited, New Delhi, 2006.
Rex M. and Mark R. Airconditioning and refrigeration, McGraw-Hill, New York 2006
Faye C. *ett. all,* Heating, ventilating, and airconditioning : analysis and design, John Wiley & Sons, Hoboken, N.J. 2005.

KM40603 FINITE DIFFERENTIAL METHODS

The present course discusses the applications of finite difference in Heat Transfer. It starts with some numerical methods such as; system of linear algebraic equations, numerical differentiation and numerical solution of ordinary and partial differential equations. The finite difference techniques are applied to steady state heat transfer for 1-D and 2-D including convection boundaries. In addition to this, unsteady state heat transfers for 1-D and 2-D using implicit and explicit form, including convection boundaries are solved using finite difference method.

References

Daniel R. Lynch. Numerical Partial Differential Equations for Environmental Scientists and Engineers. Springer, USA.
Kendall Atkinson & Weimin Han. Elementary Numerical Analysis (3rd Edition). John Wiley & Sons, New York
J.C. Butcher. Numerical Methods for Ordinary Differential Equations. John Wiley & Sons, USA
D.V. Griffiths and I.M. Smith. Numerical Methods for Engineers. CRC Press, Boca Raton
Dennis G. Zoll & Michael R. Cullen, Differential Equations with Boundary-Value Problems (5th edition).Brooks Cole, Australia
Daniel R. Lynch. Numerical Partial Differential Equations for Environmental Scientists and Engineers. Springer, USA.
Frank P. Incropera & David P. DeWitt. Introduction to Heat Transfer(3rd Edition). John Wiley & Sons, New York.

KM43803 COMPUTER AIDED MANUFACTURING

The course aims to introduce Design Modeling with computer: CAD/CAM Applications: Hardware and software components for computer automation: Advanced computer architecture used in manufacturing: manufacturing systems: Control of Manufacturing equipment: computer-controlled parts handling and assembly: principles of wire and surface Modeling, solid Modeling and finite element Modeling. In supporting organization of complex system, and the communication of data within the engineering team.

References

Chris Mcmahon & Jimmie Brown 2/E, 1998, Cad/Cam:Principles,Practice& Manufacturing Management, Addison Wesley
PN Rao, 2002, CAD/CAM,Principle and Application,McGraw Hill.
Chris McMahon & Jimmie Brown, 2/e, 1998, CAD/CAM: Principles, Practice & Manufacturing Management, Addison Wesley.
Charles E Wilson, 1997, Computer Integrated Machine Design, Prentice Hall.
CT Shaw and JT Mottram, 1996, Using Finite Element in Mechanical Design, McGraw Hill UK Title.
Tirupathi R.Chandrupatla,2002 Third Edition,Introduction to Finite Elements In Engineering, PearsonEducation International
Kunwood Lee, Principal of CAD/CAM/CAE System, 1999,Addison Wesley.

KM40403 OPERATIONAL RESEARCH

The course will introduce Operational Research techniques in the context of management decision making. Specifically, this course covers the topics on linear programming, simplex methods, transportation model, network models, and inventory models as techniques for managing operations. At the same time, the topics on queuing system and simulation modeling will also be introduced. The emphasis will be on developing theory to handle discrete decision and optimization problems. However, this course also covers the practical application as well as mathematical theory.

References

HAMDY A. TAHA, 2010. OPERATIONS RESEARCH: AN INTRODUCTION, 9th EDITION, PEARSON EDUCATION, New JERSEY.
Krajewski, Lee J., Ritzman, Larry P., Malhotra, Manoj K., 2010. Operations Management: processes and supply chains. 9th Edition, New Jersey, Pearson.

McClain, J.B. and Thomas, L.J., 1985. Operations Management. New Jersey, Prentice Hall.
Panneerselvam, P. 2006. Production and operations management, 2nd Edition, New Delhi, Prentice Hall.
Chase, R.B., Aquilano, N. J., 1985. Production and Operations Management, 4th Edition, Richard D. Irwin Inc.
Richard, T. J., 1985. Production Operation Management: Concepts, structure and analysis. New York: McGraw Hill.
Nahmias, Steven 2001. Production and operation analysis. 4th Edition, McGraw-Hill, International.

KM45003 MAINTENANCE AND MONITORING OF MACHINES

This course discusses one main topic: General Maintenance of the Operating Machine: Cost Control, Maintenance Management, House Keeping Maintenance of Mechanical Equipment, Maintenance of Electrical Equipment, Lubrication.

References

Dr Ron Barron, 1996, Engineering Condition Monitoring, Longman.
John Bentley, 2/e, 1999, Introduction to Reliability & Quality Engineering, Addison Wesley.
Lindley R Higgins, 5/e, 1994, Maintenance Engineering Handbook, McGraw Hill.
Trevor M. Hunt, 1996n Condition Monitoring of Mechanical and Hydraulic Plant, Chapman and Hall.
Jon Juel Thomsen, 1997, Vibrations & Stability, McGraw Hill.
Victor Wowk, 1999, Machinery Vibration Alignment, McGraw Hill.

KM44403 ADVANCE MANUFACTURING

The course covers the details of the advanced machining theory and practices, advanced machining processes, advanced metal forming processes, advanced welding processes and advanced foundry processes. Contents: Advanced machining theory & practices - mechanisms of chip formation, shear angle relations, and theoretical determination of cutting forces in orthogonal cutting; analysis of turning, drilling, and milling operations; mechanics of grinding; dynamometry; thermal aspects of machining; tool wear; economics of machining; processing of polymers, ceramics, and composites;
Advanced machining processes - introduction of USM, AJM, ECM, EDM, LBM, and EBM; Advanced forming processes - electro-magnetic forming, explosive forming, electro-hydraulic forming, stretch forming, contour roll forming; Advanced welding processes - EBW, LBW, USW; Advanced foundry processes - metal mould, continuous, squeeze, vacuum mould, evaporative pattern, and ceramic shell casting.

References

Serope Kalpakjian, 6/e, 2009, Manufacturing Engineering & Technology, Addison Wesley.
E. P. DeGarmo, J. T Black, R. A. Kohser, Prentice Hall of India, New Delhi (ISBN 0-02-978760)."Materials and Processes in Manufacturing" (8th Edition)
A. Ghosh, and A. K. Mallik, Affiliated East-West Press Pvt. Ltd. New Delhi, "Manufacturing Science"
G.F. Benedict, Marcel Dekker, Inc. New York (ISBN 0-8247-7352-7), Nontraditional Manufacturing Processes"

KM42203 SURFACE ENGINEERING

Recent advances in surface engineering and coating technologies have led to the development of a new breed of nano-structured and/or -composite coatings that can meet the increasingly multifunctional application needs of future mechanical systems. Some of these coatings are truly super-hard and - lubricious, hence are well-suited for demanding transportation and green manufacturing applications. Surface treatment methods are now combined with multilayer coating architectures to meet the ever increasing application requirements of critical engine parts and components. Furthermore, a new generation of nano-structured diamond, diamondlike and carbide derived carbon films is also available and can be used for various advanced microelectronics, biomedical and optical applications. The primary goal of this course is to provide a comprehensive overview of the latest developments in surface engineering and coating technologies in chemical vapor deposition (PVD and CVD) processes.

