

COURSE SYNOPSIS

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
HK88	Oil and Gas Engineering
H2451	Diploma in Process Engineering (Oil and Gas Operations)

CIVIL ENGINEERING PROGRAMME (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 solve variety of engineering problems using calculus. 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
Weir, M.D., Hass, J., and Giordano, F. R. (2008). Thomas' Calculus. 11th Edition. Pearson Addison Wesley. Boston.
Paul.s Online Math Notes. <http://tutorial.math.lamar.edu/Classes/CalcI/CalcI.aspx>
James Stewart (2015). Calculus (8th Edition). Cengage Learning, Boston.

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 is designed to give exposure to students to the basic concept of engineering drawings, which discusses how construction projects can be translated to drawing, dimensioning and detailing. This course will cover the aspect of understanding and interpretation of engineering elements, and how it is applied using Computer Aided Drawing (CAD) using Autodesk AutoCAD software.

Undergraduates will learn about various types of civil works drawings, e.g. reinforced concrete drawings and structural steel detailing drawings. Upon the completion of this course, students should be able to produce civil engineering drawings in the form of CAD.

References

Onstott, S. (2017), "AutoCAD 2018 and AutoCAD LT 2018 Essentials: Autodesk Official Press", Sybex.
Huth, M.W. and Wells W., (2010), "Understanding Construction Drawings", 5th Edition, Delmar Thomson Learning.
Elsheikh A., (1995), "An Introduction to Drawing for Civil Engineers", MacGraw Hill Book Co. Ltd.
Parmley R., (2003), "Civil Engineer's Illustrated Sourcebook", MacGraw Hill Professional.

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 (2007), Engineering Geology, Second Edition, Elsevier Ltd.

Tony Waltham (2002), Foundation of Engineering Geology, Second Edition, Spon Press, Taylor & Francis.

C.S Hutchison and D. N. K. Tan (2009), Geology of Peninsular Malaysia, Published by University of Malaya and Geological Society of Malaysia.

Monroe, J.S, Wicander R (2006), The Changing Earth, Thomson Learning Inc.

Rock and Minerals (Britannica Illustrated Science Library), (2008), Encyclopædia Britannica, Inc.

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 provides the fundamental concepts and principles employed by civil engineers. It is divided into two (2) parts:

Statics and Dynamics. Statics deals with equilibrium of bodies at rest and moving at constant velocity. Meanwhile, Dynamics deals with bodies moving in accelerated motion.

References

- Bedford & Fowler. (2007). Engineering Mechanics: Statics, 5th Edition. Pearson.
- Bedford & Fowler. (2007). Engineering Mechanics: Dynamics, 5th Edition. Pearson.
- Keith M. Walker. (2008). Applied Mechanics for Engineering Technology. Prentice Hall.
- R.C. Hibbeler. (2013). Engineering Mechanics Statics, 13th Edition. Pearson.
- R.C. Hibbeler. (2013). Engineering Mechanics Dynamics, 13th Edition. Pearson.

KA10802 CONSTRUCTION TECHNOLOGY

This course will 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.

Students will acquire knowledge on preparatory work and implementation, earthworks, piling, concrete and concreting, floors, claddings and walls, roofs and roofing, finishing work, mechanized construction, and Industrialized Building System (IBS).

References

- Emmitt, S., Gorse, C.A. (2014), Barry's Introduction to Construction of Buildings, 3rd Edition, Wiley-Blackwell.
- Sarkar, S.K., Saraswati, S. (2016), Construction Technology, 12th Edition, Oxford Higher Education.
- Allen, E., Iano, J. (2014), Fundamentals of Building Construction: Materials and Methods", 6th Edition, Wiley New Jersey, USA.
- Chudley, R., Greeno, R. (2005), Construction Technology, 4th Edition, Prentice Hall.

KA20102 ENGINEERING STATISTICS

This course serves as an introduction of basic concept of statistics and probability; and its applications in science and civil engineering so that students become proficient in the language and terminology associated with probability and statistics. It also equips students with knowledge related to applied statistics.

References

- Douglas C. Montgomery (6th Edition) (2013). Applied Statistics for Engineers
- Orris, J.B. (2007). Basic Statistics Using Excel and Megastat. McGraw-Hill, Boston
- Eelko, H. (2007). Applied Statistics with SPSS. Sage Publication, London
- Montgomery D.C. and Runger G.C. 2008. Applied Statistics and Probability for Engineers. John Wiley & Sons, Inc (Asia) Pte Ltd.
- William Navidi (2014). Statistics for Engineers and Scientists (4th Edition). McGraw-Hill, New York.

KA20502 DIFFERENTIAL EQUATIONS

Differential Equations form the heart of applied mathematics; they capture an amazing variety of phenomena in fields ranging from physical science and engineering to biology from financial derivatives to traffic flow. As useful as these equations are, in practice they can be quite difficult to solve. Nearly all disciplines in science and engineering rely fundamentally on differential equations. This course comprises analytical solution of differential equations.

References

- Paul Dawkins. 2007. Differential Equations. 2007 Paul Dawkins
- R. Kent Nagle, Edward B. Saff, David Snider .Fundamentals of differential equations. Eighth ed. 2012. Pearson Education, Inc.
- Jeffrey R. Chasnov. 2009–2016. Introduction to Differential Equations. The Hong Kong University of Science and Technology
- Wei-Chau Xie. 2010. Differential Equations for Engineers. Cambridge University press
- William E. Boyce, Richard C. DiPrima, 2012. Elementary Differential Equations and Boundary Value Problems, 10th Edition. Wiley.

KA20703 FLUID MECHANICS

Fluid flow has a broad application area. The importance of understanding the mechanics of fluids is apparent from when we turn on our kitchen faucets, thus activating flow through a network of pipes and valves, to when we drive our cars, which rest on pneumatic tires, have hydraulic shock absorbers, and pump gasoline through a complex piping system. As a result, it is vital that civil engineers develop a basic foundation in the mechanics of fluids before investigating these and other similar problems.

References

- Frank M. White (2008), Fluid Mechanics, 7th Edition, Mc Graw-Hill, New York.
- Rodolfo Repetto (2016), Notes on Fluid Dynamics, Department of Civil, Chemical and Environmental Engineering. Yunus A. Çengel , John M. Cimbala (2013), Fluid Mechanics Fundamentals and Applications, Mc Graw-Hill, Boston. Igor Gaissinski, Vladimir Rovenski. (2018) Modeling in Fluid Mechanics. Instabilities and Turbulence, Taylor and Francis Group, LLC, London.
- Y. NAKAYAMA (1999). Introduction to Fluid Mechanics, Y. Nakayama and R. F. Boucher, Tokyo.

KA20903 MECHANICS OF SOLIDS

This course provides the fundamentals of the basic design of a simple structure including stress and strain, shear force and bending moment, stresses in beams, deflection and slope of beams, columns, and torsion.

References

- James M. Gere & Barry J. Goodno. (2012). Mechanics of Materials, 8th Edition. Cengage Learning.
- R.C. Hibbeler. (2016). Mechanics of Materials, 10th Edition. Pearson.
- S.S. Bhavikatti. (2010). Mechanics of Solids. New Age International Publishers.
- William Nash. (2013). Schaum's Outline of Strength of Materials, 6th Edition. McGraw-Hill Education.
- Yusuf Ahmad. (2001). Mekanik Bahan dan Struktur. Penerbit UTM.

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

- Uzairi S 2015. Aturcara Kontrak & Taksiran. IBS Buku Sdn. Bhd. Malaysia

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

This course provides 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

Neville, A.M, 2012, 'Properties of Concrete. 5th Edition', Butterworth Longman Group Ltd,

Neville, A.M. (2010), 'Concrete Technology', 2nd Revised Edition, Butterworth Longman Group Ltd. Advanced Concrete Technology 2: Concrete Properties. Oxford: Elsevier.

Newman, J., & Choo, B.S. 2003. London. M.L. Gambhir, 2004, 'Concrete Technology 3rd Edition', McGraw-Hill.

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

Kavanagh, B. & Mastin, T. (2014), Surveying: Principles and Applications, 9 th Edition, Pearson Inc., Upper Saddle River, New Jersey, U. S. A.

Kavanagh, B. (2009), Surveying: Principles and Applications, Pearson Education Inc., Upper Saddle River, New Jersey, U. S. A.

Duggal, S. K. (2009), Surveying, Vol.1, 3 rd Edition, Tata McGraw-Hill, New Delhi, India.

Ghilani, C .D. & Wolf, P. R. (2011), Elementary Surveying: An Introduction to Geomatics, 13 th Edition, Pearson Education Ltd.,Edinburgh Gate, Harlow, U. K.

Nathanson, J., Lanzafama, M. T. & Kissam, P. (2011), Surveying Fundamentals & Practices, 6 th Edition, Pearson Education Inc., Upper Saddle River, New Jersey, U. S. A.

McCormac, J., Sarasua, W. & Davis, W. (2013), Surveying, 6th Edition John Wiley & Sons Inc., Hoboken, New Jersey, U. S. A.

McCormac, J. (2004), Surveying, 5 th Edition, John Wiley & Sons Inc., Hoboken, New Jersey, U. S. A.

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. (2015). Numerical Methods for Engineers. 7th 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 structures, elastic theorems and energy principles & moving loads and influence lines.

References:

- Connor J.J and Faraji. S. 2013, Fundamental of Structural Engineering, Springer.
- Leet K.M. and Uang C. M. 2018, Fundamentals of Structural Analysis, McGraw-Hill, 5th International Edition.
- Megson, T.H.G. 2014, Structural and Stress Analysis, Elsevier, 3rd Edition.
- Kassimali A. 2011, Structural Analysis, Thomson, 4th Edition (SI Edition).
- Hibbeler R.C. 2011, Structural Analysis, Prentice Hall, 8th Edition.
- West H.H. and Geshwindner L.F. 2002, Fundamentals of Structural Analysis, John Wiley, 2nd Edition.

Utku S., Wilbur J.B. and Norris C.H. 2002, Elementary Structural Analysis, McGraw-Hill

KA21603 GEOTECHNICAL ENGINEERING 1

This course provides background knowledge on the properties and behaviour of soils for geotechnical engineering practice. Understanding of the course will help the students in designing civil and geotechnical engineering structures. Knowledge on properties and mechanics of soil include soil classification, mass-volume relationship, compaction, permeability and stress distribution.

References

- C. Liu and J.B Evett (2008), *Soils and Foundations, Seven Edition*, Pearson- Prentice Hall
- Nurly Gofar and Khairul Anuar Kassim (2009), *Introduction to Geotechnical Engineering (Part 1)*, 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.
- Braja M Das (2007), *Principles of Foundation Engineering*, 6th Edition, Thomson.
- R. Whitlow (2001), *Basic Soil Mechanics, 4th Edition*, Prentice-Hall

KA21801 CONCRETE AND MATERIAL LAB

This course expose the students on the testing procedure performed on concrete and other civil engineering materials, which include the cement, sand, and coarse aggregate. Lab testing on green concrete produced from waste materials is also performed.

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

- Beer, F. P., Johnston, E. R. Jr, Dewolf, J. T. & Mazurek, D. F. 2012. Mechanics of Materials. 6th Ed. New York: McGraw Hill.
- Hibbeler, R. C. 2010. Mechanics of Materials. 8th Ed. New Jersey: Pearson Education.

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.
- Evet, J. B. & Liu, C. 1989. Schaum's Solved Problem Series: 2500 Solved Problems in Fluid Mechanics and Hydraulics. McGraw-Hill.

KA31303 GEOTECHNICAL ENGINEERING 2

This course provides background knowledge on the properties and behaviour of soils for geotechnical engineering practice. Understanding of the course will help the students in designing civil and geotechnical engineering structures. Topics for the course are shear strength, compressibility and consolidation of soils, slope stability and retaining structures.

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, 6th 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.
- N.S.V. Kamesware Rao (2011), Foundation Design; Theory and Practice, 1st Edition, John Wiley & Sons (Asia) Pte Ltd.
- Nurly Gofar and Khairul Anuar Kassim, INTRODUCTION TO GEOTECHNICAL ENGINEERING PART I (Revised Edition), Pearson Education, 2009.

KA31503 THEORY OF STRUCTURE 2

The course contains structural analysis of indeterminate structures. 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. & Goodier J.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

- Potter, M. C., Wiggert, D. C. & Ramadan, B. H. 2012 *Mechanics of Fluids*. 4th SI Ed. USA: Cengage Learning.
- Cimbala, J. M. & Çengel, Y. A. 2010. *Fluid Mechanics: Fundamentals and Application*. 2nd Ed in SI unit. Singapore: McGraw-Hill.
- Cruise, J. F., Sherif, M. M., Singh, V. P. 2007. *Elementary Hydraulics*. Thomson Nelson.
- Beer, F. P., Johnston, E. R. Jr, Dewolf, J. T. & Mazurek, D. F. 2012. *Mechanics of Materials*. 6th Ed. New York: McGraw Hill.
- Hibbeler, R. C. 2010. *Mechanics of Materials*. 8th Ed. New Jersey: Pearson Education.

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

- Bond, A.J., Brooker, O., Harris, A.J., Harrison, T., Moss, R.M., Narayanan, R.S., Webster, R. (2006). How to Design Concrete Structures using Eurocode 2. The Concrete Centre.
- Bhatt, P., MacGinley, T.J. Choo, B.S. (2006). Reinforced Concrete Design to Eurocode Design Theory and Examples, 4th Edition. CRC Press.
- McKenzie, W.M.C. (2015). Design of Structural Elements to Eurocodes, 2nd Edition. Palgrave Macmillan.
- Mosley, B., Bungey, J., Hulse, R. (2012). Reinforced Concrete Design to Eurocode 2, 7th Edition. Palgrave Macmillan.

KA34503 HIGHWAY ENGINEERING

This course intent to provide an in-depth knowledge on the basic theory of highway engineering. Topics that will be discussed are basic road geometric design, highway materials, pavement design and construction, pavement rehabilitation and maintenance.

References

- Garber, Nicholas, and Lester Hoel (2015). Traffic and Highway Engineering, 5th Edition, Cengage Learning.
- Harlods N. Atkins. 2003. 4th Edition. Highway Materials, Soils and Concretes. Prentice Hall Ohio.
- Martin Rogers. 2008. Second Edition. Highway Engineering. Blackwell Publishing.
- Read, J. and Whiteoak, D. (2015). The shell bitumen handbook 6th Edition. Thomas Telford.
- Jabatan Kerja Raya Malaysia, Spesifikasi Pembinaan Jalan Raya, JKR/SPJ/1998
- Jabatan Kerja Raya Malaysia, Arahan Teknik Jalan 5/85
- Transport Research Laboratory, Oversea Road Note 31, 1993
- Jabatan Kerja Raya Malaysia, Design of Flexible Pavement Structure, 2006

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) Kekuatan Bahandan 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.
- 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 Jalanraya Berbitumen. DBP.

KA35401 HIGHWAY AND TRAFFIC LAB

This course will expose the students on the testing procedures related to highway material and traffic data collection. The experiments will help students to understand the properties of materials tested. In traffic part, students will understand the traffic

characteristics of the selected study location.

References

Garber, Nicholas, and Lester Hoel (2015). Traffic and Highway Engineering, 5th Edition, Cengage Learning.
Martin Rogers (2008). Highway Engineering Second Edition, Blackwell Publishing.
Karim M.R, Hamzah M. O & Hasan A. (1997). Pembinaan Jalanraya Berbitumen, DBP.

KA35603 FOUNDATION DESIGN

The Course aims to provide in depth knowledge about the important aspects of foundation design such as site exploration, contact pressure, settlement analysis, bearing capacity, design criteria and other geotechnical aspects. Students will be able to design shallow and deep foundations including Pile foundations using the current Techniques.

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

This course integrates the 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 Final Year Project 1, 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 Final Year Project 2.

References

Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2018.

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. Jeffrey; 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. Tchobanoglous, Theisen & Vigil. (1993) Integrated Solid Waste Management. McGraw-Hill. Akta Kualiti Alam Sekeliling 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

This course integrates the 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 Final Year 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 2018

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

Jae K. Shim, Joel G. Siegel, Financial Accounting (2012), Schaum's Outline Financial Accounting, 2 nd Edition, McGra Hill, New York.

Robert Libby, Fred Phillips, Patricia Libby (2004), Fundamentals of Financial Accounting, McGraw Hill, New York.

Don Hermann, J. David Spice, Wayne Thomas, (2008), Financial Accounting, McGraw Hill, New York.

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

This course discusses on the different types of supplementary cementitious materials, special types of concrete and its manufacturing methods, concrete testing and quality control, concrete durability issues including its repair and maintenance for long life service, and strength assessment of concrete structures. The topic on green technology concrete is also included for sustainable concrete construction.

References

A.M. Neville, 2002, 'Properties of Concrete. Vol.2', Butterworth Longman Group Ltd, London.
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.
Gajanan M. Sabnis. (2012). Green Building with Concrete - Sustainable design and construction, Taylor and Francis Group

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 Arbor 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

- 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.
- Teodorovic, D., & Janic, M. (2016). Transportation Engineering: Theory, Practice and Modeling. Butterworth-Heinemann.

Khisty, C. J., & Lall, B. K. (2017). Transportation engineering. Pearson Education India.

KA43403 ADVANCED ENVIRONMENT ENGINEERING

This course focuses on the development of strategies to tackle some of the environmental issues. The purpose of this course is to provide students with a working knowledge of developmentally appropriate practices to reduce the impact of the buildings on the environment. This goal will be accomplished by a thorough review of current guidance methods and class exercises designed to familiarize students with some techniques. By the end of this course, students are expected to develop their own approach to tackle some of the issues based on practices best suited to their unique skills.

References

- S. Edward Rubin (2001). Engineering and the Environment. McGraw-Hill, Boston.
- Architectural Institute of Japan (2005). Architecture for a Sustainable Future. Published by the 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
- Michael Bocwell (2015). Solar Electricity Handbook: A Simple Practical Guide to Solar Energy-Designing and Installing Solar Pv Systems. Greenstram Publishing

KA45503 BUILDING PATHOLOGY

This course shall enable the student to identify and analyse common building defects using a pathological approach. Carry out prognosis of defects diagnosed and recommend the most appropriate course of action having regard to the building, its future and resources available. Design, specify, implement and supervise appropriate programmes of remedial works.

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 & Lian Duan (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 STABILIZATION AND GROUND IMPROVEMENT

The course covers the problematics of soft ground and methods of ground improvement and soil stabilization.

References

H. Bredenberg, G. Holm, B. B. Broms, Dry Mix Methods for Deep Soil Stabilization 1998.
Manfred 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 concepts in highway material.

References

Garber, Nicholas, and Lester Hoel (2015). Traffic and Highway Engineering, 5th Edition, Cengage Learning. Harlow, UK. 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. 3rd Ed. ESRI Press.
Ormsby, T., Napoleon, 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. 5th Ed. McGraw-Hill.

KA47203 FINITE ELEMENT METHOD

This course covers the fundamental and principles of the finite element formulation of stiffness and force matrices for one-, two-, three-dimensional elements including bar, beam, frames, and trusses.

References

- D.L. Logan. (2012). A First Course in the Finite Element Method SI, 5th Edition. Cengage Learning.
- K.J. Bathe. (2014). Finite Element Procedures, 2nd Edition. Prentice Hall.
- R.G. Budynas. (1999). Advanced Strength and Applied Stress Analysis, 2nd Edition. McGraw-Hill.
- S.S. Bhavikatti. (2005). Finite Element Analysis. New Age International (P) Limited.
- S.S. Rao. (2004). The Finite Element Method in Engineering, 4th Edition. Elsevier Science & Technology Books.

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 Konrad Bergmeister, 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. 2015. 5th Edition (SI Edition). Traffic Engineering. PWS Publishing Singapore.
- Papacostas C.S. dan Prevedouros P.D. 2001. Transportation Engineering & Planning. New Jersey: Prentice Hall.
- Riza Atiq. 2005. Sistem Kawalan Lalu Lintas Bandar. Dewan Bahasa.Kuala Lumpur
- Roess, R. P., Prassas, E. S., & McShane, W. R. (2011). Traffic Engineering.
- Tiwari, G., & Mohan, D. (Eds.). (2016). Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer. CRC Press.

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 Detention 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 mean 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

- G. B. Thomas, M. D. Weir, J. Hass, and F. R. Giordano, (2014). Thomas' Calculus. 13th Edition. Pearson.
- K. J. Smith, M. J. Strauss, M. D. Toda, (2013). Calculus, 6th Edition. Kendall Hunt Publishing.
- J. Stewart, (2015). Calculus, 8th Edition. Brooks Cole.
- E. Kreyszig, (2011). Advanced Engineering Mathematics, 10th Edition. Wiley.

KE17203 DIFFERENTIAL EQUATIONS

This course is one of the basic 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. 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. 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

- D. G. Zill, W.S. Wright, (2012). Differential Equations with Boundary Value Problems, 8th Edition. Cengage Learning, USA.
- W. E. Boyle, (2012). Elementary Differential Equations and Boundary Value Problems, 10th Edition. John Wiley, London.
- G. Ledder, (2004). Differential Equations: A Modeling Approach. McGraw-Hill, USA.
- P. DuChateau, D. Zachmann, (2011). Schaum's Outline of Differential Equations, 3rd Edition. McGraw-Hill Education, USA.
- B. R. Hunt, R. L. Lipsman, J. E. Osborn, J. M. Rosenberg, (2012). Differential Equations with MATLAB, 3rd Edition. John Wiley, London.

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

- E. Hughess, (2002). Electrical & Electronic Technology, 8th Edition. Prentice Hall.
- A. R. Hambley, (2002). Electrical Engineering: Principles & Applications, 2nd Edition. Prentice Hall.
- A. B. Carlson, (2000). Circuits: Engineering Concepts & Analysis of Linear Electric Circuits Brooks/Cole: Thomson Learning.
- R. Pratap, (2006). Getting Started with MATLAB 7 – A Quick Introduction for Scientists and Engineers, New York. Oxford University Press.
- R. J. Smith & R.C. Dorf, (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

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

KE17503 ENGINEERING PROGRAMMING

A technical introduction to the fundamentals of structured programming with an emphasis on producing clear, robust and reasonably efficient code using top-down design, problem analysis, development of algorithm and effective testing and debugging. Starting from first principles, we will cover a large subset of C programming including: data types and expression evaluation; programmer-defined functions including passing parameters by value and by address; selection and repetition; recursion; external file input and output; arrays, analysis of searching and sorting algorithms, and strings; pointers and dynamic memory allocation.

References

- J. R. Hanley, E. B. Koffman, (2015). Problem Solving and Program Design in C. Pearson.
- B. A. Fouzan, R. F. Gilberg, (2006). Computer Science: A Structured Programming Approach Using C. Thomson.
- R. N. Reddy, C. I. A. Ziegler, (2009). C Programming for Scientists and Engineers. Jones and Bartlett.

KE17603 LOGIC DESIGN

The 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

- A. B. Macrovitz, (2002). Introduction to Logic Design. McGraw-Hill, New York.
- M.D. Lang Ercegovac, J. H. T. Moreno, (1999). Introduction to Digital System. McGraw-Hill, USA.

R. L. Tokheim, (1994). Digital Electronic. McGraw-Hill, Singapore.

R. J. Tocci, N. S. Widmer, G. L. Moss, (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

R. F. Pierret, (1996). Semiconductor Device Fundamentals. Addison-Wesley.

A. S. Sedra, K. C. Smith, (2003). Microelectronic Circuits. Oxford University Press.

M. Shur, (1996). Introduction to Electronic Devices. John Wiley & Sons.

S. M. Sze, (2001). Semiconductor Devices, Physics and Technology, 2nd Edition. John Wiley & Sons.

A. J. Dekker, (1998). Solid State Physics. Macmillan.

KE18401 ENGINEERING LABORATORY I (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

A.S. Sedra, K.C. Smith, (2003). Microelectronic Circuits. Oxford University Press.

R.C. Dorf, J. A. Svoboda, (2006). Introduction to Electric Circuits, 7th Edition. 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.

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

- A. D. Wunsch, (2004). Complex Variables and Applications. Pearson.
- S. C. Chapra, R. P. Canale, (2014). Numerical Methods for Engineers. McGraw-Hill.
- M. T. Heath, (2002). Scientific Computing. McGraw-Hill.
- Y. K. Kwok, (2010). Applied Complex Variables for Scientists and Engineers. Cambridge University Press.
- E. Kreyszig, (2011). Advanced Engineering Mathematics. Wiley.

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 be able to appreciate the knowledge of microprocessor design into computer architecture operations and functions of performances optimization.

References

- B. B. Brey, (2009). The Intel Microprocessors. Pearson International Edition, New Jersey.
- W. Stallings, (2003). Computer Organization & Architecture-Designing For Performance, 6th Edition (International). Prentice Hall.
- W. A. Triebel, (2003). The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications: Including the 80286, 80386, 80486, and Pentium Processor Families. Prentice Hall.
- D. V. Hall, (1992). Microprocessors and Interfacing: Programming and Hardware. McGraw Hill, Singapore.
- J. Uffenbeck, (2002). The 80x86 Family Design, Programming and Interfacing. Prentice Hall, New Jersey.
- B. B. Brey, (1996). Programming the 80286, 80386, 80486 and Pentium-based Personal Computer. Prentice Hall, New Jersey.
- D. A. Patterson, J. L. Hennessy. (1999). Computer Organization and Design-The Hardware/Software Interface. Morgan Kaufmann.
- T. C. Bartee, (1991). Computer Architecture and Logic Design. McGraw Hill.
- J. P. Hayes, (1998). Computer Architecture and Organization, 3rd Edition. McGraw Hill.
- B. Hamacher, Z. Vranesic and S. Zaky, (2002). Computer Organization, 5th Edition. McGraw Hill.
- A.S. Tanenbaum, (2006). Structured Computer Organization, 5th Edition. Pearson Prentice Hall.

KE27303 ANALOG ELECTRONICS

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

- A. R. Hambley, (2000). Electronics. Prentice-Hall.
D. J. Comer, D. T. Comer, (2002). Fundamentals of Electronic Circuit Design. Wiley.
R. C. Jaeger, T. Blalock, (2003). Microelectronic Circuit Design. McGraw-Hill.
D. Neamen, (2001). Electronic Circuit Analysis and Design. McGraw-Hill.
M. Rashid, (1999). Microelectronic Circuits: Analysis and Design. PWS Publishing Company.

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

- R. D. Yates, D. Goodman, (2014). Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers. Wiley.
D. P. Bertsekas, J. N. Tsitsiklis, (2008). Introduction to Probability. Athena Scientific.
A. Leon-Garcia, (2008). Probability, Statistics, and Random Processes For Electrical Engineering. Prentice Hall.
P. Peebles, (2002). Probability, Random Variables, and Random Signal Principles. McGraw-Hill.
S. Ross, (2018). A First Course in Probability. Prentice Hall.
R. 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 introduced and analyzed. 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

- B. L. Anderson, R. L. Anderson, (2005). Fundamentals of Semiconductor Devices. McGraw.
N. H. E Weste, K. Eshraghian, (1994). Principles of CMOS VLSI Design - A Systems Perspective, 2nd Edition. Addison-Wesley Publishing Company.
J. M. Rabaey, A. Chandrakasan, B. Nikolic, (2003). Digital Integrated Circuits- A Design Perspective, 2nd Edition. Prentice Hall.
C. G. Sodini, R. T Howe, (1997). Microelectronics - An Integrated Approach, International Edition Prentice Hall.
R. Pratap, (2006). Getting Started with MATLAB 7- A Quick Introduction for Scientists and Engineers. Oxford University Press, New York.
B. G. Streetman, S. K. 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

- N. N. Rao, (2004). Elements of Engineering Electromagnetics. Prentice Hall.
- D. Fleisch, (2008). A Student's Guide to Maxwell's Equations. Cambridge University Press.
- W. Hayt, J. Buck, (2005). Engineering Electromagnetics. McGraw-Hill.
- U. S. Inan, A. Inan, (1998). Engineering Electromagnetics. Prentice Hall.
- M. F. Iskander, (2000). Electromagnetic Fields and Waves. Waveland Pr Inc.
- S. 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

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

References

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

KE28301 ENGINEERING LABORATORY II (Logic & 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

- A. S. Sedra, K.C. Smith, (2003). Microelectronic Circuits. Oxford University Press.
- R. C. Dorf, J. A. Svoboda, (2006). Introduction to Electric Circuits, 7th Edition. 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.

KE28401 ENGINEERING LABORATORY III (Microelectronic & Microprocessors and Computer Architecture)

This course is intended to expose the students with hands-on experimental works experience in Microelectronic, Microprocessors and Computer Architecture. Students will be using Verilog HDL programming tool for hands-on experimental on embedded design on Altera board for certain module of Microelectronics system. In Microprocessors part, students will experience using Assembly language programming tool of Intel 80386DX microprocessor architecture. Some of experimental that carried for Intel 80386DX includes Addressing mode, data movements, Interrupt function, Arithmetic operations and procedure call. In Computer Architecture part, students will experience the design of 16-bits custom-made microprocessors that includes module of control, datapath and ALU units. Certain application using the design processor assembly language such as factorial and other arithmetic operations also carried out. At the end of the course, students should able to implement integrated design of microprocessor and computer architecture operations and functions for performances optimization.

References

- Brey B.B., 2008. The Intel Microprocessors. 8th Edition, Pearson International Edition, New Jersey.
- Kip R. Irvine. 2006. Assembly Language for Intel-Based Computer. 5th Edition. Prentice Hall

Stallings, William. 2012. Computer Organization & Architecture - Designing For Performance. 9th Edition (International). Prentice Hall

KE30005 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. At the completion of their industrial training, students will be awarded a Pass/Fail grade.

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

- E. W. Kamen, B. S Heck, (2006). Fundamentals of Signals and Systems Using the Web and MATLAB®. Prentice Hall.
- B. Boulet, L. Chartrand, (2005). Fundamentals of Signals and Systems. Da Vinci Engineering Press.
- C. T. Chen, (2004). Signals and Systems. Oxford University Press.
- S. T. Karris, (2008). Signals and Systems with MATLAB Computing and Simulink Modeling. Orchard Publications.
- J. H. McClellan, R. W. Schafer, M. A. Yoder, (2003). Signal Processing First. Prentice Hall.
- A. V. Oppenheim, A. 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

- J. P. Bentley, (2005). Principles of Measurement Systems, 4th Edition. Pearson Prentice Hall, Malaysia.
- E. O. Doebelin, (1995). Measurement Systems, Applications and Design. McGraw Hill, New York.
- M. J. Usher, (1994). Sensors and Transducers. McGraw Hill, London.
- C. F. Coombs, (1995). Electronic Instrument Handbook. McGraw Hill, New Jersey.
- 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

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

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

- N. S. Nise (2008). Control Systems Engineering, 5th Edition. Wiley.
- K. Ogata, (1997). Modern Control Engineering. Prentice Hall.
- G. C. Goodwin et al., (2001). Control System Design. Prentice Hall.

KE37503 POWER SYSTEM ANALYSIS

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 synchronous generator, transformers, transmission lines and distribution feeders, and analyzes their parameters. It discusses the per unit system, transmission line modeling, power flow analysis, symmetrical and unsymmetrical faults, and determines the steady-state variables in the interconnected system

References

- H. Saadat, (2004). Power System Analysis. McGraw Hill, Singapore Edition.
- W. D. Stevenson, (1995). Element of Power System Analysis, 4th Edition. McGraw Hill, New York.
- C. A. Gross, (1986). Power System Analysis, 2nd Edition. John Wiley & Sons, Singapore.
- D. J. Glover, M. S. Sarma, (1996). Power System Analysis & Design, 2nd Edition. Power Series in Engineering, London.
- B.M. Weedy, (2006), Electric Power Systems, John Wiley & Sons.