References

Surface Engineering: Surface Modification of Materials (Nato Science Series E:) by R. Kossowsky and S.C. Singhal
Surface Engineering Casebook: Solutions to Corrosion and Wear-Related Failures by J S Burnell-Gray and P K Datta (Woodhead Publishing)
Introduction to surface engineering by P. A. Deanley (Cambridge University Press)

KM44003 FAILURE MECHANISM

Failure mechanisms related to mechanical engineering will be introduced. The methods of the physics of failure of materials, components and structures are reviewed. The main emphasis will be given to basic degradation mechanisms through understanding the physics, chemistry, mechanics of such mechanisms. Mechanical failures are introduced through understanding fatigue, creep, yielding, buckling, wear, impact loading, crack, corrosion in materials and components and also structural resonance.

References

Jack A. Collins, Failure of Materials in Mechanical Design, 2nd Edition, 1993, John Wiley and Sons
Norman E. Dowling, 1993, *Mechanical Behavior of Materials - Engineering Methods for Deformation*, *Fracture and Fatigue, Second Edition*, Prentice Hall.
Patrick O'Conner, Practical Reliability Engineering, 3rd Edition, 1991, John Wiley and Sons, Inc.

KM44603 ADVANCED MATERIALS

This course serves as an elective subject, which the students will be introduced to the advanced materials. The scope of the course includes the introduction to the general properties, fabrication process, characterization method, and exposure to the possible application of advanced materials.

References

J. H. Koo, McGraw-Hill, New York, 2006.
M. J. Madou, Vol. 3, CRC Press, Boca Raton, 2012.
R. J. Young, P. A. Lovell, CRC Press, Boca Raton, 2011.
K. Matyjaszewski, M. Moller, E. Kumacheva, T. P. Russell, Vol. 7, Elsevier, Amsterdam, 2012.
M. J. O'Connell, CRC Press, Boca raton, 2012.

KM44803 CARBON MATERIALS TECHNOLOGY

The fundamental principles and properties of carbon have given its broad industrial application. Lectures will cover raw materials, the carbonization process, graphitization, characterization of carbon materials, oxidation processes, carbon electrodes in metallurgical and electrometallurgical industry, active carbon, carbon black, intercalation compounds, fullerenes, and graphen. Lectures will also cover areas of carbon science and technology that more recently have resulted in great scientific activity, like the use of carbon as electrode material in Li-ion batteries, supercapacitors, fuel cells, heat resistant devices, tools and metal cutters and etc..

References

Thomas L. Floyd. 2014. Digital fundamentals. 10th Edition. Pearson.
Edward Hughes. 2005. Electrical and Electronic Technology. 9th Edition. Prentice Hall.
Earl Gates. 2014. Introduction to basic electricity and electronics technology. Delmar Cengage Learning.
John Bird. 2007. Electrical and electronic principles and technology. 3rd Edition. Elsevier.
Stalin A. Boctor, et al. 1997. Electrical concepts and applications. West Publishing Company.

KM41603 NUMERICAL METHOD IN HEAT ENGINEERING

A course in the basics aspects of numerical discretization of heat transfer equation within the finite volume framework. Course activities includes understanding the numerical methods and its usage in the field of heat engineering as well as developing in-house solver and/or utilizing open source CFD software to solve complex heat engineering problems.

Rujukan

Yogesh Jaluria, 2013, Design and Optimization of Thermal Systems, CRC Press
Wilbert F. Stoecker, 2011, Design of Thermal Systems (Third Edition), Mc-GrawHill
W. J. Minkowycz, E. M. Sparrow, J. Y. Murthy, 2006, Handbook of Numerical Heat Transfer, John Wiley & Sons Ltd.
Robert F Boehm, 1987, Design Analysis of Thermal Systems, Wiley
Suhas V. Patankar, 1980, Numerical Heat Transfer and Fluid Flow, Hemisphere Publishing Corporation

KM41003 INTERNAL COMBUSTION ENGINES

This course discusses main topic: Energy Conversion in ICE, Engine Component, Application of ICE, Engine Parameters. Basic Principles in ICE, Air- Fuel Cycle And Analysis, Fuel, Alternative Fuel, Carburation, Engine Friction and Lubrication, Heat Rejection and Cooling System, Measurement and Testing in ICE, Supercharging, Turbocharging and Performance parameters.

References

1. V GANESAN 2012, *Internal Combustion Engine*, Mc Graw Hill.
2. John B. Heywood, 2011 *Internal Combustion Engine Fundamentals*, Mc Graw Hill.
3. Willard W. Pulkrabek 2009, *Engineering Fundamentals of the Internal Combustion Engine,* Prentice Hall.

KM41803 AERODYNAMICS

The course is an advanced study of fluid dynamic concepts, focuses on the analysis and modelling of aerodynamics, particularly in wind energy. The course blends aerodynamic theory and computational methods used for the design of airfoils and state-of-the-art wind turbines. The course takes on the analysis of wind turbine performance according to momentum-based theories with detailed characterization of the aerodynamics of the wind turbine blade. Optimisation according to the blade element momentum theory and other guidelines will be included. Elements involved in wind turbine projects, including meteorology and wind resource assessment; are introduced to learn the fundamental of wind energy and how large-scale dynamics and local site conditions are affecting the wind turbine performance will be explored. Students must have knowledge in fluid dynamics, programming and computational fluid dynamics before proceeding with this elective course.

References

Hansen, M.O.L., Aerodynamics of Wind Turbines, Earthscan Ltd, 2007.
Ivanell, S., and Sørensen, J.N., Wind Turbine Aerodynamics, 2010.
Manwell, J.F., McGowan, J.G., Rogers, A.L., Wind Energy Explained: Theory, Design and Application, 2nd Edition, John Wiley & Sons, 2010.

ELECTRONIC (COMPUTER) ENGINEERING PROGRAMME (HK20)

KS04403 CALCULUS I

The purpose of this course is to equip students with fundamentals and applications of calculus in solving a variety of engineering-related problems. This course will also provide students with mathematical knowledge needed to support their concurrent and subsequent engineering studies.

References

Thomas, G.B., Weir, M.D. and Hass, J.R, (2010). Thomas' Calculus. 12th Edition. Global Edition. Pearson Addison Wesley. Boston
Tan, S.T., (2010). Calculus. International Edition. Brooks/Cole Cengage Learning. USA
Stewart, J. (2008), Early Transcendentals Calculus. 6th Edition. Thomson Brooks/Cole. USA.

KS05503 CALCULUS II

The intent of this course is to provide an in-depth appreciation of advance differential and integral applications involving
complex algebraic and trigonometric phenomena. Application of dot and cross products in vector value function, TNB frame, vector analysis in projectile motion and polar curves, and multiple integral in calculating area, volume and vector fields are among the major topics in this course.