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

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

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

- L. T. Beuchamp, E. N. Bowie, (2004). Ethical Theory in Business, 7th Edition. Pearson Education/Prentice Hall.
- M. M. Jennings, (2003). Business Ethics, 4th Edition. Thomson Learning.
- F. J. Betty, S.S. Samuelson, (2002). Business Law and the Legal Environment, Alt. Edition. Thomson Learning.
- T. Donaldson, H. P. Werhen, M. Cording, (2002). Ethical Issues in Business, 7th Edition.
- P. L. Hartman, (2005). Perspectives in Business Ethics, 3rd Edition. McGraw Hill.
- C. B. Fleddermann, (2012). Engineering Ethics, 4th Edition. Pearson.

KE38301 ENGINEERING LABORATORY IV (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

- TERCO Lab Manual for Electric Machines Lab.
- TERCO Lab Manual for Power System Lab.
- S. J. Chapman, (2011). Electric Machinery Fundamentals. McGraw-Hill.
- H. Saadat, (2004). Power System Analysis, International Edition. McGraw-Hill.

KE38303 ELECTRICAL AND ELETRONIC 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 a system.

References

- E. Hughess, (2002). Electrical & Electronic Technology, 8th Edition. Prentice Hall.
- A. R. Hambley, (2002). Electrical Engineering: Principles & Applications, 2nd Edition. Prentice Hall.
- A. B. Carlson, (2000). Circuits: Engineering Concepts & Analysis of Linear Electric Circuits. Brooks/Cole: Thomson Learning.
- R. Pratap, (2006). Getting Started with MATLAB 7–A Quick Introduction for Scientists and Engineers. Oxford University Press, New York.
- R. A. Reis, (2005). Electronic Project Design and Fabrication. Pearson, Upper Saddle River, NJ.
- W. T. F. Bond, (1996). Design Project Planning: A Practical Guide for Beginners. Prentice Hall, London.
- D. I. Cleland, (1994). Project Management: Strategic Design and Implementation. McGraw-Hill, New York.
- R. J. Smith, R. C. Dorf, (1992). Circuits, Devices and Systems. 5th Edition. John Wiley & Sons, Inc.
- L. O. Chua, C. A. Desoer, E. S. Kuh, (1987). Linear and Nonlinear Circuits. McGraw Hill.
- R. E. Thomas, A, J. Rosa, (2004). The Analysis and Design of Linear Circuits. John Wiley and Sons.
- R. A. DeCarlo, P. Lin, (2001). Linear Circuit Analysis. Oxford University Press.
- A. M. Davis, (1998). Linear Circuit Analysis. PWS Publishing Company.

KE38401 ENGINEERING LABORATORY V (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

References

- B. Sklar, (2001). Digital Communications: Fundamentals and Applications, 2nd Edition. Prentice Hall.
- H. P. Hsu, (2002). Schaum's Outlines of Analog and Digital Communication Systems, 2nd Edition. McGraw Hill.
- J. G. Proakis, M. Salehi, G. Bauch, (2003). Contemporary Communication Systems Using MATLAB, 2nd Edition. CL-Engineering.
- J. P. Bentley, (2005). Principles of Measurement Systems, 4th Edition. Pearson Prentice Hall, Malaysia.
- E. O. Doebelin, (1995). Measurement Systems, Applications and Design. McGraw Hill, New York.
- M. J. Usher, (1994). Sensors and Transducers. McGraw Hill, London.

KE38603 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

- R. A. Reis, (2005). Electronic Project Design and Fabrication. Pearson, Upper Saddle River, NJ.
- W. T. F. Bond, (1996). Design Project Planning: A Practical Guide for Beginners. Prentice Hall, London.
- D. I. Cleland, (1994). Project Management: Strategic Design and Implementation. McGraw-Hill, New York.

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 Final Year 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 to Final Year Project II.

References

- Garis Panduan Gaya Penulisan Ilmiah Pascasiswazah, Universiti Malaysia Sabah 2020.

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 Final Year 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 2020.

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

- J. G. Proakis, D. G. Manolakis, (2013). Digital Signal Processing. Prentice Hall.
- C. T. Chen, (2000). Digital Signal Processing. Oxford University Press.
- E. Ifeachor, B. Jervis, (2001). Digital Signal Processing: A Practical Approach. Prentice Hall.
- S. K. Mitra, (2010). Digital Signal Processing. McGraw-Hill.
- A. V. Oppenheim, R. W. Schaffer, (2009). Discrete-Time Signal Processing. Prentice Hall.
- B. 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

- P. Schavemaker, L. V. D. Sluis, (2008). *Electrical Power System Essentials*. Wiley.
- S. Chapman, (2001). *Electric Machinery and Power System Fundamentals*. McGraw- Hill.
- F. Delea, J. Casazza, (2010). *Understanding Electric Power Systems: An Overview of the Technology, the Marketplace, and Government Regulation*. Wiley-IEEE Press.
- Jr. J. Grainger, W. Stevenson, (1994). *Power System Analysis*. McGraw-Hill.
- G. M. Masters, (2004). *Renewable and Efficient Electric Power Systems*. Wiley-IEEE Press.
- A.V. Meier, (2006). *Electric Power Systems: A Conceptual Introduction*. Wiley-IEEE Press.

KE47303 POWER ELECTRONICS AND DRIVES

This course discusses two concepts lead to automated devices. It covers the principles of variable signal conversion. It starts by the introduction of semiconductor power devices, to let the student understand the conversion of electrical power from one form to another and to observe the relationship between the ac and dc powers. It explains most of converters, inverters, and step up and down for single and 3-phase wave forms. The course introduces an application on the fundamental of electric drives. It discusses the drives connected to different types of converters and inverters operated in various modes and quadrants. It describes varies operations for dc and ac drives under different conditions

References

- M. H. Rashid, (2004). *Power Electronics, 3rd Edition*. Prentice hall.
- P. c. Sen, (2000). *Thyristor DC Drives, 4th Edition*. John Wiley & Sons.
- B. K. Bose, (2001). *Modern Power Electronics and AC Drives*. Prentice hall.
- N. N. Barsoum (1997). *Electric Machine and Drive Systems, Library Edition*, Sydney.
- N. Mohan, (1995). *Power Electronics Converters, Applications, and Design, 2nd Edition*, John Wiley & Sons.
- T. Wildi (1991). *Electrical Machine, Drives, and Power Systems, 2nd Edition*, Prentice hall.

KE47403 PENGURUSAN DAN KEWANGAN UNTUK JURUTERA

KE47403 MANAGEMENT AND FINANCE FOR ENGINEERS

This course aims to teach students on how to apply project management skills and economic techniques in evaluating 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

- E. P. Stanley, J. M. Samuel, R. M. Jack, M. S. Scot, M. M. Sutton, (2008). Project Management: Planning, Scheduling, and Controlling Projects. John Wiley & Sons Inc, USA.
- L. Blank, A. Tarquin, (2012). Engineering Economy, 7th Edition, McGraw Hill International Edition.
- P. Chan, (2008). Fundamentals Engineering Economics, 2nd Edition. Prentice-Hall.

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 coordination of electrical insulation is also included.

References

- M. S. Naidu, V. Kamaraju, (2004). High Voltage Engineering, 3rd Edition. McGraw-Hill.
- M. Khalifa, (1990). High Voltage Engineering: Theory and Practice. Marcel.Dekker.
- K. Dieter, (2001). High Voltage Test Techniques. Butterworth-Heinemann.
- E.Kuffel, (2000). High Voltage Engineering Fundamentals. Butterworth-Heinemann.
- M. Abdel-Salam, (2000). High-Voltage Engineering, 2nd Edition. Marcel Dekker.

KE48301 ENGINEERING LABORATORY VI (Power Electronics & High Voltage)

The students are exposed to 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

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

PROGRAMME I-ELECTIVE

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

- T.T. Wohlers, (1998). [Applying AutoCAD: A Step-by-Step Approach for AutoCAD Release 14. Glencoe/McGraw-Hill, New York.](#)
- A. Yarwood, (1999). AutoCAD Release 14: A Concise Guide. [Longman](#), Harlow Essex.
http://www.autocadcentral.com/Tutorials/tutorials_index.htm.
- Garis Panduan Pendawaian Elektrik (Suruhanjaya Tenaga).
- R. C. Mullin, (2008). 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 and 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. In the aspect of control system, programmable logic controllers are taught and practical laboratory experiences are provided. This course also covers 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

- M. P. Groover, (1992). Automation, Production Systems and Computer Integrated Systems. Prentice Hall.
- F. D. Petruzella, (2005). Programming Logic Controllers. McGraw Hill.
- J. W. Webb, R. A. Reis, (1999). Programmable Logic Controllers: Principles and Applications. Prentice Hall.
- J. A. Rehg, H. W. Kraebber, (2004). Computer-Integrated Manufacturing. Prentice Hall.
- S. B. Niku, (2001). Introduction to Robotics: Analysis, Systems, Applications. Prentice Hall.

PROGRAMME ELECTIVE

KE41103 ROBOTICS

This 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

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

KE41203 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 analogue transfer function to the digital equivalent for the purpose of analysis and design. The relationship of digital and analogue domains will be discussed with reference to classical analysis and controller design. State space design of digital controllers is also included.

References

- G. F. Franklin, J. D. Powell, M. Workman, (1998). Digital Control of Dynamic Systems, 3rd Edition. Addison-Wesley.
- N. S. Nise, (2008). Control Systems Engineering, 5th Edition. Wiley.
- J. H. McClellan, R. W. Schafer, M. A. Yoder, (2003). Signal Processing First. Pearson Prentice Hall.

KE41503 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

- N. S. Nise, (2008). Control Systems Engineering, 5th Edition. Wiley.
- W. K. Ogata, (1997). Modern Control Engineering. Prentice Hall.
- K. Dutton, S. Thompson, B. Barraclough (1997). The Art of Control Engineering, 1st Edition. Addison Wesley.

KE41603 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

- R. Jain, R. Kasturi, B. G. Schunck, (1995). Machine Vision. McGraw-Hill, Inc.
- M. Sonka, V. Hlavac, R. Boyle, (1999). Image Processing, Analysis, and Machine Vision, 2nd Edition. PWS Publishing.
- J.R. Parker, (1997). Algorithms for Image Processing and Computer Vision. Wiley Computer Publishing, USA.
- L.G. Shapiro, G.C. Stockman, (2001). Computer Vision. Prentice Hall Inc, USA.
- B. Horn, B. Klaus, P. Klaus, (1986). Robot Vision. Cambridge, MIT Press /McGraw-Hill.
- R.C. Gonzalez, R.E. Woods, (2001). Digital Image Processing, 2nd Edition. Prentice Hall.

KE42003 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

- R. C. Gonzalez, R. E. Woods, (2001). Digital Image Processing, 2nd Edition. Prentice Hall.
- M. Sonka, V. Hlavac, R. Boyle, (1999). Image Processing, Analysis, and Machine Vision, 2nd Edition. PWS Publishing.
- J. R. Parker, (1997). Algorithms for Image Processing and Computer Vision. Wiley Computer Publishing, USA.
- R. Jain, R. Kasturi, B. G. Schunck, (1995). Machine Vision. McGraw-Hill, Inc.
- L. G. Shapiro, G. C. Stockman, (2001). Computer Vision. Prentice Hall Inc, USA.
- A. K. Jain, (1989). Fundamentals of Digital Image Processing. Prentice Hall Inc, USA.

KE42303 ADVANCED 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

- S. Haykin, (2001). Adaptive Filter Theory. Prentice Hall.
- E. Ifeachor, B. Jervis, (2001). Digital Signal Processing: A Practical Approach. Prentice Hall.
- S. M. Kay, (1993). Fundamentals of Statistical Signal Processing, Volume I: Estimation Theory (v. 1). Prentice Hall Steven.
- S. M. Kay, (1998). Fundamentals of Statistical Signal Processing, Volume 2: Detection Theory (v. 2). Prentice Hall Dimitris Manolakis.

V. K. Ingle, S. M. Kogon, (2005). *Statistical and Adaptive Signal Processing: Spectral Estimation, Signal Modeling, Adaptive Filtering and Array Processing*. Artech House Publishers.

T. Nguyen, G. Strang, (1996). *Wavelets and Filter Banks*. Wellesley College.

KE42503 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

R. O. Duda, P. E. Hart, D. G. Stork, (2001). *Pattern Classification*, 2nd Edition. Wiley & Sons, New York.

C. M. Bishop, (2006). *Pattern Recognition and Machine Learning*. Springer, New York.

E. A. Zoeller, (2008). *Pattern Recognition: Theory and Application*. Nova Science Publishers.

S. Theodoridis, K. Koutroubas, (2009). *Pattern Recognition*, 4th Edition. Academic Press, Amsterdam.

T. Hastie, R. Tibshirani, J. Friedman, (2009). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction*, 2nd Edition. Springer.

KE42603 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.

References:

Y. Wang, J. Ostermann, Y. Q. Zhang, (2002). *Video Processing and Communications*. Prentice Hall.

A. C. Bovik, (2009). *The Essential Guide to Video Processing*, 2nd Edition. Elsevier Science.

H. Sun, T. Chiang, X. Chen, (2004). *Digital Video Transcoding for Transmission and Storage*. CRC Press.

J. Ohm, (2015). *Multimedia Signal Coding and Transmission*. Springer.

Chakrabarti, Indrajit, Batta, K. N. Srinivasarao, Chatterjee, S. Kumar, (2015). *Motion Estimation for Video Coding*. Springer.

[F. Zhai, \(2006\).](#) *Joint Source-Channel Video Transmission*. Morgan & Claypool Publishers.

KE43003 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

- O. Shunri, F. David, (2006). Silicon Nanoelectronics. Taylor & Francis Group.
- N. H. E Weste, K. Eshraghian, (1994). Principles of CMOS VLSI Design-A Systems Perspective, 2nd Edition. Addison-Wesley Publishing Company.
- J. M. Rabaey, A. Chandrakasan, B. Nikolic, (2003). Digital Integrated Circuits-A Design Perspective, 2nd Edition. Prentice Hall.
- C. G. Sodini, R. T. Howe, (1997). Microelectronics-An Integrated Approach, International Edition. Prentice Hall.
- R. Pratap, (2006). Getting Started with MATLAB 7–A Quick Introduction for Scientists and Engineers. Oxford University Press, New York.
- B. G. Streetman, S. K. Banerjee, (2006). Solid State Electronic Devices. Pearson, N. J.

KE43103 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

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

KE43303 DIGITAL INTEGRATED CIRCUIT SYSTEM DESIGN

This course elaborates and expands 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

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

KE43503 PHOTONICS AND OPTICAL SYSTEM

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

- B. E. A. Saleh, M. C. Teich, (1991). Fundamentals of Photonics. Wiley-Interscience.
- C. Pollock, M. Lipson, (2003). Integrated Photonics. Kluwer Academic Publishers.
- H. J. R. Dutton, (1998). Understanding Optical Communications. Prentice Hall Series in Networking.
- F. T. Ulaby, (2001). Fundamentals of Applied Electromagnetics. Prentice Hall.
- E. Hecht, (2002). Optics, 4th Edition. Addison Wesley.
- S. V. Kartalopoulos, (2003). DWDM, Networks, Devices and Technology. IEEE Press and Wiley Interscience.

KE44103 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 modeling, Code Division Multiple Access (CDMA), Multiple Input Multiple Output (MIMO) antenna based wireless communication systems and Orthogonal Frequency Division Multiplexing (OFDM).