References

Thomas, G.B., Weir, M.D. and Hass, J.R, (2010). Thomas' Calculus. 12th Edition. Global Edition. Pearson Addison Wesley. Boston.
Stewart, J. (2008), Early Transcendentals Calculus. 6th Edition. Thomson
Brooks/Cole. USA. Tan, S.T., (2010). Calculus. International Edition. Brooks/Cole
Cengage Learning. USA

KS06603 ENGINEERING PROGRAMMING

This course is an introduction to programming using C++ programming language. It introduces students to design and develop basic program using C++ programming language. The topics cover introduction to computers and C++ programming language i.e. Classes, Objects, Strings, Control statements, Functions, Recursion, Arrays, Vectors, Pointers, File processing, Searching and Sorting.

References

Deitel, P., Deitel, H. and Sengupta, P. (2010). C++ How to Program (8th ed.). Prentice Hall: England.
Malik, D.S. (2011). C++ Programming From Problem Analysis to Program Design (6th ed.). Cengage Learning: USA. Forouzan, B.A. and Gilberg, R.F. (2004). Computer Science: A structured approach using C++. Thomson: USA.

KS08803 ETHICS AND LAW FOR ENGINEERS

The course is a combination of two areas of studies: ethics and law. In this course,the subject of ethics will be taught at more depth and length, whilst the subject of law is taught at an "awareness and mindful" level. Further only laws that frequently impact the engineering profession will be taught. The course covers both business and engineering ethics.

References
Beuchamp, L. Tom; Bowie, E. Norman; Ethical theory in business, 7th Edition Pearson Education/Prentice hall, 2004 Jenning, M. Marianne, Business ethics, 4th edition, Thomson Learning, 2003
Betty, F. Jeffry; Samuelson, S. Susan; Business law and the legal environment, Alt. edition, Thomson Learning, 2002. Donaldson, Thomas; Werhen, H. Patricia; Cording, Margaret; Ethical issues in business, 7th edition, 2002 Hartman, P. Laura; perspectives in business ethics, 3rd Edition, McGraw Hill, 2005.

KS09903 MANAGEMENT AND ACCOUNTING FOR ENGINEERS

This course touches on engineering management aspects from the accounting perspective. An engineer needs to understand different approaches in planning, organisation, control and performance measurement as support in the process of product manufacturing and the provision of services. This course will also take a general approach in introducing the function of financial statements, taxation and audit, as well as financial information analysis and its relevance to the engineering discipline and professional environment. Emphasis is given to cost management techniques, decision-making techniques and the provision of engineering information in a financial format as a form of management support with an introduction to General Management and Project Management.

References
Horngren, C.T., Sundem, G.L. and Stratton, W.O. (2005). Introduction to Management Accounting (13th ed.). Pearson Prentice Hall:New Jersey.
Lucey, T. (2002). Costing. (6th ed.) DP Publications Ltd.
Atkinson, A.A, Kaplan, R.S. and Young, S.M. (2004). Management Accounting. (4th ed.). Pearson Prentice-Hall: New Jersey. Garrison, R.H., Noreen, E.W. and Brewer, P.C. (2006). Managerial Accounting (11th ed.) McGraw-Hill.
Various journal articles to be provided from time to time.

KS30005 INDUSTRIAL TRAINING (LI)

Industrial Training is a required course for all the students in the Faculty of Engineering (FKJ). It is compulsory for students who have completed their 6th semester of study to undergo their industrial training. This industrial training is a full time attachment with the industry or any government body. It is 5-credit hour course for Engineering students and 12-credit hour course for Information Technology students. At the completion of their industrial training, students will be awarded a Pass/Fail grade.

KS40002 PROJECT I

Project, or Final Year Project (FYP), is an investigative undertaking, which culminates all the fundamental knowledge and skills a student has acquired during the course of their studies. Each student is expected to demonstrate the abilities to organize experiential learning, which includes design work, conducting experiments or other suitable activities. In Project I, student sets out to understand the problem through literature review, draw up a proposal, and plan for the methodology for the project they are undertaking.

References
Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah, 2016.

KS40004 PROJECT II

Project II is the continuation from Project I, whereby students conduct various activities to investigate and adapt the course of their research project, through the results and findings they obtain through simulation and/or laboratory experiments. Students are required to submit a report with detailed description of their work, findings, and providing critical analysis of the results they obtained. Students will also need to present their findings.

References
Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah, 2016.

KS10503 ELECTRIC CIRCUITS ANALYSIS

This course introduces the students the basic of electric circuits encompasses the ac circuits (sinusoidal and phasor, sinusoidal steady-state analysis, ac power analysis, and frequency response). Other topics included are advanced techniques for network analysis, which provide students with introduction to Laplace transform.

References
Alexander C. K. & Sadiku M. N. O., 2007. Fundamentals of Electric Circuits. 3rd Edition. McGraw-Hill.
Nilsson J. W. & Eiedel S. A., 2005. Electric Circuits. 7th Edition. Pearson Prentice Hall, New Jersey.
J. David Irwin & R. Mark Nelms, 2005. Basic Engineering Circuit Analysis. 8th Edition. John Wiley & Sons, Inc.

KS10701 ENGINEERING WORKSHOP

The lab begins with general Safety Briefings before students actually enter any laboratory. Next briefing will be very specific to lab safety. The rest of the course will be on basic electronics circuit project development. At the end of the course, small electronics circuit will be assigned to all students and report will be submitted.

References

C. Robertson. PCB Designer´s Reference. Prentice Hall, 2003.
C. Coombs, Printed Circuits Handbook, McGraw-Hill Professional, 6 edition, 2007.

KS12003 ANALOG ELECTRONICS

This course provides an introduction to electronic devices and circuits which encompasses the fundamental elements and concepts of Diode, Bipolar Junction Transistor (BJT), Junction Field-Effect Transistor (JFET) and Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET), Operational-Amplifiers and Power Amplifiers.

References

Thomas L. Floyd, “Electronic Devices, 9th Edition, Pearson.
Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 11th Edition, Pearson.
Muhammad H. Rashid, “Microelectronic Circuits – Analysis and Design”, 2nd Edition, Cencage Learning.

KS14003 DISCRETE MATHEMATICS

This course provides fundamental knowledge required for a first-year students in math and computer science. Students will be learning to think and write mathematically. Besides that, students are required to solve basic concepts in Sets, Boolean Algebra, Function, Relations, Combinatorics, Probability, Graphs and Tree.

References

Bernard Kolman, Robert C. Busby & Sharon Cutler Ross. 2009. Discrete Mathematical Structures. Pearson Prentice Hall. Douglas E. Ensley & J. Winston Crawley. 2006. Discrete Mathematics: Mathematical Reasoning and Proof with Puzzles, Pattern and Games. John Wiley.
D.S. Malik & M.K. Sen.2010. Discrete Mathematics: Theory and Applications. Cengage Learning.
Kenneth H. Rosen & Kamala Krithivasan. 2013. Discrete Mathematics and Its Application. McGraw-Hill.
Susanna S. Epp. 2011. Discrete mathematics with applications. Brooks/Cole Cengage Learning.

KS16001 LABORATORY I (ELECTRONICS AND CIRCUIT LAB)

Experimental exercises in use of laboratory instruments. Voltage, current, impedance, frequency and waveform measurements. Frequency and transient response. Elements of circuit modeling and design. Laboratory experiments in the measurement of electronic device characteristics. Design of biasing networks, small signal amplifiers and switching circuits.

References

R. C. Dorf, J. A. Svoboda, 2006. Introduction to Electric Circuits, 7th Ed – Wiley
R. A. DeCarlo, P. Lin, 2001. Linear Circuit Analysis – Oxford University Press
A. M. Davis, 1998. Linear Circuit Analysis – PWS Publishing Company
M. H. Rashid, 1998. Microelectronic Circuits: Analysis and Design –Brooks Cole
D. J. Comer, D. T. Comer, 2002. Fundamentals of Electronic Circuit Design – Wiley

KS20503 LOGIC DESIGN

The first part of the course introduces the students to Boolean algebra and the fundamental logic gates. Then a thorough study of combinatorial logic circuit analysis and design is given. In the second part, sequential logic circuit analysis and design is covered along with programmable logic devices and memory devices.

References

Floyd, Thomas L. Digital Fundamentals, 10th Edition, Prentice Hall. Hayes, John, P.
Introduction to Digital Logic Design, Addison-Wesley.
Mano, Morris, M., Kime, Charles, R. Logic and Computer Design Fundamentals, Prentice Hall. Brown, S.,
Vranesic, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill,
Kleitz, W. Digital Electronics, A practical Approach, Prentice Hall.

KS20703 DATA STRUCTURES AND ALGORITHMS

This course introduces data abstraction with formal specification, and elementary algorithm analysis. Basic concepts of data and its representation inside a computer are included. Data structures emphasized include linear, linked, and orthogonal lists, tree structures, and graphs. Data structures are implemented as data abstractions. In addition to gaining a conceptual understanding of how data can be organized to efficiently accomplish common data processing tasks such as sorting and searching strategies along with overall data management, students will also be trying C++ programming skills through small programming assignments that will require them to implement specific data structures.

References

Data Abstraction & Problem Solving with C++: walls & mirrors (5th ed), Carrano, F.M, Pearson Ed. 2006.

KS21303 DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

This course begins with the definition and terminology of the differential equations. Various approaches such as Direct Integration, Separable Variable, Linear Integrating Factor, Nonlinear Integrating Factor and Substitution methods are introduced to solve the linear and nonlinear first order ordinary differential equations. Next, homogeneous and non-homogeneous higher order ordinary differential equations are solved using approaches such as Complementary Functions and Particular Integral, Superposition, Reduction Order, Variation of Parameters, D-operator, Euler- Cauchy, Laplace Transform. The method of Series Solution of higher order differential equation can be used to obtain solutions through ordinary points and singular points. Homogenous and non-homogeneous first order linear systems can be solved using Undetermined Coefficients and Variation of Parameters approaches.

References

Zill D.G. and Cullen M.R. 2008. *Differential Equations with Boundary Value Problems,* 7th Edition. Thompson. [ISBN-10: 0495108367, ISBN-13: 9780495108368]

Boyce W.E. and Diprima R.C. 2008. *Elementary Differential Equations and Boundary Value Problems,* 9th Edition. John Wiley: London. [ISBN-10: 0470383356, ISBN-13: 9780470383353]

Werner E. Kohler and Lee W. Johnson 2009. *Elementary Differential Equations with Boundary Value Problems*, 3rd Edition. Addison Wesley. [ISBN-10: 0321461592, ISBN-13: 9780321461599]

Richard B. and Gabriel C. 2006. *Schaum's Outline of Differential Equations, 3rd* edition. McGraw-Hill [ISBN-13: 9780071456876]

Hunt B.R., Lipsman R.L., Osborn J.E. and Rosenberg J.M. 2005. *Differential Equations with MATLAB,* 2nd Edition. John Wiley: London. [ISBN: 978-0-471-71812-3]

KS21501 LABORATORY II (LOGIC DESIGN LAB)

This lab is to accompany the course Logic Design. As such, students will be given the opportunities to design and build combinatorial and sequential logic circuits to reinforce the theory studied at the course. In addition, through a mini project given as a part of this lab, students will be exposed to real-life design problems.

References

Floyd, Thomas L. Digital Fundamentals, 10th Edition, Prentice Hall.

Hayes, John, P. Introduction to Digital Logic Design, Addison-Wesley.

Mano, Morris, M., Kime, Charles, R. Logic and Computer Design Fundamentals, Prentice Hall.

Brown, S., Vranesic, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill,

Kleitz, W. Digital Electronics, A practical Approach, Prentice Hall.

KS21403 SOFTWARE ENGINEERING

The course is divided into three parts. The first part is product and process that provides an introduction to software engineering. The second part, describing the practice of software engineering applications and software engineering practices to develop a software. The third section describes the software project management, inclusive of topics relating to planning, managing and controlling software development projects.

References

Pressman, R.S. 2004. *Software Engineering, A Practitioner Approach,* 6th Edition. McGraw Hill,

USA. Ghezzi, C., Jazayeri, M. 1991. *Fundamentals of Software Engineering*. Prentice Hall, USA.

Safaai Deris et al. 2002. *Kejuruteraan Perisian*. McGraw Hill Education.

Bruegge, B., dan Dutoit, A. H. 2004. *Object-oriented Software Engineering using UML, Patterns and Java,* 2nd Edition. Prentice Hall, USA.

KS21803 PROBABILITY AND RANDOM PROCESS

This course contains essential topics of probability and random variables, with studies of the theories and the applications. It begins with the concepts of experiments, models, basic probability. Based on that, topics such as discrete and continuous random variables, pairs of random variables, random vectors, and sum of random variables are covered. It also provides a brief survey on parameter estimation, hypothesis testing, and estimation of a random variable.

References
R.D. Yates and D. J. Goodman, “Probability and Stochastic Processes”, 2nd Ed., John Wiley & Sons, Hoboken, NJ, 2005.
H.P. Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables, and Random Processes”, McGraw-Hill, New York, NY, 1997.
S.Miller and D. Childers, “Probability and Random Processes: with Applications to Signal Processing and Communications”, 2nd Ed., Academic Press, 2004.
V. Krishnan, “Probability and Random Processes”, John Wiley & Sons, Hoboken, NJ, 2006.
A.Papoulis and S. U. Pillai, “Probability, Random Variables, and Stochastic Processes”, 4th Ed., McGraw-Hill, New York, NY, 2002.
A.Leon-Garcia, “ Probability and Random Process for Electrical Engineering”, 3rd Ed., Prentice Hall, 2008

KS22402 ENGINEERING PHYSICS

This course is an introductory course which will cover three main topics which are: Mechanics, Thermodynamics and the principles of electromagnetism, The course begins with general introduction to laws of physics, and then into mechanics. General topics on electromagnetic principles will be covered next. The last topics will be on thermodynamics. Thermodynamics laws will be covered as much possible.