References:

- M. Schwartz, (2013). Mobile Wireless Communications. Cambridge University Press.
- A. Goldsmith, (2005). Wireless Communications. Cambridge University Press.
- A. F. Molisch, (2011). Wireless Communications. John Wiley.
- K. L. Du, M. N. S. Swamy, (2010). Wireless Communication Systems. Cambridge University Press.

KE44503 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:

- J. G. Proakis, M. Salehi, (2008). Digital Communications, 5th Edition. McGraw-Hill.
- S. Shanmugam, (2005). Digital and Analog Communicator Systems. John Wiley.
- H. Taub, D. L. Schilling, G. Sana, (2008). Principles of Communication Systems, 3rd Edition, McGraw-Hill.
- S. Haykin, (2005). Digital Communication. Jon Wiley.
- B. Sklar, (2009). Digital Communication Fundamentals and Applications, 2nd Edition, Pearson Education.
- J.G Proakis, (2001). Digital Communication, 4th Edition. Tata McGraw-Hill Company.

KE44603 ANTENNA AND APPLICATIONS

Antenna acts as RF / microwave system`s energy sensing purpose. Review of frequency domain electromagnetic wave dynamics, radiation, and 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:

- V. F. Fusco, (2005). Foundations of Antenna Theory and Techniques. Pearson/Prentice Hall.
- C., A. Balanis, (2010). Antenna Theory, Analysis and Design. John Wiley and Sons.
- S. R. Saunders, (2011). Antennas and Propagation for Wireless communication Systems. John Wiley and Sons.
- J. D. Kraus, R. J. Marhefka, A. S. Khan, (2010). Antennas for All Applications, 4th Edition. TMH, New Delhi.
- C. A. Balanis, (2005). Antenna Theory: Analysis and Design. John Wiley & Sons, New Jersey.
- F. T. Ulaby, (2010). Fundamentals of Applied Electromagnetics, 6th Edition. Pearson.
- W. H. Hayt, Jr, J. A. Buck, (2001), Engineering Electromagnetics, 6th Edition. McGraw Hill International.

KE44703 SATELLITE 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:

- D. Roddy, (2006). Satellite Communication, 4th Edition. Mc Graw Hill International.
- T. Pratt, C. Bostian, J. Allnutt, (2003). Satellite Communications, 2nd Edition. John Wiley & Sons.
- W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, (2007). Satellite Communication Systems Engineering, 2nd Edition. Pearson Education.

KE45003 INDUSTRIAL DRIVES

This course introduces the fundamental of electric drives, the concept of power electronic applications and 2-axis motor representation in principal reference frames. 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 drives

References

- M. H. Rashid, (2004). Power Electronics, 3rd Edition. Prentice hall.
- P. c. Sen, (2000). Thyristor DC Drives, 4th Edition. John Wiley & Sons.
- B. K. Bose, (2001). Modern Power Electronics and AC Drives. Prentice hall.
- N. N. Barsoum (1997). Electric Machine and Drive Systems, Library Edition, Sydney.
- T. Wildi (1991). Electrical Machine, Drives, and Power Systems, 2nd Edition, Prentice hall.

KE45303 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

- A. E. Clayton, N. N. Hancock, (1959). Performance and Design of DC Machines. Pitman, London.
- A. K. Sawhney. (1984). A Course on Electrical Machine Design. Dhanpath Rai & Sons.
- M. G. Say, (1948). Performance and Design of AC Machines. Pitman.
- J. Cathey, J. J. Cathey, (2001). Electric Machines: Analysis and Design Applying MATLAB. McGraw-Hill.
- I. Boldea, (2009). Electric Machines: Steady State, Transients, and Design with MATLAB. Taylor & Francis.

KE45503 SUBSTATION ENGINEERING

This course introduces aspects of the fundamentals and considerations of substation design, configuration and design of busbar and safety requirement. This course describes the functions of various substation main equipment, 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

- J. D. McDonald. (2007). Electrical Power Substations Engineering, 2nd Edition. CRC Press.
- S. Rao, (2003). Electrical Substation Engineering & Practice. Khana Publishers, New Delhi.
- C. Bayliss, (2002). Transmission and Distribution Electrical Engineering. Newness, Great Britain.
- R. D. Garzon, (2002). High Voltage Circuit Breaker. Marcel Decker Inc, USA.
- H. L. Willis, (2000). Power Distribution Planning. Dekker/CRC Press.

KE45603 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

- J. Duncan, M. S. Sarma, T. J. Overbya, (1996). Power System Analysis and Design, 4th Edition. John Willey & Sons, London.

H. Saadat, (2004). Power System Analysis. McGraw Hill, Singapore.
B. M. Weedy, (2006). Electric Power Systems. John Wiley & Sons.
K. R. Padiyar, (2008). HVDC Power Transmission System Technology and System Interaction. New Age International Publishers.

KE49003 HYBRID SYSTEMS

This course starts by introduction of renewable and non-renewable energy types. The combination between the two types in one grid system is discussed in detail. Two major parts of hybrid system are electricity generation and heat generation, each part uses type of energy sources. These are explained with the relation to optimum performance and cost, energy saving and low carbon emission. Physical integration of the technologies within the building, heat storage and heat recovery system are also introduced.

References

Józef Paska, (2009), Hybrid power systems – An effective way of utilizing primary energy sources, Elsevier.
Mahmoud Ghofrani, (2016), Optimizing Hybrid Renewable Energy Systems: A Review.
Jyoti B.Fulzele, (2018), Design and Optimization of Hybrid PV-Wind Renewable Energy System, Elsevier.
Christos G.Cassandras, (2006), Hybrid system simulation with SimEvents, 2nd IFAC Proceedings.

KE49103 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 course 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

G. Boyle, (2004). Renewable Energy, 2nd Edition. Oxford University Press.
B. Sorensen, B. Srensen, (2004). Renewable Energy, 3rd Edition. Academic Press.
M. G. Simoes, F. A. Farret, (2004). Renewable Energy Systems: Design and Analysis with Induction Generators. CRC Press.
G. Boyle, B. Evereet, J. Ramage (2003). Energy Systems and Sustainability. Oxford University Press.

KE49203 SOLAR ENGINEERING

The course introduces the different materials of solar panels with their characteristics, and analysis the maximum power point tracking and simulated by software. Different methods of tracking system are also given in detail with program codes and sensors. Energy efficiency of solar power is explained in detail analysis with the relation to different demands, distributed generators, energy mix and hybrid sources.

References

A, Michael Boxwell (2019) Solar Electricity Handbook.

Gerro Prinsloo, (2015), Sun Tracking and Solar Renewable Energy Harvesting: Solar Energy Harvesting, Trough, Pinpointing and Heliostat Solar Collecting Systems

Yuchi Sun, (2019). Short-term solar power forecast with deep learning: Exploring optimal input and output configuration, Elsevier.

S. X. Suleymanov, (2018). Determination of Parameters of Heat Treatment and Melting of Materials in a Solar Furnace, Springer.

KE49303 ADVANCED 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 advanced materials and systems for solar photovoltaic (SPV) technology. Basic principles of non-heating, energy efficient materials and devices knowledge of solid state lighting and green energy engineering leading to understanding of advanced 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 supporting technologies for green energy engineering will be deliberated in this course. 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:

C. Honsberg, S. Bowden. Photovoltaics: Devices, Systems and Applications CD-ROM.

G. M. Masters, (2004). Renewable and Efficient Electric Power Systems, 2nd Edition. Wiley.

R. F. Pierret, (2013). Semiconductor Device Fundamental Test Books. Addison-Wesley.

W. D. Callister Jr., (2007). Materials Science and Engineering-An Integrated Approach. Wiley.

E. F. Schubert, (2003). Light-emitting Diodes. Cambridge Univ. Press.

J. Nelson, (2003). The Physics of Solar Cells. Imperial College Press.

N. H. Singh, (2003). Handbook of Luminescence, Display Materials, and Devices. American Scientific Publishers.

S. R. Wenham, (2007). Applied Photovoltaics. Taylor & Francis.

D. Birtalan, W. Nunley, (2007). Optoelectronics-IR-V-VU-Devices and Applications. Oxford University Press.

CHEMICAL ENGINEERING PROGRAMME (HK03)

KC04403 CALCULUS

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

- 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. (2014). Thomas' Calculus. 13th Edition. Pearson Addison Wesley. Boston. Kreyszig, E. (2006). Advanced Engineering Mathematics. Wiley. Singapore.
- Vraberger, D., Purcell, 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 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 are among the major topics in this course.

References

- Thomas G. B., Weir, M.D. and Hass, J. (2016). Thomas' Calculus. 13th Edition. Pearson Higher Ed. USA.
- Strauss, Monty J., Bradley, Gerald L., Smith, Karl J. (2002). Calculus, 3rd Edition. Prentice Hall, USA.
- Stewart, James. (2015). Calculus, 8th Ed. Thomson Learning, USA.

KC06603 ENGINEERING PROBLEM SOLVING AND PROGRAMMING

This course introduces the concept of computer programming based on FORTRAN language and MATLAB. The programming 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 J. Palm (2010), Introduction to MATLAB for Engineers. Third Edition McGraw-Hill.
- Michael Metcalf, John Reid, Malcolm Cohen. (2011) Modern Fortran explained. Oxford University Press.
- Stephen J. Chapman (2004) Fortran 90/95 for Scientists and Engineers, Second edition, McGraw-Hill.

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

Charles E. Harris, Jr. et al., (2016), *Engineering Ethics: Concepts and Cases*, 5th Edition, CENGAGE,
Wan Arfah Hamzah, (2009), *A First Look at the Malaysian Legal System*; Oxford Fajar Sdn. Bhd.
Jenning, M. Marianne, (2009) *Business ethics*, 6th edition, Thomson Learning.
Rajendra S. Sisodia David B. Wolfe, Jagdish N. Sheth, (2014), *Firms of Endearment: How World-Class Companies Profit from Passion and Purpose*, 2nd Edition, Pearson Education.

KC09903 MANAGEMENT AND ACCOUNTING FOR ENGINEERS

This course is a prerequisite for the completion of the engineering degree at 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. (2009). *Costing*. (7th ed.) DP Publications Ltd.
Atkinson, A.A, Kaplan, R.S. and Young, S.M. (2012). *Management Accounting*. (6th 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. (2016) *Organic Chemistry*, 5th Edition, Mc Graw Hill.

Carey, F. A (2014) *Organic Chemistry*, 9th 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.(2012) 5th Edition. *Shreve's Chemical Process Industries*. McGraw-Hill, New York.
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. (2016) *Organic Chemistry*, 5th Edition, Mc Graw Hill.
Carey, F. A (2014) *Organic Chemistry*, 9th 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.

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. Petrochemical industries. Food and food byproduct processing industries.

References

- Austin, G. T. 2012. *Shreve's Chemical Process Industries*, 5th Edition. McGraw-Hill, New York.
- 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. 1999. *Chemical Engineering, Vol. 1, Fluid Flow, Heat Transfer and Mass Transfer*, Butterworth-Heinemann, 6th Edition, Oxford.
- Coulson, J.M. and Richardson, J.F. 2013 *Chemical Engineering, Vol. 2, Particulate systems, and Separation Processes*, Butterworth-Heinemann, 5th Edition, Oxford.
- Richardson, J.F. and Harker, J.H. 2013. *Chemical Engineering, Vol. 3, Chemical and Biochemical Reactors and Process Control*, Butterworth-Heinemann, 3rd Edition, Oxford.
- Sinnott, R.K., 2015. *Coulson and Richardson's Chemical engineering: Chemical Engineering Design*, Volume 6. Butterworth-Heinemann, 5th 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., 2016. *Principles of Electric Circuits. Conventional Current Version. 9th Edition*. Pearson Education, Inc., (Prentice Hall).
- Edward Hughes, 2002. *Hughes Electrical & Electronic Technology. Eighth Edition*. Pearson Prentice Hall.
- Robert L. Boylestad. 2015. *Introductory Circuit Analysis, 13th 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

- Sinnott, R. K. (2015) *Chemical Engineering Design Volume 6, 5th Edition*, Elsevier
- Geankoplis, C. J. (2018) *Transport Process and Separation Process Principles*, Prentice Hall, 5th 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. (2009). *Foundations of Materials Science and Engineering, 5th Edition*, McGraw Hill, New York.
- William D. Callister, Jr. (2014). *Materials Science and Engineering, An Introduction, 9th Edition*, Wiley International Edition, New York.
- James F. Shackelford (2014) *Introduction to Materials Science for Engineers. 8th 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 Laplace transforms in solving the differential equations.

References

- Ervin Kreyszig , 2011, *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*, 6th Ed. Prentice Hall.
- Boyce W.E, and Diprima R.C. 2004, *Elementary Differential Equations and Boundary value Problems*, 8th Ed. 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

- Cengel, Y.A. 2015. *Heat and Mass Transfer: Fundamentals and Applications*. 5th Ed. McGraw Hill, Singapore.
- 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.
- 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.

KC22603 CHEMICAL ENGINEERING THERMODYNAMICS

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 Thermodynamics*, 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*, Terjemahan 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. 2015. *Thermodynamics: An Engineering Approach*, 8rd 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.

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

- Cengel, Y.A. 2015. *Heat and Mass Transfer: Fundamentals and Applications*. 5th Ed. McGraw Hill, Singapore
- 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.
- Kevin D. D., and Donald P. V. Jr., 2015 *Fundamentals of Chemical Engineering Thermodynamics*, Cengage Learning, US.
- Cengel Y.A. and Boles M.A. 2015. *Thermodynamics: An Engineering Approach*, 8rd Ed. McGraw-Hill: USA
- 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.

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

- Cengel, Y.A. and Cimbala, J.M. Fluid Mechanics-Fundamentals and Applications, 4th Ed., McGraw Hill, Singapore, 2020.
De Nevers, N. Fluid Mechanics for Chemical Engineers, 3rd Ed., McGraw Hill, Singapore, 2005.
Munson B, Young, D, Okiishi, T and Huebsch,W. Fundamentals of Fluid Mechanics, 6th Ed., John Wiley & Sons Inc., New Jersey, 2010.
Mc Cabe and Smith, Unit Operations of Chemical engineering.McGraw hill, New York, 2007.
Geankoplis, C.J., Transport Processes and Separation Process Principles, 5th Ed. Prentice Hall, 2018.

KC30005 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 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 praiseworthy.

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. (2017). Bioprocess Engineering: Basic Concepts. 3rd Ed. Prentice Hall.

Blanch, H.W., D.S. Clark. (1997). Biochemical Engineering. CRC Press.
Bailey, J.E., D.F. Ollis. (1997) Biochemical Engineering Fundamentals. McGraw-Hill.
Kathleen Park Talaro and Barry Chess. (2018) Foundations in Microbiology, 10th Edition, McGraw-Hill

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. 2016. Process Dynamics and Control, 4th 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 International
Luyben W. L., 1990, Process Modeling, Simulation and Control for Chemical Engineers, McGraw-Hill International, Singapore
Awang Bono, Duduku krishnaiah and Mariani Rajin, 2008, "Products and Process Optimization using Response Surface

Methodology", Penerbit UMS, Malaysia

Peters M. S., Timmerhaus K. D., 1991, Plant Design and Economics for Chemical Engineers, McGraw-Hill International, Singapore

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. Bentley (1995), Principles of Measurement Systems , Longman, Essex.

E.O. Doebelin (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.

V.R Radhakrishnan (1997), 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. (2012) Introduction to Environmental Engineering. WCB/McGraw-Hill. 5th Edition.

Metcalf & Eddy.(2004) Wastewater Engineering Treatment & Reuse. McGraw-Hill. 4th Edition.

Noel De Nevers. (2000) Air Pollution Control Engineering. McGraw-Hill. 2nd Edition.

Tchobanoglous, 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., 2008, 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.

Smith, R., 2005, Chemical process design and integration NJ: John Wiley & Sons,

KC33103 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.