References
M. N. O. Sadiku, Elements of Electromagnetics, Oxford, 2006
I.H. Shames, Engineering Mechanics: Statics and Dynamics, 4th Ed., PHI, 2002.
R E Sonntag, C Borgnakke and G J Van Wylen, Fundamentals of Thermodynamics, 6th Ed., John Wiley, 2003.

KS22603 COMPUTATIONAL METHODS

This course enables students to develop the required skills to formulate and solve mathematical problems using computational methods and computations. Students will also acquire an understanding and appreciation of the importance of computers and the role of approximations and errors in implementation and development of computational methods to solve complex problems.

References
Chapra, S.C. and Canale, R.P. (2006). Numerical Methods for Engineers. 5th Edition. McGraw Hill. New York.
Gerald Recktenwald (2002). Numerical Methods with Matlab.2000, Prentice Hall.
Matthews, J.H. and Fink, K.D. (2004). Numerical Methods using MATLAB. Pearson. New Jersey.

KS21502 DESIGN PROJECT I

In this course, students will work in a group to design, develop, and test a real-life application that covers both analogue and digital electronics. Students will be evaluated on their ability to work as a team to design, develop and test their prototype.

KS30903 MEASUREMENTS AND INSTRUMENTATION

This course covers static and dynamic characteristics of instrumentation system. It also covers typical measurement system elements, including sensor elements, signal conditioning elements, and signal processing elements. Sensor application topics such as flow measurement systems and ultrasonic measurement systems will also be included.

References
J. P. Bentley, 2005, Principles of Measurement Systems, 4th Edition, Pearson Prentice Hall, Malaysia.
Alan S. Morris, 1993, Principles of Measurement and Instrumentation, 2nd Edition, Great Britain: Prentice Hall.
Ernest O. Doebelin, 2004, Measurement Systems: Application and Design, 5th Edition, New York: McGraw-Hill.

KS31303 SIGNALS AND SYSTEMS

This course introduces students to the mathematical description and representation of both continuous-time and discrete-time signals and systems. Fundamental input-output relationship and convolution are explained. Various transforms and their application for LTI systems are developed.

References
Cherles L. Phillips, John M. Parrand Eve A. Riskin, 2008, Signals, Systems and Transforms, 4th Edition, Pearson Education. Simon Haykin and Barry Van Veen, 2003, Signals and Systems, John Wiley & Sons, International Edition.
Edward W. Kamen. Bonnie S. Hech, 2000, Fundamentals of Signals and Systems Using MATLAB, Prentice Hall. Douglas K. Lindner, 1999, Introduction to Signals and Systems, McGraw-Hill International Editions.
Fred J. Taylor, 1994, Principles of Signals and Systems, McGraw-Hill International Editions. Leland B. Jackson, 1991, Signals, Systems and Transforms, Addison Wesley

Alan V. Oppenheim and Alan S. WIlsky with S. Hamid Nawab, 2014, Signals and Systems 2nd Edition, Pearson New International Edition.
K. Gopalan, 2009, Introduction to Signal and System Analysis,
Cengage Learning Tarun Kumar Rawat, 2010, Signals and Systems,
Oxford Higher Education

KS31503 MICROELECTRONICS

This course is started with an explanation of semiconductor materials and properties, and the crystal structure of solids. In this course, the concept of MOS transistors and the principle of CMOS technology will be introduced and analyzed. The fabrication processes involved in the design of CMOS logic are also described. They are assisted and designed by layout design rules, Euler path and stick diagram.

References

Neil H. E. Weste, David Money Harris, Fourth Edition, 2011, Integrated Circuit Design,
PEARSON. Thomas L. Floyd, “Electronic Devices Conventional Current Version”, 9th
Edition 2014, Pearson.
Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory, 11th Edition
2014, Pearson. Donald A. Neamen, “Semiconductor Physics and Devices”, 4th Edition 2012,
McGraw-Hill.
Donald A. Neamen, “Microelectronics – Circuit Analysis and Design”, 4th Edition 2010, McGraw-Hill.
Adel S. Sedra, Kenneth C. Smith and adapted by Arun N. Chandorkar, “Microelectronic Circuits – Theory and Applications”, 5th Edition 2009, Oxford University Press.

KS32303 MICROPROCESSORS

This course introduces students to microprocessor and assembly language programming in general, and then discuss, in details, how to program in assembly language, a common microprocessor, the Intel 80386DX. Finally interfacing techniques between the Intel 80386DX microprocessor to peripheral devices is then given.

References

Brey B.B., 2009. The Intel Microprocessors, Pearson International Edition, New Jersey.
Triebel, Walter A.. 2003. The 8088 and 8086 microprocessors : programming, interfacing, software, hardware, and applications : including the 80286, 80386, 80486, and Pentium processor families, Prentice Hall
Hall D.V., 1992, Microprocessors and Interfacing: Programming and hardware, McGraw Hill,
Singapore. Uffenbeck J., 2002. The 80x86 Family Design, Programming and Interfacing, Prentice
Hall, New Jersey.
Brey B., 1996. Programming the 80286, 80386, 80486 and Pentium-based Personal Computer, Prentice Hall,
New Jersey.

KS32503 EMBEDDED SYSTEMS

This course is primarily a project-based course. It will place its emphasis to software/hardware integration and I/O programming. The MPLAB IDE assembly language is chosen to meet computation, resource, and software development. This course will gear to the integration of hardware modules to construct embedded systems, and the programming models and characteristics of various input/out interfaces.

References

Predko, M., *Programming and Customizing PIC Microcontrollers,* 2002, Mc Graw Hill USA.
Tim Wilmshurst, *Designing Embedded Systems with PIC Microcontrollers:Principles and application,* First edition 2007, Elsevier, USA.
PICmicro™ *Mid-Range MCU Family Reference Manual*, 1997, Microchip Technology Incorporated, USA.
PIC12F519 *Data Sheet,* 2007, Microchip Technology Incorporated, U.S.A.
PIC16F684 *Data Sheet,* 2004, Microchip Technology
Incorporated, U.S.A.
http://en.wikipedia.org/wiki/PIC_microcontroller
Predko M., 123 *PIC Microcontroller Experiments for the Evil Genius,* 2005, Mc Graw Hill. USA.
Mazidi, M.A., Mazidi, J.G. & McKinlay, R.D., *The 8051 Microcontroller and Embedded Systems Using Assembly and C*, 2006, Pearson Education Inc., USA.
Iovine, J., *PIC Microcontroller Project Book*, 2004, Mc Graw Hill, USA..