Ghattas, R. G. and McKee, S. L. (2001) Practical Project Management. Prentice Hall, 1st Edition.

Klasterin, T. (2004) Project Management. John Wiley & Sons, Inc, 1st Edition.

Harvey Maylor (2003) Project Management. Prentice Hall, 3rd Edition Robbins

KC33202 PROCESS ENGINEERING LAB

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

References

Laboratory manual used for KC33202

Additional references supporting the course

Geankoplis, C.J., 2014, Transport Processes and Separation Process Principles, 4th Edition (New International Ed.), Pearson Education Ltd.

McCabe, W. L. and Smith, J. C. 2004. Unit operations of chemical engineering. 7th Ed. 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.

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 reactors and solving skills. Students will be exposed to the various reactors and effect of temperature and pressure.

References

Fogler, H.S., 2016, Elements of Chemical Reaction Engineering, 5th Edition. Pearson Education Limited . 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., 2016, Product and Process Design Principles: Synthesis, Analysis and Evaluation, 4th Ed. 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., 2014, Transport Processes and Separation Process Principles, 4th Edition (New International Ed.), Pearson Education Ltd.

Treybal, R.E. 1981, Mass Transfer Operations, McGraw Hill.. 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 BIOPROCESS 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. 2009, 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.
- 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

Tchobanougias, 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

W. D. Seider, J. D. Seader, D. R. Lewin, S. Widagdo, Product And Process Design Principles: Synthesis, Analysis And Evaluation, 3rd edition, John Wiley and Sons, Inc., Asia, 2010.
K. T, Ulrich, and S. D. Eppinger, Product Design and Development, 2nd Edn, McGraw-Hill, New York, 2000.
J. A. Kent, Handbook of Industrial Chemistry And Biotechnology, Springer, New York, 2007
M Kohler and W. Fritzche, Nanotechnology: an introduction to nanostructuring techniques, Wiley and Sons Inc. Weinheim, 2004.
J. H. Koo, Polymer Nanocomposite, McGraw-Hill, New York, 2006.
P. A. Schweitzer, Paint and Coating: Application and Corrosion Resistance, CRC Press, London, 2006

KC44703 OIL AND GAS

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 York
J 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 Sekuli , 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 engineering.

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 Horwood. 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 technology (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

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 , Marcel 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, Materials 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 BENGKEL KEJURUTERAAN

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, Vernier caliper, 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. The 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, materials 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. Douglas, 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 Adebisi, G. A. 1993. Classical thermodynamics, International Ed. Saunders College publishing; USA
- Sonntag, R.E., Borgnakke, C., and wylan, 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

KM21502 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.

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.

KM3005 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.
- Norton R L "Machine Design – an integrated approach" 3 e, Pearson/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. Juvinal, Penerjemah: 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 introduces the concepts of control systems towards the design of system stability. Prior to complex engineering problem, basic definition and system modeling will be discussed. Laplace Transform is reviewed to show the transformation differential equation into s-domain transfer function. Analysis of control system will be carried out in time domain and frequency domain. Analysis of time domain is demonstrated using root locus. While in the frequency domain, Bode plot technique is used for stability analysis. The knowledge is applied for compensator design. The concept of PID controller will be introduced.

References

N. S. Nise (2019), *Control System Engineering*, 8th edition, 2019, Wiley.

R. C. Dorf and R. H. Bishop (2016), *Modern Control Systems*, 13th edition, Pearson.

K. Ogata (2009), *Modern Control Engineering*, 5th edition, Pearson.

B.C. Kuo (2003), *Automatic Control Systems*, 8th edition, John Wiley & Sons.

KM32003 FINITE ELEMENT METHOD

This course introduces the concept of finite element method (FEM) in modelling and solving the practical engineering problems. The course emphasizes the solution of real-life engineering problems using the finite element method underscoring the importance of the choice of the proper mathematical model, discretization techniques and element selection criteria. The course covers the principle of FEM, direct stiffness method, derivations for prismatic bar under axial loading, truss structure, bending of beam, plane stress & strain, and thermal-fluid related application.

References

- D. L. Logan (2012), *Finite Element Method: A first course in the*, 5th edition, Cengage Learning.
- K.-J. Bathe (2014), *Finite Element Procedures*, 2nd edition, Prentice Hall.
- S. S. Rao (2011), *The Finite Element Method in Engineering*, 5th edition, Elsevier.
- T. R Chandrupatla and A. D. Belegundu. (2002), *Introduction to Finite Elements in Engineering*, 3rd Edition, Prentice Hall.
- LISA Finite Element Analysis (2013), *Tutorials and Reference Guide*.

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 Kietz, 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, RAJAMANOHRAN, 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 and system such as 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, 7/e, 2013, 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. Addison- Wesley: USA.
- Joseph S. Martinich 1997. Production and Operation Management. An Applied Modern Approach. 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 emissivity 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 covers 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., Illinois, 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

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

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, Pearson Education International

Kunwood Lee, Principal of CAD/CAM/CAE System, 1999,Addison Wesley.

KM44403 PEMBUATAN LANJUTAN

KM40403 OPERATIONS 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, diamond like 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 vapour 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 graphene. 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.

References

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 energy. The course blends aerodynamic theory and computational methods used for the design of airfoils and state-of-the-art 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 other guidelines will be included. Elements involved in wind turbine projects, including meteorology and wind resource assessment 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 to proceed 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, 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 single-variable 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, (2014). Thomas' Calculus. 13th Edition. Global Edition. Pearson Addison Wesley. Boston
Stewart, J. (2015), Early Transcendentals Calculus. 8th Edition. Thomson Brooks/Cole. USA.
Tan, S.T., (2010). Calculus. International Edition. Brooks/Cole Cengage Learning. USA

KS05503 CALCULUS II

The intent of this course is to provide an extension of Calculus II, where students are taught to solve multivariable engineering problems. 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, (2014). Thomas' Calculus. 13th Edition. Global Edition. Pearson Addison Wesley. Boston
.Stewart, J. (2015), Early Transcendentals Calculus. 8th 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 language. The course will introduce students to design and develop program in C. The topics covered include introduction to computer science and constructs in C including variable, assignment statement, selection structures, repetition and loops, modular programming, simple data types, arrays, strings, abstract data types, text and binary file and dynamic data structures.

References

Behrouz A. Forouzan and Richard F. Gilberg. "Computer Science A Structured Programming Approach Using C". Third Edition. Brooks/Cole. 2001.
Harvey Deitel and Paul Deitel. "C How to Program, Seventh Edition". Pearson, 2013.

KS08803 ETHICS AND LAW FOR ENGINEERS

This course aims to familiarize the students as a future engineer to the importance and the role of engineering ethics in the workplace and on society in general. The exposure will cover case studies involving professional ethics of engineers and relevant

laws.

References

- Jr. Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Ray James and Elaine Englehardt. (2018). Engineering Ethics: Concepts and Cases. 6th Edition. Cengage Learning.
- Charles B. Fleddermann. (2011). Engineering Ethics. 4th Edition. Pearson.
- Mike Martin and Roland Schinzinger. (2009). Introduction to Engineering Ethics. 2nd Edition. McGraw-Hill Education.
- Tom L. Beauchamp, Norman L. Bowie and Denis G. Arnold. (2008). Ethical Theory in Business, 8th Edition. Pearson.
- Jenning, M. Marianne. (2017). Business Ethics: Case Studies and Selected. 9th Edition. Cengage Learning.
- Betty, F. Jeffry and Samuelson, S. Susan. (2018). Business law and the legal environment. Standard Edition. 8th Edition. South-Western College/West.

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., Schatzberg, J.O. and Burgstahler D. (2014). Introduction to Management Accounting (16th ed.). Pearson
- Atkinson, A.A, Kaplan, R.S., Matsumura E.M. and Young, S.M. (2012). Management Accounting: Information for Decision-Making and Strategy Execution (6th ed.). Pearson.

KS10503 ELECTRIC CIRCUITS ANALYSIS

This course introduces the students the basic of electric circuits encompasses the DC circuits (basic concepts and laws, analysis method, circuit theorems, and first and second order circuit) and AC circuits (sinusoids and phasors, sinusoidal steady-state analysis and AC power analysis).

References

- Robert L. Boylestad, 2016 "Introductory Circuit Analysis", 13 th Edition, Pearson
- Alexander C. K. & Sadiku M. N. O., 2012. Fundamentals of Electric Circuits. 5rd Edition. McGraw-Hill.

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 process of building electronic circuits starts with designing using CAD to capture schematics and simulate using Proteus Isis. The next phase will be the building of prototypes using breadboards and veroboards. Then, students are required to

produce PCB (printed circuit board) designs to be sent to PCB manufacturers with 2 copper layers, complete with solder mask, silkscreen and drill holes. Functionally proven electronic circuits will be given to students to implement in PCB and incorporate additional components to make them function properly for a desired purpose.

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

- Robert L. Boylestad and Louis Nashelsky, 2014 "Electronic Devices and Circuit Theory", 11th Edition, Pearson.
Thomas L. Floyd, 2014 "Electronic Devices, 9th Edition, Pearson.

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

- James L. Hein. 2017. Discrete structures, logic, and computability. World Headquarters/Jones & Bartlett Learning
Bernard Kolman, Robert C. Busby & Sharon Cutler Ross. 2014. Discrete Mathematical Structures. Pearson Prentice Hall.
Wallis, W. D. 2013. A Beginner's Guide to Discrete Mathematics. Springer Science & Business Media
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)

This course is designed to provide students with a foundation in the electrical and electronics technology. The experiments in this courses support the overall learning process by helping student to develop practical skills in the use of power supplies, instruments, and components in a hands-on test environment. It provides laboratory exercises in basic electrical theory, electric and electronic circuits, and passive devices in both direct and alternating current. The course also help student to develop the techniques of gathering accurate experimental information and communicating that information through written reports and tabulated data.

References

- Robert L. Boylestad, "Introductory Circuit Analysis", 2012, Prentice Hall.
Edward Hughes, "Electrical & Electronic Technology", 2016, Pearson.

Nilsson J. W. & Eiedel S. A, "Electric Circuits", 2011, Pearson Prentice Hall.
J. David Irwin & R. Mark Nelms, "Basic Engineering Circuit Analysis", 2010, John Wiley & Sons, Inc.
Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", 2008, Pearson.

KS20503 LOGIC DESIGN

This course teaches the students Boolean algebra and the basic logic gates, analysis and synthesis of combinational and sequential logic circuits, finite state machines, hardware description language (HDL) and programmable logic devices (such as FPGA) that are sufficient for them to build microprocessor and memory devices.

References

Mano, Morris, M., Kime, Charles, R. Logic and Computer Design Fundamentals 5th edition, Pearson, 2016.
Floyd, Thomas L. Digital Fundamentals, 11th Edition, Pearson, 2015.
Mansar Alam, Bashir Alam. Digital Logic Design, PHI Learning, 2016
Brown, S., Vranesic, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2008
Kleitz, W. Digital Electronics, A practical Approach, Pearson, 2011.

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 (7th Ed), Frank M. Carrano, Timothy M. Henry, Pearson Ed. 2017.

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

C. Henry Edwards, David E. Penney, David T. Calvis. 2016. *Differential Equations with Boundary: Value Problems*, Pearson
Boyce W.E. and Diprima R.C. 2013. *Elementary Differential Equations and Boundary Value Problems*, 10th Edition. John Wiley.

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. & Maxim, B. R. 2015. *Software Engineering, A Practitioner Approach*, 8th Edition. McGraw Hill, New York.
Ghezzi, C., Jazayeri, M., Mandrioli D., 2003. *Fundamentals of Software Engineering*, 2nd Edition, Prentice Hall, USA.
Bruegge, B., dan Dutoit, A. H. 2004. *Object-oriented Software Engineering using UML, Patterns and Java*, 2nd Edition. Prentice Hall, USA.

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, 11th Edition, Pearson, 2015.
Mansar Alam, Bashir Alam. Digital Logic Design, PHI Learning, 2016
Mano, Morris, M., Kime, Charles, R. Logic and Computer Design Fundamentals 5th edition, Pearson, 2016l.
Brown, S., Vranasic, Z. Fundamentals of Digital Logic with VHDL Design, McGraw Hill, 2008
Kleitz, W. Digital Electronics, A practical Approach, Pearson, 2011.

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. Yales and D. J. Goodman, Probability and Stochastic Processes 2nd Ed., John Wiley & Sons Hoboken, NJ, 2014
Hossein Pishro-Nik, "Introduction to Probability, Statistics and Random Processes", Kappa Research, LLC, 2014.
Sheldon Ross, "First Course in Probability", Pearson Education, 2014.
Henry stark and John W. Woods, "Probability and Random Processes with Application to Signal Processing, 2th Ed, Pearson Education Limited, 2014
Oliver Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier AP2014
Vantakan Krishnan, " Probability and Random Processes", John Wiley & Sons Hoboken , NJ, 2015.

KS22402 ENGINEERING PHYSICS

This course is an introductory course which will cover two main topics in physics which are not normally covered in other core subjects in a computer engineering course such as mechanics and thermodynamics. The course begins with a general introduction to laws of physics, and then into mechanics and thermodynamics. Solutions to practical problems related to computer engineering in thermodynamics will be covered.

References

Cengel Y.A. and Boles M.A. 2015. Thermodynamics: An Engineering Approach, 8rd Ed. McGraw-Hill: USA
R.C. Hibbeler, Engineering Mechanics: Statics, 12th Ed., Pearson, 2010.

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. (2014). Numerical Methods for Engineers. 7th Edition. McGraw Hill. New York. Gilat A and Subramaniam V. (2013). Numerical Methods for Engineers and Scientists. John Wiley & Sons. New York.
Klusalaas J. (2018) Numerical Methods in Engineering with MATLAB, 3rd Edition. Cambridge University Press, Cambridge.

KS22802 DESIGN PROJECT I

This course is a group-based and project-based course. All groups will be given a general description of a complex engineering problem to solve. The assessment of this course is based on three sections. First is team work which is assessed by the Coordinator. Second is a technical report which is assessed by an examiner. Finally, a demonstration is used to assess the performance of the developed prototype. The demonstration is assessed by a panel of 2 judges.

KS30005 INDUSTRIAL TRAINING (LI)

Industrial Training is a required course for all the students in 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 a 5-credit hour course. At the completion of their industrial training, students will be awarded a Pass with Distinction/Pass/Fail grade.

KS30403 CONTROL SYSTEMS

This course introduces basic concepts of control systems within the constraints of linear time invariant systems. Students will be 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 a Root Locus, Bode and Nyquist plots for analysis and controller design will also be discussed.

References

- Norman S. Nise. 2017. Control Systems Engineering. Wiley.
- Robert H. Bishop, Richard C. Dorf. 2016. Modern Control Systems, 13th Edition. Pearson Education.
- Katsuhiko Ogata. 2010. Modern Control Engineering. Pearson Education.
- Anand Kumar. 2014. Control Systems. 2nd Revised Edition, PHI Learning.

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 & Reza Langari, 2015, Measurement and Instrumentation: Theory and Application, 2nd Edition, Academic Press Inc.
- Alan S. Morris, 1993, Principles of Measurement and Instrumentation, Second Edition, Great Britain: Prentice Hall.
- Ernest O. Doebelin, 2004, Measurement Systems: Application and Design, Fifth Edition, New York: McGraw-Hill
- Robert B. Northrop, 2005, Introduction to Instrumentation and Measurement, Second Edition, CRC Press.

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

- Charles L. Phillips, John M. Parr and Eve A. Riskin, 2014, Signals, Systems and Transforms, Fifth Edition, Pearson Education.
- Simon Haykin and Barry Van Veen, 2013, Signals and Systems, John Wiley & Sons, International Edition.
- S. Varadajan, M.M. Prasada Reddy and M Jithendra Reddy, 2016, Signals and Systems, 1/ I.K International Publishing House Pvt. Lmt.
- Alan V. Oppenheim and Alan S. Willsky with S. Hamid Nawab, 2013, Signals and Systems, 2nd Edition, Pearson New International Edition.
- Rodger A. Ziemer William H. tranter and D. Ronald fannin 2014, Signals and Systems Continuous and Discrete, Pearson Education.