KS32702 DESIGN PROJECT II

In this course, students will work in a group to design, develop, and test a real-life software application that covers both user interface and database system. Students will be evaluated on their ability to work as a team to design, develop and test their prototype.

KS30403 CONTROL SYSTEMS

This course emphasize on engineering knowledge in Control Systems. Students are required to solve and analyze transfer function, block diagram reduction, system responses and stability problems. Besides that, students are required to design a system using root locus and frequency response.

References

Ashok Kumar. 2006. Control systems. Tata McGraw-Hill.
Hadi Saadat. Ebook. Computational Aids in Control Systems Using Matlab. Norman S. Nise. 2011. Control Systems Engineering. Wiley.
Katsuhiko Ogata. 2010. Modern Control Engineering. Pearson Education. Rao V. Dukkipati. 2005. Control systems. Alpha Science International.

KS31403 DIGITAL SIGNAL PROCESSING

This course emphasize on engineering knowledge in Digital Signal Processing. Students are required to solve and analyze the Z-Transforms, Linear Time Invariant Systems, Discrete Fourier Transforms. Besides that, students are required to design FIR Filter of IIR Filter based on specific requirement.

References

Ambardar, A. 2007. Digital Signal Processing: A Modern Introduction. International Thomson Publishing Company. Ingle, V. K & Proakis, J. G. 2012. Digital Signal Processing Using MATLAB. 3rd Edition. Cengage Learning.
Mitra, S. K. 2011. Digital Signal Processing: A Computer-BasedApproach. 4th Edition. McGraw-Hill.
S. Salivahanan, A. Vallavaraj & C. Gnanapriya. 2008. Digital Signal Processing. Tata McGraw - Hill
Schiling, R. J. & Harris, S. L. 2005, Fundamentals of Digital Signal Processing Using MATLAB, Thomson, Canada.

KS31603 COMMUNICATION SYSTEM ENGINEERING

The course starts with the introduction to communication systems, communication systems model and basic considerations of practical communication systems, followed by signal representations in communications and brief review of signals and systems. The next part covers modulation techniques. It begins with baseband and bandpass concept, advantages and classification of modulations. After that, analog modulation theory of AM, FM, and PM are given, with their respective modulators and demodulators. Digital transmissions are presented afterwards, starting from the concepts of sampling, followed by variants of PAM and PCM, and lastly, keying modulations (ASK, FSK, PSK and QAM). The last part deals with other important topics in communication systems, i.e. fundamental limits in information theory, error control coding and antenna and propagation.

References

Simon Haykin, 2009, *Communication Systems,* 4th ed., John Wiley,
J. Pearson, 1992, *Basic Communication Theory,* Prentice Hall.
Ferrel G. Stremler, 2000, *Introduction to Communication Systems,* Adison Wesley
B. Carlson, P. B. Crilly and JC Rutledge, 2002, *Communication Systems: An Introduction to Signals and Noise in Electronic Communications,* 4th ed., McGraw Hill.
Bernard Sklar, 2001, *Digital Communications: Fundamentals and Applications,* 2nd ed.,
Prentice Hall. Hwei P. Hsu, 1993, *Schaum's Outlines of Analog and Digital Communication Systems,* McGraw Hill.

KS32203 ELECTROMAGNETICS

This course aims to expose students to basic electromagnetic concepts related to electric & magnetic fields. Wave generation from the wave equation is emphasized along with Maxwell's equation. The use of electromagnetic concepts in transmission lines & antennas is discussed.

References

Fawwaz T. Ulaby, 2007 "Fundamentals of Applied Electromagnetics", Prentice Hall
William H. Hayat, Jr. John A Buck, 2006, "Engineering Electromagnetics", Seventh Edition
McGraw Hill. Matthew N. O. Sadiku, 2004, Elements of Electromagnetics, Third Edition, Oxford.
Stuart M. Wentworth, 2005, Fundamentals of Electromagnetics with Applications, John Wiley & Sons Inc.
Karl E. Longgren, Sava V. Savov and Randy J. Jost, 2007, Fundamentals of Electromagnetics with MATLAB, Scitech Publishing Inc.

KS32403 COMPUTER ARCHITECTURE

The purpose of this course is to introduce the structure, function and networking architecture of computers and to provide clear and complete knowledge of the nature and characteristics of modern-day computer systems and its network.

References

Stallings, William. 2008. *Computer Organization & Architecture - Designing For Performance.* Eighth Edition (International).Prentice Hall

A. Tanenbaum.2003. *Computer Networks* 4th Edition. Prentice Hall

N. Carter, 2002. *Computer Architecture,* Schaum's Outline Series, McGraw Hill

M. Morris Mano, Charles R. Kime, 2008, *Logic and Computer Design Fundamentals,* Fourth Edition, Pearson International Edition

D. A. Patterson & J.L. Hennesy. 1999. *Computer Organization and Design - The Hardware/Software Interface,* Morgan Kaufmann

Thomas C. Bartee, *Computer Architecture and Logic Design,* McGraw

Hill, 1991 John P. Hayes, *Computer Architecture and Organization,* 3rd

Ed., McGraw Hill, 1998.

C. Hamacher, Z. Vranesic and S. Zaky, *Computer Organization,* 5th Ed., McGraw Hill, 2002.

A.S. Tanenbaum, *Structured Computer Organization*, 5th Ed., Pearson Prentice Hall, 2006.

F.Halsall.1996. *Data Communication, Computer Networks and Open Systems* 4th Edition. Addison-Wesley

KS32602 DESIGN PROJECT III

In this course, students will work in a group to design, develop, and test a real-life application that covers both electronics and computer science area. Students will be evaluated on their ability to work as a team to design, develop and test their prototype.

KS41103 COMPUTER NETWORKS

This course is an introductory course containing principles of computer networks. The course begins with the general introduction to computer networks. Afterwards, it covers the concepts and methods used in the physical layer, data link layer, medium access control sub-layer, networking layer, transport layer, and application layer.

References

A. Tanenbaum, *Computer Networks,* 4th Ed., Prentice Hall, Upper Saddle River, NJ, 2003.

F. Halsall, *Computer Networking and The Internet*, 5th Ed. Addison Wesley, 2005

W. Stallings, *Data and Computer Communications*, 8th Ed., Prentice Hall, Upper Saddle River, NJ, 2007

E. Aboelela, *Network Simulation Experiments Manual,* Morgan Kaufmann, San Francisco, CA, 2003.

L. Peterson, *Computer Networks: A Systems Approach*, 3rd Ed., Morgan Kaufmann, San Francisco, CA, 2003.

W. R. Stevens, *TCP/IP Illustrated Vol. 1: The Protocols*, Addison-Wesley, 1994

KS41701 LABORATORY III (COMMUNICATION LAB)

This course contains laboratory work focusing on the enhancement of the students' understanding of data communications and computer networks. Phase 1 will be on the principles of flow control and experiments will revolve around UART. Phase 2 will be on the communication between computers through modulator-demodulator.