KS31403 DIGITAL SIGNAL PROCESSING

This course covers the fundamental DSP concepts and applications, Z-transforms, Linear Time Invariant Systems, Discrete and Fast Fourier Transforms, FIR and IIR filters design

References

- Salivahanan. S. 2015. Digital Signal Processing. McGraw Hill Education.
- Rao, K. D. and Swamy M. N. S. 2018. Digital Signal Processing: Theory and Practice. Springer.

Alexander, W. and Williams C. M. 2017. Digital Signal Processing: Principles, Algorithms and System Design. Elsevier.
Raja Rajeswari, K. 2015. Digital Signal Processing. I.K. International Publishing House Pvt. Ltd.
Proakis, J. G. and Manolakis D. G. 2014. Digital Signal Processing. Pearson Education Limited.

KS31503 MICROELECTRONICS

The purpose of this course is to introduce the important field of Microelectronics to Electronic (Computer) Engineering students. 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. Students also will be introduced to the design of digital components, electronic devices and digital systems using modern software tools.

References

Neil H. E. Weste, David Money Harris, Fourth Edition, 2011, Integrated Circuit Design, PEARSON.

References supporting the course:

Adel S. Sedra, Kenneth C. Smith and adapted by Arun N. Chandorkar, "Microelectronic Circuits – Theory and Applications", 5th Edition 2009, OXFORD UNIVERSITY PRESS.

Robert F. Pierret, SEMICONDUCTOR DEVICE FUNDAMENTALS, 1996, Massachusetts : Addison-Wesley

S. M. Sze, M. K. Lee, Semiconductor Devices: Physics and Technology, 3rd Edition, 2013, Wiley Singapore Pte. Ltd.(up to post graduate level)

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.

C. A. Mead and L. A. Conway, "Introduction to VLSI Systems". Addison-Wesley, ISBN 0-201-04358-0, 1980. The first textbook in this subject but still useful.

KS31603 COMMUNICATION SYSTEM ENGINEERING

This course studies the underlying concepts that cause data communication possible. The topics include wireless and wired transmission media, digital and analog signals, modulation, multiplexing, switching, error control, and flow control. The course ends with discussions on examples of data communication systems, including modems, Digital Subscriber Lines (DSL), Wireless Local Area Network (LAN), and cellular phones.

References

W. Stallings, Data and Computer Communications, 8th Ed., Prentice Hall, Upper Saddle River, NJ, 2014.

B. Forouzan, 2013, "Data Communications and Networking", 4th Ed., McGraw Hill,

Curt White, 2015, "Data Communications and Computer Networks" 8th ed Cengage learning. "

William Bouchana, 2013, "Handbook of Data communications and Networks", Springer. Bernard Sklar, Digital Communications: Fundamentals and Applications, 2nd ed., Prentice Hall, 2001.

Brijendra Singh, 2014, "Data Communications and Computer Networks", MPH.

Cory Boeard and William stallings, 2016, "Wireless Communications etworks and Systems, Global Edition, mPH.

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, Umberto Ravaioli, 2015 "Fundamentals of Applied Electromagnetics", 7th Edition, Pearson.
- William H. Hayat, Jr. John A Buck, 2012, "Engineering Electromagnetics", 8th Edition, McGraw-Hill
- Matthew N. O. Sadiku, 2007, Elements of Electromagnetics, 4th 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.

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., 2014. The Intel Microprocessors, 8th Edition, Pearson Education Limited, England.
- 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.

KS32403 COMPUTER ARCHITECTURE

This course provides a basic foundation of how computer works to students. This course also introduces available methods to improve the performance of computer, computer software, as well as discusses issues related to modern processors. It introduces 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. 2016. Computer Organization & Architecture - Designing For Performance. Ninth Edition (International). Prentice Hall
- J. L. Hennessy & D. A. Patterson, 2011. Computer Architecture: A Quantitative Approach, Fifth Edition, Morgan Kaufmann
- Carl Hamacher, Zvonko Vrasenic, Safwat Zaky, Naraig Manjikian, 2012. Computer Organization and Embedded Systems, 6th Edition, McGraw Hill
- M. Morris Mano, Charles R. Kime, 2012, Logic and Computer Design Fundamentals, Fifth Edition, Pearson International Edition
- D. A. Patterson & J.L. Hennessy. 2012. Computer Organization and Design - The Hardware/Software Interface, 4th Edition, Morgan Kaufmann

KS32503 EMBEDDED SYSTEMS

This course is designed to provide students with a foundation in embedded system which is a core subject in the Electronic Computer Engineering field. This course enables students to write embedded system software that communicates effectively with a range of hardware devices, as well as to design and implement complex embedded system through the use of an integrated development environment (IDE) and handheld computer technology. In this course, the fundamentals of embedded system hardware and firmware design will be explored. Issues such as embedded processor selection, hardware/firmware partitioning, circuit design, circuit debugging, firmware design, firmware debugging, and development tools will be discussed. The PIC16F887, one of the latest microcontrollers from Microchip, will be studied. The MPLAB IDE, Proteus ARES/ISIS and EasyPIC v7 development board are chosen to meet computation, resource, firmware, and hardware development. This course will gear to the integration of hardware modules to construct complex embedded systems, and the programming models and characteristics of various input/output interfaces.

References

Predko, M., *Programming and Customizing PIC Microcontrollers*, 2008, Mc Graw Hill USA.

Tim Wilmshurst, *Designing Embedded Systems with PIC Microcontrollers: Principles and application*, 2nd edition 2010, Elsevier, USA.

PICmicro™ *Mid-Range MCU Family Reference Manual*, 1997, Microchip Technology Incorporated, USA.

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..

KS32602 DESIGN PROJECT III

This course is a group-based and project-based course. All groups will be given a general description of a complex engineering problem to solve. The assessment of this course is based on three sections. First is team work which is assessed by the Coordinator. Second is a technical report which is assessed by an examiner. Finally, a demonstration is used to assess the performance of the developed prototype. The demonstration is assessed by a panel of 2 judges.

KS32702 DESIGN PROJECT II

This course is a group-based and project-based course. All groups will be given a general description of a complex engineering problem to solve. The assessment of this course is based on three sections. First is team work which is assessed by the Coordinator. Second is a technical report which is assessed by an examiner.

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, 2018.

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, 2018.

KS40803 OPERATING SYSTEM

Operating systems are the main central to computing activities. An operating system is a program that acts as an intermediary between a user of a computer and the computer hardware. The main tasks of operating systems are to manage resources such as CPU time and memory and to manage the users and software.

References

Silberschatz A., Galvin P. B., and Gagne G., Operating System Concepts, 9th Edition, 2014, Wiley

Additional references supporting the course:

Pradeep S., Distributed Operating Systems Concepts and Designs, IEEE Press.

Galli D. L., Distributed Operating Systems: Concepts and Practice, 2000, Prentice Hall (ISBN: 0130798436)

KS41103 COMPUTER NETWORKS

This course is an introductory course which will describe the principles of computer networks. The course begins with general introduction to computer networks, followed by elaborate explanation about the contents of every layers in layered concepts (physical layer, data link layer, medium access control sub-layer, network layer, transport layer, and application layer) of data networks. More advanced level contents are covered towards the end of the course which includes flow controls, error correction and detection, and retransmission mechanism in a data network.

References

James F. Kurose and Keith W, Ross, Computer Networking: A Top-Down Approach, Pearson, 2017

HCNA Network Study, Huawei Technologies Co. Ltd., Springer, 2016

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

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

- Constantine A. Balanis, 2015, "Antenna Theory: Analysis and Design", John Wiley & Sons, New Jersey.
Edward J. Shortridge, 2018, "Super dipole Antennas", Dog Ear Publishing.
Kamal Kishore, 2013, "Antennas and Wave propagation", I. K. International Pvt Ltd.
Y.T. Lo and S. W. Lee, 2013, "Antenna Handbook, Theory, Application and Design", Springer.
Kumar Sanjay and Shukla Saurabh, 2015, "wave Propagation and Antenna Engineering", PHI Learning Pvt Ltd.
John D. Krauss and Rolald J. Marhefta, 3/e, 2003, "Antennas for all applications", McGraw-Hill, Singapore.

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

- Jonathan Katz and Yehuda Lindel, 2015. Introduction to Modern Cryptography 2nd Edition, CRC Press
Charles P. Pfleeger, Shari Lawrence Pfleeger. 2007 Security in Computing, 4th 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. 2006. Introduction to Cryptography with Coding Theory. 2nd Ed. Prentice Hall.

KS41603 PENGENALPASTIAN CORAK

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

- Bishop, C. M. (2011). Pattern Recognition and Machine Learning. Springer.
Duda, R. O., Hart, P. E. and Stork, D. G. (2003). Pattern Classification. 2nd Edition. Wiley & Sons.
Zoeller, E. A. (2008). Pattern Recognition: Theory and Application. Nova Science Publishers.

Theodoridis, S. and Koutroumbas, K. (2008). Pattern Recognition. 4th Edition. Academic Press.
Hastie, T., Tibshirani, R. and Friedman, J. (2016). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. 2nd Edition. Springer.

KS41701 LABORATORY III (COMMUNICATION LAB)

This course consists of laboratory work focusing on the enhancement of the students' understanding of data communications and computer networks. Phase 1 will be on the design and testing of transmitter modulator circuitry. Phase 2 will be on the design and testing of receiver demodulator circuit. Phase 3 will be on testing the transmitter and receiver module and making measurements.

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.

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 Cover 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

KS42003 ADVANCED SIGNAL PROCESSING

This course covers 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, adaptive digital filters, Signal compression.

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-Based Approach*. 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.

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 devices. 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 fossil 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. MATLAB and HOMER software programs are used.

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. and Norvig P. (2014). Artificial Intelligence: A Modern Approach, 3rd Edition. Pearson Education.
- Winston, Patrick Henry. (2005). Artificial Intelligence. 3rd ed. Addison-Wesley
- Koller, Daphne & Friedman, Nir. (2009). Probabilistic Graphical Models: Principles and Techniques. MIT Press. Hastie, T., Tibshirani, R. and Friedman, J. (2016). The Elements of Statistical Learning: Data Mining, Inference, and Prediction. 2nd Edition. Springer.
- Aurelien Geron. (2017). Hands-On Machine Learning with Scikit-Learn and TensorFlow. 1st Edition. O'Reilly Media.

KS42603 DAT AB ASE 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 Lasso (Author), Mr Tom Stachowitz (Contributor)
- Android Application Development Cookbook - Second Edition Paperback March 31, 2016 by Rick Boyer (Author), Kyle Mew (Author)

KS42803 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. (2017). Digital Image Processing. 4th Edition. Pearson.

Gonzalez, R. C., Woods, R. E. and Eddins, S. L. (2009). Digital Image Processing using MATLAB. 2nd Edition. Gatesmark Publishing.

Umbaugh, S. E. (2017). Digital Image Processing and Analysis. 3rd Edition. CRC Press.

Russ, J. C. and F. Brent Neal. (2015). The Image Processing Handbook. 7th Edition. CRC Press.

Sonka, M., Hlavac V. and Boyle, R. (2014). Image Processing, Analysis, and Machine Vision. 4th Edition. Cengage Learning.

KS42903 POWER SYSTEMS FOR ELECTRONIC ENGINEERS

The course continues the topics of power grid system. It discusses the short and medium transmission line model, power flow analysis, symmetrical components, unsymmetrical faults, and determining the steady-state variables in the interconnected system. Power protection schemes and type of relays are introduced.

References

Power System Analysis and Design, by J. Duncan Glover, M.S. Sarma and T.J. Overbye, Cengage Learning, 5th Edition, 2012

Power System Analysis, by John J. Grainger, William D. Stevenson and Gary W. Chang, McGraw Hill, 2016.

Power System Analysis, by Hadi Saadat, Mc. Graw Hill, Singapore 2004

OIL AND GAS ENGINEERING PROGRAMME (HK88)

KG04403 CALCULUS

This course is to equip students with understanding, appreciation, and application of calculus as well as introduction to solve variety of engineering problems using calculus. Additionally, this course also provides students with mathematical knowledge needed to support their concurrent and subsequent engineering studies.

References

Thomas, G.B., Weir, M.D., Hass J.R., Heil C., Behn, A. (2013). Thomas Calculus. 13th Edition. Pearson Education Limited, England.
Tan, S.T. (2010). Calculus. International Edition. Brooks/Cole Cengage Learning. USA.

KG12501 ENGINEERING WORKSHOP

Basic Machine equipment usage i.e: lathe machine, milling machine, press drill, band saw and grinding machine. Instrument i.e: micrometer, Vanier caliper and other basic tools that used in workshop and laboratory. Material removal process, material forming and type of welding operation and method. Introduction to workshop operation from CAD, CAM, machine technology. Rules and safety in workshop.

References

Bawa, H. S. and Pant, G. B. 2000. Workshop Technology, Vol 1. McGrew-Hill;
Krar, S. F. 2004. Illustrated Dictionary of metal working & Manufacturing McGrew-Hill

KG12903 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.

References

Hibbeler, R.C. 2017. Engineering Mechanics: Statics & Dynamics, 14 ed. Singapore: Prentice Hall;
Bedford, A. & Fowler, W. 2008. Engineering Mechanics: Statics & Dynamics, 5 ed. Singapore: Prentice Hall.

KG12303 INTRODUCTION TO OIL AND GAS ENGINEERING

This course introduces students to various disciplines in oil and gas engineering. The contents of the course includes the origin, migration, accumulation and the exploration of petroleum, the types and properties of reservoir rocks and reservoir fluid, and type of formation evaluation. This course also briefly discuss the operation and equipment used in drilling, well completion and production of petroleum.

References

Van Dyke, K. 1997. Fundamentals of Petroleum. 4th Edition. University of Texas at Austin: Petroleum Extension Service;
Archer, J.S. & Wall, C.G. 1988. Petroleum Engineering: Principles and Practice. London: Graham & Trotman;
Conaway, C. F. Petroleum Industry: A Non-technical Guide. London: Penwell Books.

KG05503 MULTIVARIABLE CALCULUS

This course covers vector and multi-variable calculus. Topics include Vectors and Matrices, Partial Derivatives, Double and Triple Integrals, and Vector Calculus in 2 and 3-space.

References

Thomas, G.B., Weir, M.D., Hass J.R., Heil C., Behn, A. (2013). Thomas Calculus. 13th Edition. Pearson Education Limited, England;
Tan, S.T. (2010). Calculus. International Edition. Brooks/Cole Cengage Learning. USA.

KG06603 ENGINEERING PROGRAMMING

This course introduces students to apply computational methodologies to solve engineering problems when no closed-form, analytical solution exists. Achievement of this goal requires learning the basics of structured programming as well as learning how to combine engineering knowledge, judgment, and intuition to develop reasonable approximations through the engineering modelling process. Because mathematical judgment and approximations are involved, the material in this course will be somewhat more open-ended than the material covered in other courses. Emphasis will be placed on understanding the basic concepts behind the various numerical methods studied, implementing basic numerical methods using the MATLAB/C structured programming environment, and utilizing more sophisticated numerical methods provided as built-in MATLAB/C functions. This approach is taken since understanding how numerical methods work is essential for choosing the correct method and understanding its limitations. At the same time, the existence of commercial numerical libraries makes it inefficient and unnecessary for students to re-develop complex existing numerical routines.

References

Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists (Second Edition), McGraw Hill 2008. ISBN 978-0-07-212290-7;
William J. Palm III, Introduction of MATLAB 6 for Engineers, McGraw Hill, 2001. ISBN 0-07-234983-2;
Amos Gilat, Vish Subramaniam, Numerical Methods An Introduction with Applications Using MATLAB 2nd Edition, 2011, ISBN 978-0-470-87374-8

KG12403 ENGINEERING THERMODYNAMICS

This course introduces the principles of engineering thermodynamics. The scope of the course covers basic concepts and definitions; the thermodynamic system, properties, phase equilibrium of pure substances, equations of state for gases, tables of thermodynamic properties, work and heat. First law of thermodynamics; thermodynamic cycles, change of state, internal energy, enthalpy, specific heat; open systems, steady-state and transient processes. Second law of thermodynamics; reversible and irreversible processes, the Carnot cycle, the thermodynamic temperature scale, the entropy and exergy concept. Thermodynamic gas power cycles, vapor power cycle and refrigeration cycles. The understanding of thermodynamics is required as an Engineer to mathematically model and solve engineering problems.

References

Cengel Y.A. and Boles M.A. 2018. Thermodynamics: An Engineering Approach, 9th Edition. McGraw-Hill: USA;
Moran, M.J. and Shapiro, H.N. 2008. Fundamentals of Engineering Thermodynamics, 6th Edition. John Wiley & Sons: USA;
Sonntag, R.E., Borgnakke, C., and Wylen, G.C.V. 1998. Fundamentals of Thermodynamics, 5th Edition. John Wiley & Sons: USA.

KG12603 RESERVOIR ROCK AND FLUID PROPERTIES

This course introduces students to the important concepts, theories, and methods of properties determinations (calculation, correlation, and laboratory method) of some reservoir rock and fluid properties. The topics in reservoir rock properties include porosity, permeability, fluid saturation, rock compressibility, rock wettability, relative permeability, capillary pressure, and electrical properties of reservoir rocks. In reservoir fluid properties, the topics cover one and two-phase behaviours of both ideal and real systems, gas properties, liquid properties and reservoir fluid properties.

References

Abhijit, Y. Dandekar (2006). Petroleum Reservoir Rock and Fluid Properties. Taylor & Francis Group;
McCain, W.D. (1990). The Properties of Petroleum Fluids. London: PennWell Books;
Amyx, J.W., D.M. Bass, and R.L. Whiting (1960). Petroleum Reservoir Engineering. New York: McGraw-Hill;

KG22903 FLUID MECHANICS

The course provides preliminaries and background for understanding fluid flow studies, mainly focuses on static flows, motion flows, compressor, pump, and introduction to CFD solving engineering problems.

References

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.

KG22303 DIFFERENTIAL EQUATIONS

This course covers first order ordinary differential equations (ODEs), higher order ODEs, systems of ODEs, series solutions of ODEs, interpretation of solutions, Fourier analysis and solution of linear partial differential equations using the method of separation of variables. These mathematical equations are used to describe or represent engineering problems related to oil and gas engineering.

References

Nagle, R. K., Saff E. B., and Snider A. D. Fundamentals of Differential Equations, 8th ed. Boston: Pearson/Addison Wesley, 2012;
Maymeskul, V. Student's Solutions Manual to Accompany Fundamentals of Differential Equations 8th Edition and Fundamentals of Differential Equations and Boundary Value Problems 6th Edition. Boston: Pearson/Addison Wesley, 2012;
Differential Equations with Boundary-Value Problems, seventh edition. Dennis G. Zill, Michael R Cullen. Copyright 2009, Brooks/Cole. ISBN-13: 978-0-495-10836-8.

KG22501 LABORATORY I

This course covers experiments to implement the concepts/theories taught in Fluid Mechanics and Engineering Thermodynamics courses. There are two types of experiments carried out in this course, which are guided experiments and open-ended experiments. Students are evaluated based on the reports written for each experiment and presentation. Students are also trained to record data in the logbook and perform data analysis.

References

Laboratory I manual;

Merle, C.P. and C.W. David (1997). Mechanics of Fluid. 2nd Edition. New Jersey: Prentice-Hall;

Cengel Y.A. and Boles M.A. 2018. Thermodynamics: An Engineering Approach, 9th Edition. McGraw-Hill: USA.

KG22101 LABORATORY II

This course exposes the students the practical aspect of basic geosciences laboratory. It provides the students with the identification of minerals and rocks, geologic maps construction, particle size analysis of sediments and the use of Brunton compass in measuring strike and dip of geological structure planes.

References

Laboratory manual

Siegal, B.S. (1995). Geological Sciences Laboratory Manual. London: Burgess Publishing Co;

Gilbert, C.M. and C.M. Christensen (1997). Physical Geology Laboratory Course. London: McGraw-Hill Book Co;

Lutgens, F.K. and E.J. Tarbuck (2006). Essentials of Geology. London: Pearson Prentice Hall.

KG22301 GEOLOGY FIELD WORK

This course exposes students to the practical aspect of field geology and geology of Malaysia especially in Sabah. Students will be trained on how to make geological observations including simple geological mapping using the compass-step method.

References

Lutgens, F.K. and E.J. Tarbuck (2006). Essentials of Geology. London: Pearson-Prentice Hall;

Chernicoff, S. and D. Whitney (2007). Geology: An Introduction to Physical Geology. London: Pearson-Prentice Hall;

Gilluly, J., A.C. Waters and A.O. Woodford (1975). Principles of Geology. 4th ed. New York: W.H. Freeman and Co.

KG22503 GEOSCIENCE

This course introduces students with the introduction of geosciences/geology and subtitles of physical geology. The course emphasis on the Earth physical & chemical characteristic, especially its surface and internal features. Then, turn to a discussion of Earth materials and the related processes. Next, Earth's internal structure and the processes that deform rocks and give rise to mountains will also be included. Finally, the course concludes with geologic time and Earth history.

References

Lutgens, F.K., Tarbuck, E.J. and Tasa, D.G. (2014). Essentials of Geology. 12th ed., Pearson Prentice Hall;

Tarback, E.J., Lutgens, F.K. and Tasa, D.G. (2013). Earth: An Introduction to physical Geology. 11th ed., Pearson Prentice Hall;
Chernicoff, S. and Whitney, D. (2007). Geology: An Introduction to Physical Geology. Pearson Prentice Hall;
Gilluly, J., Waters, A.C. and Woodford, A.O. (1975). Principles of Geology, 4th ed., W.H. Freeman and Co.

KG22203 MATERIALS OF ENGINEERING

This course explains the basic principles of materials science used in the development of contemporary engineering materials used in everyday engineering applications. Materials have widely varying properties and consequently it is necessary for the engineer to have knowledge of the characteristic properties and behaviour during processing/fabrication and in service of the common types of engineering materials. It is also a constantly evolving discipline, and new materials with interesting properties lead to new applications.

References

William D. Callister, Jr. & David G. Rethwisch (2015). Materials Science and Engineering, 9th Edition, SI Version, John Wiley & Sons (Asia) Pte Ltd;
Donald R. Askeland, Pradeep P. Fulay & Wendelin J. Wright (2011). The Science and Engineering Materials, 6th Edition, SI Version, Cengage Learning

KG22403 GEOPHYSIC

This course covers petroleum geology and petroleum geophysics sections to provide a detailed description of clastic and carbonate reservoir rocks, with the unifying theme being that reservoir location, shape and properties can be understood and predicted from knowledge of the environments in which the sediments forming the rocks were deposited, and the various processes which occur following deposition (diagenesis) with the supported from reflection seismology. From this information, engineers can estimate volume of reserves in discovered hydrocarbon accumulation

References

Pennington, W.D. 1997. Seismic Petrophysics—An Applied Science for Reservoir Geophysics. The Leading Edge 16 (3): 241. <http://dx.doi.org/10.1190/1.1437608>;
Mavko, G., Mukerji, T., and Dvorkin, J. 1998. The Rock Physics Handbook: Tools for Seismic Analysis of Porous Media. Cambridge, UK: Cambridge University Press. ISBN 0-521-54344-4;
Cordsen, A., Galbraith, M., and Peirce, J. 2000. Planning Land 3D Seismic Surveys. Tulsa, Oklahoma: Society of Exploration Geophysicists, Geophysical Developments;
Jensen, J.L. et al. 1997. Statistics for Petroleum Engineers and Geoscientists, 390. Englewood Cliffs, New Jersey: Prentice-Hall Inc.

KG22801 LABORATORY III

This course covers experiments to implement the concepts/theories taught in Material Engineering course. There are two types of experiments carried out in this course, which are guided experiments and open-ended experiments. Students are evaluated based on the reports written for each experiment and presentation. Students are also trained to record data in the logbook and perform data analysis.

References

Laboratory manual;

William D. Callister, Jr. & David G. Rethwisch (2015). Materials Science and Engineering, 9th Edition, SI Version, John Wiley & Sons (Asia) Pte Ltd;

Donald R. Askeland, Pradeep P. Fulay & Wendelin J. Wright (2011). The Science and Engineering Materials, 6th Edition, SI Version, Cengage Learning

KG22401 LABORATORY IV

This course covers experiments to implement the concepts/theories taught in Reservoir Engineering course. There are two types of experiments carried out in this course, which are guided experiments and open-ended experiments. Students are evaluated based on the reports written for each experiment and presentation. Students are also trained to record data in the logbook and perform data analysis.

References

Laboratory manual;

"Advanced Reservoir Engineering" by Tarek Ahmed & Paul D. McKinney (2005).

KG22802 ELECTRICAL TECHNOLOGY

The students will be introduced to the concept and theory of basic electrical engineering. This subject will highlight the fundamentals of electrical engineering to enable the student to apply simple electrical circuits and network in their working environment. This subject will cover on DC and AC systems (single and three phase systems) and analyse simple network using electrical basic laws; Ohm's Law, Kirchhoff's Law, current and voltage divider, nodal and loop analysis. Students will be exposed on simple magnetic circuits, transformers and introduction to electrical machines.

References

Richard C. Dorf, James A. Svoboda, "Introduction to Electric Circuits", 7th edition, Wiley;

Alexander & Sadiku, "Fundamentals of Electric Circuits", 4th edition, Mc Graw Hill;

James W. Nilsson, Susan A. Riedel, "Electric Circuit", 8th edition, Addison Wesley;

Robert L. Boylestad, "Introductory Circuit Analysis", 11th edition, Pearson International Edition

KG22603 RESERVOIR ENGINEERING

The course provides an understanding of the underlying value and limitations of the analyses provided by reservoir engineers, as well as a better understanding of the required data and assumptions involved in the practice of reservoir engineering. Participants will obtain an understanding of routine reservoir engineering calculations, the data required to perform these calculations, the primary tools and techniques used by reservoir engineers, and the information gained by the application of those techniques. The limitations of the extrapolation of the results to the decision making process will also be covered. Throughout the course, the impact of the data, assumptions and technical limitations are related to the economic impact they have on reservoir management.

References

Fundamentals of Reservoir Engineering by Dake;

Fundamental principles of Reservoir Engineering by Towler;
Applied Petroleum Reservoir Engineering by Craft, Hawkins And Terry;
The Practice Of Reservoir Engineering by Dake

KG22803 ENGINEERING DESIGN

This course focuses on the subject of engineering design, which plays the unique role in guiding an individual engineer or a team of engineers to think like a designer along a systemic, rational, and creative pathway towards breakthrough innovations of new products/services. The course provides students with a holistic understanding of the big picture, wide spectrum, and structured process of engineering design. In particular, it focuses on the early stage design, with respect to functional design and conceptual design, as well as component design.

References

CAD Manual;

"*Axiomatic Design – advances and applications*", by Nam Suh, Oxford University Press;

"*Engineering design – A systematic approach*", G. Pahl and W. Beitz, Springer-Verlag.

KG08803 ETHICS AND LAW FOR ENGINEERS

This course introduces students introduce engineering students to the concepts, theory and practice of engineering ethics and laws. Laws related to oil and gas engineering also included. Students apply classical moral theory and decision making to engineering applications encountered in academic and professional careers.

References

Fundamentals of Ethics for Scientists and Engineers, E.G. Seebauer and R.L. Barry (Oxford, Oxford University Press, 2000). ISBN: 9780195134889;

Malaysia Law for engineers; D.L. Marston, Law for Professional Engineers, 4th Ed., McGraw-Hill Ryerson, 2008.

KG32101 LABORATORY V

This course requires the students to perform hands-on preparing and measuring drilling fluids properties according to the API standard. Laboratory experiments are designed to help students better understand the factors controlling drilling fluid properties as well as familiarize students with field testing procedures of drilling fluids. This laboratory is equipped with complete drilling fluid testing and analysis. Equipment available include blenders, mud balances, marsh balances, rheometers, pH meters, resistivity meters, and the filter press unit, etc.

References

Laboratory manual;

American Petroleum Institute, "Recommended Practice for Standard Procedure For Testing Drilling Fluids (API RP 13B)";

Walker, R. E. 1964. Practical Oil Field Rheology. Houston, Texas: Spring Meeting of Southern District Division of Production, API;

Simpson, J. P. and H. V. Sanchez. 1965. Mud Technology Handbook. Houston, Texas: Baroid Division National Lead Industries;

Perkins, H. W. 1951. A Report on Oil Emulsion Drilling Fluids. Beaumont, Texas: API Production Division.

KG32103 DRILLING ENGINEERING

The aim of the course is to provide students with a fundamental understanding of petroleum well drilling procedures, its mechanics, and design methodology. The course gives an overview of drilling rig operations and related equipment; offshore drilling and advanced drilling tools; drill-string design; drill bit technology; drilling hydraulics; drilling mud design; pore pressure and fracture pressure calculations; basic casing design; basic well control; well planning.

References

- "Applied Drilling Engineering" by A.T. Bourgoyne, Jr., et al., SPE textbook series, Vol. 2 (1991);
"Drilling Engineering", by A. A. Azar and G. Robello Samuel, PennWell Publisher, 2007;
"Volume II – Drilling Engineering", by R. F. Mitchell, SPE Petroleum Engineering Handbook Series, 2006.

KG32503 ENGINEERING STATISTICS

This course introduces the engineering statistical techniques to solve engineering problems. It introduces to statistical methodology emphasizing applications in engineering. Topics include descriptive and inferential statistics, regression, analysis of variance, and design of experiments.

References

- Richard L. Scheaffer, Madhuri S. Mulekar and James T. McClave, Brooks/Cole, Probability and statistics for engineers, 5th edition (ISBN: 9781285329918);
Mendenhall, W., and Sincich, T., Statistics for Engineering and the Sciences, 6th edition, CRC Press, 2016;
Hogg, R. V., and Tanis, E. A., Probability and Statistical Inference, 9th edition, Prentice Hall, 2014.

KG32703 RESERVOIR SIMULATION

This course includes derivations of basic equations and underlying principles used in developing reservoir simulators. It covers the development of a simple governing equation, partial differential equations for single-phase and multiphase flow in porous media. Finite difference approximations are used to solve the equations. Input data requirements and applications of simulation models for history matching and prediction of field performance will be discussed. A spreadsheet, i.e. Microsoft Excel, would be used for many of the examples and exercises.

References

- Crichlow, H.B. (1977). Modern Reservoir Engineering: A Simulation Approach. New Jersey: Prentice-Hall Inc., New Jersey;
Ertekin et al. (2001). Basic Applied Reservoir Simulation. Henry L. Doherty Memorial Fund of AIME, Richardson, Texas: Society of Petroleum Engineers;
Aziz, A and A. Settari (1979). Petroleum Reservoir Simulation. London: Applied Science Publishers.

KG32903 PROCESS CONTROL AND INSTRUMENTATION

The purpose of this course is to introduce the key concepts in automatic control and instrumentation of process plants. Material and energy balances are extended to unsteady state (dynamic) systems and Laplace Transforms are introduced as a means of conveniently representing process control systems and solving ordinary differential equations. First order, second order, and

integrating systems including dead time are treated with basic controller algorithms. Commonly used sensing, transmission and final control elements are described and depicted in piping and Instrumentation Diagrams (P&IDs). The course is delivered through a combination of lectures, tutorials, practical and exposure to simulation programs currently used in industry. Once you have completed the course, you should be able to characterise and tune simple processes and appreciate the relevance of control systems to safety and profitability.