References

E. Aboelela, Network Simulation Experiments Manual, Morgan Kaufmann, San Francisco, CA, 2003.

B. Forouzan, Data Communications and Networking, 4th Ed., McGraw Hill, 2007.

L. W. Couch, Digital and Analog Communication Systems, 7th Ed., Prentice Hall, 2006.

W. Stallings, Data and Computer Communications, 8th Ed., Prentice Hall, Upper Saddle River, NJ, 2007.

KS42103 POWER SYSTEMS FOR ELECTRONIC ENGINEERS

This course introduces the principles of power system operation. It explains the fundamental aspects of complex powers in AC source and loads, the three phase transformation and power factor correction. It gives details of the important elements used in power systems, namely generator, transformers, transmission line and distribution feeders and analyzes their parameters. It discusses the per unit system, transmission line modeling, power flow analysis, symmetrical fault, and protection system.

References

Power System Analysis, by Hadi Saadat, Mc. Graw Hill, Singapore 2004.
Power System Analysis and Design, by J. Duncan Glover, M.S. Sarma and T.J. Overbye, Thomson, 4th Edition, John Willey
& Sons, London, 1996.
Electric Power Systems by B.M. Weedy, John Wiley & Sons, IEEE 2006.
Elements of Power Systems Analysis by W D Stevenson, 4th Edition, McGraw Hill, New York
1995. Power System Analysis by Charles A Gross, John Wiley & Sons, Singapore 1986.
Elements of Power Systems Analysis by W D Stevenson, 4th Edition, McGraw Hill, New York
1995. Power System Analysis by Charles A Gross, John Wiley & Sons, Singapore 1986.

KS40803 OPERATING SYSTEM

This course covers the principles of operating systems concepts. In particular, the course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, file systems, storage, and I/O management. Hands-on lab assignments with MINIX operating system are also included to help the study of the practical aspects of the implementation.

References

A. Silberschatz, P. Galvin, G. Gagne, Operating System Concepts, 8th Ed., John Wiley & Sons, 2009
A. Tanenbaum and A. Woodhull, Operating Systems Design and Implementation, 3rd Ed. Prentice Hall, 2006.
W. Stallings, Operating Systems: Internals and Design Principles, 5th Ed., Prentice Hall, 2005.
A. Tanenbaum, Modern Operating Systems, 3rd Ed., Prentice Hall, 2007.
H. M. Deitel, P. J. Deitel (Author), and D. R. Choffnes, Operating Systems, 3rd Ed., Prentice Hall, 2003.
J. A. Harris, Schaum's Outline of Operating Systems, 3rd Ed., McGraw-Hill, 2001.

KS42103 IMAGE PROCESSING

The course introduces image processing theories, algorithms and practical solutions which cover the topics of digital image perception and acquisition, enhancement, segmentation, morphological transform and compression. Various digital image applications such as in medical imaging, digital photography and vision system will be discussed. MATLAB software will be used for practical learning.

References

Gonzalez, R. C. and Woods, R. E. 2002. *Digital Image Processing,* 2nd Edition. New Jersey: Prentice-Hall.
Gonzalez, R. C., Woods, R. E. and Eddins, S. L. 2004. *Digital Image Processing using MATLAB.* New Jersey: Pearson Prentice Hall.
Umbaugh, S. E. 2005. *Computer Imaging: Digital Image Analysis and Processing*.
CRC Press. Russ, J. C. 2007. *The Image Processing Handbook.* Canada: CRC
Press.
Qidwai, U. and Chen, C.H. 2009. *Digital Image Processing: An Algorithmic Approach with MATLAB.* Taylor and Francis.

KS41203 ANTENNA AND PROPAGATION

This course begins with a review of electromagnetic radiation. The general characteristics of antennas directivity, gain, beamwidth, effective aperture and polarization are presented. Various types of commonly used basic antenna, wire antennas, reflector antennas, parabolic dish, end fire, broadside, patch, slot and broad bandwidth antennas are introduced. Antenna arrays techniques are covered. Radio communication link and radio wave propagation, mainly ground waves, sky waves and line of sight transmission are presented.

References

John D. Krauss and Rolald J. Marhefta, 3/e, 2003, Antennas for all applications, McGraw Hill,
Singapore. Vincent F. Fusco, 2005, Foundations of Antenna Theory and Techniques,
Pearson/Prentice Hall. Constantine, A. Balanis, 2/e, 1997, Antenna theory, Analysis and design,
John Wiley and Sons.
Simon R. Saunders, 1999, Antennas and Propagation for Wireless communication Systems, John Wiley and Sons.
Tapan K. Sarkar,Mickael C. Wicks, Magdalena Salazar-Palma, and Robert J. Bonneaau, 2003, Smart Antennas, Wiley Interscience.
Constantine A. Balanis, 2005, "Antenna Theory: Analysis and Design",John Wiley & Sons, New Jersey.

KS41403 COMPUTER SECURITY

This course will cover the most important features of computer security, including topics such as cryptography, operating systems security, network security, and language-based security. The course will discuss more on Security Control, Access Control, Firewalls, Protocols, Mobile codes, Network Security Controls, Cryptography and Privacy, Anatomy, Legal & Ethical issue in computer system security.

References

Charles P. Pfleeger, Shari Lawrence Pfleeger. 2003 Security in Computing, 3rd Edition. Prentice Hall.
Anderson, Ross. 2001 Security Engineering. Wiley.
Carr Houston H. & Snyder Charles P. 2007 Data Communication & Network Security. McGraw Hill Int. Ed.
Schneiner, B. 1996. Applied Cryptography 2nd Ed. John Wiley.
Trappe, W. and Washington, L. 2002. Introduction to Cryptography with Coding Theory. 1st Ed. Prentice Hall.

KS41603 PATTERN RECOGNITION

The course introduces the fundamental concepts and practical techniques of pattern recognition which cover the fundamental of recognition, Bayesian decision theory, parametric estimation and supervised learning, non-parametric techniques, linear discriminant functions, unsupervised learning and clustering, feature extraction and feature selection. To illustrate their applications, these techniques will be used for analyzing object-based, spatial and temporal features in images and video.

References

Duda, R. O., Hart, P. E. and Stork, D. G. 2001. *Pattern Classification,* 2nd Edition. New York: Wiley
& Sons. Bishop, C. M. 2006. *Pattern Recognition and Machine Learning.* New York: Springer.
Zoeller, E. A. 2008. *Pattern Recognition: Theory and Application*. Nova Science Publishers.
Theodoridis, S. and Koutroumbas, K. 2009. *Pattern Recognition,* 4th Edition. Amsterdam: Academic Press.
Hastie, T., Tibshirani, R. and Firedman, J. 2009. *The Elements of Statistical Learning: Data Mining, Inference, and Prediction,*
2nd Edition. Springer.

KS41803 INFORMATION THEORY AND CODING

This course discusses the foundations of the Information Theory as proposed by Shannon. Its application in defining a measure of Information and later used to calculate Communication Channel capacities will be elaborated. Information concepts such as Entropy and Redundancies will be explained in relation to Information Theory. Information Theory will be used to analyse coding and error correction techniques especially in Digital Communication. As shown by Clover and others, this course will demonstrate the fundamental contributions of Information Theory to statistical physics (thermodynamics), computer science (Kolmogorov complexity or algorithmic complexity), statistical inference (Occam's Razor), probability and statistics, and measuring Intelligence.

References

Cover, T.M. & Thomas, J.A. (1991). Elements of information theory. New York: Wiley.
Simon Haykin, Communication Systems, Fourth edition 2001, John Wiley & Sons,
Inc, USA. John G. Proakis, Digital Communications, 2nd Edition 1989, McGraw Hill
International Edition
Mischa Schwartz, Information Transmission, Modulation, and Noise, Third Edition 1980, McGraw Hill
International Student Edition

KS41903 WIRELESS COMMUNICATIONS

This course provides the fundamentals of wireless communications. Furthermore, it also introduces the modern applications of wireless communications. The topics covered include evolution of wireless communications; mobile radio channel models; modulations and their performance over mobile radio channels; multiple access schemes; capacity and its enhancement methods; introduction to wireless system design; introduction to selected topics in wireless networks (ad hoc networks, cooperative communications, and cross-layering); various wireless systems (3G, 4G, 802.11a/b/g, 802.16, WiMAX, 802.22)

References

S. Haykin and M. Moher, *Modern Wireless Communications,* Prentice Hall, 2005
T. Rappaport, *Wireless Communications: Principles and Practice,* 2nd Ed., Prentice Hall, 2002
A. Goldsmith, *Wireless Communications Systems,* Cambridge, 2005
D. Tse and P. Viswanath, *Fundamentals of Wireless Communication,* Cambridge, 2005

KS42003 ADVANCED SIGNAL PROCESSING

Theory and applications of multidimensional digital signal processing. Two dimensional signals and systems, Z-transform, Discrete Fourier transform, FIR and IIR filters and their design. Unexpected and difference with the one-dimensional case. Application Image/video and multidimensional spectral estimation, Multirate DSP fundamentals: interpolation, decimation, Multirate filter banks and Wavelets, Linear prediction and Optimum linear filters, Adapative digital filters, Signal compression.

References

Sanjit K. Mitra, 2006, Digital signal processing: a Computer approach, 3/e , McGrawHill.
John G. proakis and Dimitris G. Manolakis, 2007, Digital signal processing: Principles and Applications, 4/e, Pearson/education.
Ifeachor Jervis, 2994, Digital signal processing: A practical approach, Addison
Wesley. Roberto Cristi, 2004, Modern Digital signal processing, Thomson.
Brooks/Cole.
Avtar singh and S. Srinivasan, 2004, Digital signal processing, Thomson. Brooks/Cole.

KS42203 POWER ELECTRONICS

This course starts with the introduction of semiconductor power devices, which will provide the students the basic knowledge required to understand the conversion of electrical power from one form to another and to observe the relationship between the ac and dc powers. Power Electronic principles, converters, inverters, step up and down, single and 3-phase, as well as several wave forms are covered in detail.

References

Ned Mohan, Tore M. Undeland and William P. Robbins, Power Electronics Converters, Applications, and Design, Second/third Edition, John Wiley, 1995
Daniel W. Hart, Introduction to Power Electronics, Prentice Hall, 1997.
John G. Kassakian, Martin F. Schlecht, and George C. Verghese, Principles of Power Electronics, Addison-Wesley, 1991.
Philip T. Krein, Elements of Power Electronics, Oxford University Press, 1998.
Muhammad H. Rashid, Power Electronics Circuits, Devices, and Applications, 2nd edition, Prentice-Hall, 1993.

KS42303 ELECTRIC MACHINES AND DRIVES

This course introduces the fundamental of two types of electric machines and drives, the principle of operation, equivalent circuits and the concept of power electronic devises. It discusses different types of single and 3 phase converters and inverters operated in various modes and quadrants. It describes different types of closed loop control schemes for DC and AC motor.

References

Electrical Machines, Drives, and Power Systems, by Theodore Wildi, 2nd Edition, Prentice Hall, 1991
Modern Power Electronics and AC Drives, by Bose B. K., Prentice Hall PTR, 2001
Thyristor DC Drives, by Sen P. C., Fourth Edition, John Willey & sons, 2000
Electric Machines and Drive Systems, by N. N. Barsoum, Library Edition, Sydney 1997

KS42403 RENEWABLE ENERGY

The course expresses the problem of global warming and the difference between fusel fuel energy and clean energy. It discusses the model of 3 types of green fuel and their hybrid energy system, giving the optimum power source for required demand and its capital and levelized costs by analysis and simulation.

References

Renewable energy resources, by J. Twidell, T. Weir, Second Edition, Taylor & Francis, London, 2006
Renewable: The World-Changing Power of Alternative Energy 1st Edition by Jeremy Shere, ISBN: 978-0312643751, New York 2013
Renewable Energy: Sustainable Energy Concepts for the Energy Change 2nd Edition by Roland Wengenmayr, Thomas Bührke, William D. Brewer, Wiley-VCH Verlag GmbH & Co-KGaA, 2011

KS42503 ARTIFICIAL INTELLIGENCE

In this course, students will learn the foundational principles that drive these applications and practice implementing some of these systems. Specific topics include machine learning, search, game playing, constraint satisfaction, graphical models, and logic. The main goal of the course is to equip students with the tools to tackle AI problems they might encounter in life.

References

Russell S. & Norvig P. 2014. Artificial Intelligence: A Modern Approach, 3rd Edition. Pearson Education.
Winston, Patrick Henry. Artificial Intelligence. 3rd ed. Addison-Wesley, 1992
Koller, Daphne & Friedman, Nir. 2009. Probabilistic Graphical Models: Principles and Techniques. MIT Press.
Hastie T., Tibshirani R. & Friedman J. 2009. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer-Verlag.

KS42603 DATABASE SYSTEMS

This course studies the concepts of designing a database used to store data further data manipulation. The students will learn how a group of data stored in database, setup database server and access data in the database.

References

Database System Concepts Sixth Edition Avi Silberschatz, Henry F. Korth, S. Sudarshan
An Introduction to Database Systems (8th Edition) 8th Edition by C.J. Date
Database Systems: The Complete Book (2nd edition) by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom (ISBN 978-0131873254, Pearson Prentice Hall, 2009).

KS42703 MOBILE APPLICATIONS DESIGN

This course studies the concepts of designing mobile application that run in a mobile device with limited screen resolution and storage. The students will learn how a mobile application stores/retrieves data in local device and cloud storage.

References

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms Fundamentals 1st ed. Edition
Mobile App Development with HTML5 Paperback – March 10, 2015 By Mark Lassoff (Author), Mr Tom Stachowitz (Contributor)
Android Application Development Cookbook - Second Edition Paperback March 31, 2016 by Rick Boyer (Author), Kyle Mew (Author)