References

Stephanopoulos, G 2005, Chemical Process Control; An Introduction to Theory & Practice, Prentice-Hall;
Seborg, DE, Edgar TF & Mellichamp DA 2008, Process Dynamics & Control, 2nd Edition, John Wiley.

KG09903 MANAGEMENT & ACCOUNTING FOR ENGINEERS

This course introduces students to project management. It outlines the necessary management processes and control methods required for the successful management of resources, budgets and costs, and schedule. The course covers all major elements of project management, with emphasis on delivering a project in budget and on time. Areas covered will include an overview of project management, project initiation, project plan development, project execution and delivery, monitoring and control and project closeout. Key concepts, terms and principles of project management and project management methodology for the whole life cycle of a project will be covered. Students will learn to plan projects, handle multiple stakeholders, build a Work Breakdown Structure, estimate resources, optimise schedules, quality control, manage stakeholder communications, risk planning, tracking and reporting of project status. Students will also gain an appreciation of the roles and skills of the project manager and all team members.

References

Financial and Managerial Accounting for Decision Makers by Dyckman, Magee, Pfeiffer, Hartgraves and Morse, 2nd edition;
Adair, J. Effective Leadership, Pan, revised edition 1988;
Adair, J. Effective Teambuilding, Pan edition 1987;
Horngren, Datar, and Rajan (2018). Horngren's Cost Accounting: A Managerial Emphasis. 16th Edition, Pearson.

KG32203 PRODUCTION ENGINEERING

This course introduces students to complete petroleum production system of a petroleum well/field. The course will provide an overview of the well/field petroleum production system components including production philosophy and objectives, present and future well productivity and performance, single and multiphase flow system for surface delivery, artificial lift system and surface facilities.

References

Boyun Guo, Lyons, W. C. and Ali Ghalambor (2007). Petroleum Production Engineering: A Computer-Assisted Approach";
Nind, T.E.W. (1981). Principles of Oil Well Production;
Brown, K.E. (1967). Technology of Artificial Lift Methods. Vol.1, 2 & 3;
Golan, M. and C.H. Whitson (1991). Well Performance

KG32403 WELL COMPLETION

This course gives technical information on well completion design and production stimulation. The aim is to provide students with up-to-date working knowledge used in oil and gas industries.

References

Denis Perrin, 1999. WELL COMPLETION AND SERVICING (Oil and Gas Field Development Techniques). Oil and Gas Field Development Techniques Series, Edition Technip;
Wan Renpu, 2011. Advanced Well Completion Engineering. 3rd Edition. Elsevier and Gulf Professional Publishing;
Boyun Guo, William C. Lyons and Ali Ghalambor, 2007. Petroleum Production Engineering: A Computer-Assisted Approach. Elsevier Science & Technology Books

KG32603 SAFETY IN OIL AND GAS ENGINEERING

The course presents fundamental principle of safety and risk assessment in petroleum engineering. In particular, it emphasizes on safety legislations, inherent safety design concept, methods of hazard identification, chemical health risk assessment and various methods of risk assessments. The course also covers health and environmental issues related to petroleum engineering. At the end of this course, it is expected that the students will be able to appreciate the theoretical and practical aspects of occupational safety, health and environment in petroleum engineering. Students should also be able to use the techniques of hazard identification and risk assessment in the design and operation of petroleum engineering projects.

References

Goetsch, D.L. *Occupational Safety and Health for Technologists, Engineers and Managers*,
AW, T.C., K. Gardiner, and J.M. Harrington. *Occupational Health*;
Department of Occupational Safety and Health (DOSHS), Ministry of Human Resources (2000). A Guideline for Chemical Health Risk Assessment. Kuala Lumpur: DOSHS.

KG32803 FORMATION EVALUATION AND WELL TESTING

This course exposes students to electric logging which covers the basic concept of reservoir resistivity, spontaneous potential, resistivity log, Gamma-ray log, neutron log, formation density log, and acoustic log. Lectures also cover open hole log analysis and interpretation, the use of Archie's equation and other methods to determine water saturation, lithology and porosity determination, and assessing the true formation resistivity prior to computing the hydrocarbon reserves. Apart from that, this course also introduces students to well testing practices in oil and gas industries. The contents of the course include the concept and principles of well testing, equipment, well test interpretation methods and well test design.

References

"Well Testing: Interpretation Methods" by G. Bourdarot (1998);
"Advanced Reservoir Engineering" by Tarek Ahmed & Paul D. McKinney (2005);
"Modern Well Test Analysis: A Computer-Aided Approach" by Roland N. Horne (1995).
Asquith, G. and Krygowski, D. 2004. Basic Well Log Analysis. 2nd ed. Tulsa: AAPG.

KG30005 INDUSTRIAL TRAINING

Student shall be placed in an industry or research area at least 10 weeks under industrial supervision. This training will be evaluated and student requested provide one written report after the industrial training over.

References

UMS FKJ Industrial Attachment Handbook

KG01202 PROJECT I

This course is designed to train students on some important aspects of research management. In the first part of the undergraduate research project course, the students are not only required to carry out preliminary studies on the assigned petroleum engineering related topics but are also required to plan the research methodology that will be implemented in the following semester and maintain a log book. At the end of this course, students are required to prepare a complete research proposal, and subsequently present it. In addition, students will have the opportunity to gain important generic skills such as communication, team working, problem-solving and creative and critical thinking

References

"UMS Thesis Guidelines 2017/2018"

KG42102 FIELD DEVELOPMENT PROJECT I

Field Development Project courses expose students to the process and methods in developing an optimum plan for a particular petroleum field. It covers all aspects of field development planning, commencing with screening studies, after discovering hydrocarbons, to project sanction. The first part of the course covers collection and analysis of data, including proving of resources and reduction of uncertainty and risk. Students must build a model of geological layering of the subsurface to estimate the initial volume of oil and gas in the reservoir.

References

Petronas PMU Field Development Plan Process, 2010;

Larry W. Lake, Petroleum Engineering Handbook, 2007;

Internet, websites, journals, and proceedings.

KG42703 TRANSPORT AND STORAGE

This course enables students to develop an advanced knowledge in hydrocarbon transportation and storage facilities. The course module covers a wide range of scope which includes the flow principles, operation and construction and maintenance. Sustainability of supply and storage system is well reviewed to incorporate state-of-the-art technology. The module also integrates the standards design of transportation system and relevant code of practices. Malaysian standard requirements also are highlighted thoroughly. A visit to the related industries will also be arranged for them to gain some industrial experience.

References

Katz D.L, et al., "Handbook of Natural Gas Engineering", McGraw-Hill,1986;

Osiadacz A.J., "Simulation and Analysis of Gas Network", E & F.N. SPON London;
"Malaysian Standard – Code of Practice for the Installation of Fuel Gas Piping Systems and Appliances", MS 930, First Revision, 2010;
"Gas Transmission and Distribution Piping System", ASME B31.8, 1985

KG42303 GAS ENGINEERING

The course introduces students to connect the relationship between upstream and downstream gas sectors which covers both theories and calculations. The contents of the course include the gas well deliverability, gas well performance, gas pipeline flow, gas compressors, gas dehydration, gas treatment, gas measurement and gas regulating and control.

References

Ikoku, C.U. (1984). Natural Gas Production Engineering. New York: John Wiley and Sons;
Gas Processes Suppliers Association (1972). Engineering Data Book. Tulsa, Oklahoma: GPSA;
Guo, B. and A. Ghalambor (2005). Natural Gas Engineering Handbook. Houston, Texas: Gulf Publishing;
Smith, R.V. (1990). Practical Natural Gas Engineering. 2nd Ed. London: Pennwell.

KG42503 PETROLEUM ECONOMY

This course introduces students to petroleum economics in evaluation of oil and gas development and production. The contents of the course include the principles, methods, and techniques of engineering economic analysis, such as topics on interest and time value of money, depreciation and income tax calculations, cash flow, economic indicators, decision making, and risk and sensitivity analysis. This course will allow student to finally be able to generate cash flow of the project and perform an economic evaluation of the project.

References

Thompson, R.S. & Wright, J.D. (1984). Oil Property Evaluation. Thompson-Wright Associates, Colorado;
Abdel Aal, H.K. & . Alsahlawi, M.A. (ed.) (2014). Petroleum Economics and Engineering. CRC Press, New York;
Newendrop, P.D. (1987). Petroleum Exploration Economics and Risk Analysis. Calgary, Alberta, Canada: Canadian Society of Petroleum Geologist.

KG01204 PROJECT II

This course is a continuation of the Project I. The second part of Project requires students to implement the research proposal that has been prepared in the previous semester. This might involve practical activities such as laboratory works, data collection from industry and computer programming/simulation. At the end of the course, students should be able to prepare a full report compiling the first and second part of the Project and subsequently present their research findings. Finally, students must submit a bound thesis according to the UMS thesis-writing format. In addition, at the end of the course, students will have the opportunity to gain all important UMS attribute of generic skills a such as communication, team working, problem-solving, creative and critical thinking and etc.

References

"UMS Thesis Guidelines 2017/2018"

KG42404 FIELD DEVELOPMENT PROJECT II

The second part of the courses covers the simulation of the reservoir fluid flow behavior and optimizes the field development scenario. This simulation leads to the design of an appropriate production system. An economic assessment is performed taking into account revenue according to production forecasts and the estimated development costs. Students are required to work in small groups, submit written plans, and present their proposals to a panel.

References

Petronas PMU Field Development Plan Process, 2010;
Larry W. Lake, Petroleum Engineering Handbook, 2007;
Internet, websites, journals, and proceedings.

KG41103 ENHANCED/ IMPROVED OIL RECOVERY

This course covers all forms of enhanced oil recovery techniques with both fundamental principles and specialized applications. Students in all areas of fluid flow in permeable media can benefit from the unified approach to EOR based on common principles, conservation of mass, momentum, and energy.

References

Donaldson, E.C., Chilingarian, G.V. and Yen, T.F. (1989). Enhance Oil Recovery, II. Process and Operations. Elsevier. New York;
Larry, W.L. (1996). Enhanced Oil Recovery – Larry W. Lake – Prentice Hall;
Micheal, P. and Henry, L. D.(1985). Thermal Recovery. Society of Petroleum Engineers.

KG41303 GAS TRANSMISSION AND DISTRIBUTION SYSTEM

This course is design to expose student to hydrocarbon gas transmission and distribution system. The course contents include an introduction to gas industry, gas delivery concept, codes and standards in gas pipeline system, gas hydraulics, network analysis, construction, materials and procedures, operation and maintenance and gas regulation and measurements. A visit to the related industries will be arranged for them to gain some industrial knowledge experience.

References

Katz D.L, et al., "Handbook of Natural Gas Engineering", McGraw-Hill,1986;
American Gas Association,"Gas Engineering Handbook", Industrial Press Inc., 1984;
Osiadacz A.J., "Simulation and Analysis of Gas Network", E & F.N. SPON London;
"Malaysian Standard – Code of Practice for the Installation of Fuel Gas Piping Systems and Appliances", MS 930, First Revision, 2010;
Zainal Zakaria, Pengenalan Kepada Kejuruteraan Gas, FPREE, 2012

KG41503 ENERGY MANAGEMENT

This course develops the knowledge of energy management, auditing and security program for a successful career in various energy sectors. The program provides of energy policy analysis, energy management and auditing concept, energy planning, energy security, energy prices and the environmental impacts of energy supply and use. In addition, the course content also

focuses on the understanding of standard energy auditing procedure hence a good energy management program can be proposed to an organization.

References

Steve D., and Wayne C. T. (2009) , Energy Management Handbook, Seventh Edition, The Fairmont Press, Inc.;
Capehart, B.L., and Turner William J. K. (2003), Guide Energy Management, Fourth Edition, The Fairmont Press, Inc;
Wayne C. T. (2003), Energy Management Reference Library CD, Publisher Taylor and Francis, 2003.

KG41703 PROCESSING AND LIQUEFACTION

This course is design to expose student to method of refining and processing of hydrocarbon conducted at field ant plant. The course contents include crude refining, water hydrocarbon system, recovery and processing, dehydration, sweetening and liquefaction.

References

Alireza, B. (2014). Natural Gas Processing. Technology and Engineering Design. Gulf Professional Publication.;
John, C. (2014). Natural Gas Hydrates. A Guide for Engineers. Gulf Professional Publication;
Boyun,G. and Ali Ghalambor. (2012). Natural Gas Engineering Handbook. Gulf Professional Publication.

KG42203 DEEP WATER ENGINEERING

This course provides an overall view of deep-water exploration and technologies including geology, drilling, well planning and control, production and operation. Students will learn operational best practices of drilling and well planning and integrity for deep-water wells. The course also covers operations and personnel as well as emergency response management.

References

Bai, Y., & Bai, Q. (2018). *Subsea engineering handbook*. Gulf Professional Publishing;
Aadnoy, B., Cooper, I., Miska, S., Mitchell, R. F., & Payne, M. L. (2009). *Advanced drilling and well technology* (pp. 301-440). SPE;
Song, R., Stanton, P., & Zhou, X. (2010, January). Engineering design of deepwater free standing hybrid riser. In *ASME 2010 29th International Conference on Ocean, Offshore and Arctic Engineering* (pp. 637-649). American Society of Mechanical Engineers;
Zamora, M., Broussard, P. N., & Stephens, M. P. (2000, January). The top 10 mud-related concerns in deepwater drilling operations. In *SPE International Petroleum Conference and Exhibition in Mexico*. Society of Petroleum Engineers

KG42403 GAS STORAGE AND RETICULATION SYSTEM

This subject enables students to acquire and practice the fundamental knowledge of liquefied petroleum gases (LPG), natural gases (NG) and liquefied natural gases (LNG) storage. The course also emphasizes on gas reticulation systems which include service pipe sizing, pipe route, pressure testing and corrosion protection systems. The students are also required to prepare a group technical report and present their project at the end of the course. A visit to the related industries will also be arranged for them to gain some industrial experience.

References

Alex, M. Petroleum Storage Principles. Penn Well Book. 1980;
Leary, F. Gasfitting. Liquefied Petroleum Gas. Technical School Division. Education Department of Victoria. 1983;
Lynn, C. Denny, L, & Berbara E. Hall. Handbook Propane-Butane Gases. Chilton Company. 1969.;
Chi U Ikoku. Natural Gas Reservoir Engineering. MacGraw Hill Book Company. 1980.

KG42603 RESERVOIR GEOMECHANICS

This course covers basic stress and strain analysis; pore pressure and in situ stress estimation and measurement; deformation mechanisms in rock; rock fracture description and analysis; wellbore stresses and failure; wellbore stability analysis; fault stability analysis; depletion-induced reservoir deformation; and hydraulic fracturing. Emphasis on applications to oil and gas engineering.

References

Reservoir Geomechanics. Zoback. 2007;
Fundamentals of Rock Mechanics. Jaeger, Cook, and Zimmerman. 2007.

KG42803 OFFSHORE STRUCTURAL ENGINEERING

This course presents the introduction to the structural engineering of fixed offshore platforms. It deals with basic structural theory as well as with those aspects, such as wave loading, pile support, and dynamic response, that are of special importance to the subject.

References

Dawson, T. H. (1983). Offshore structural engineering;
Almarnaess, A. (1985). Fatigue handbook: offshore steel structures;
John B. Herbich, 'Developments in offshore engineering: wave phenomena and offshore topics,' Gulf Professional Publishing, 1999;
Hsu, T. H. (1984). *Applied offshore structural engineering*. Gulf Pub.;
Philip L. F. Liu, 'Advances in coastal and ocean engineering, Volume 5,' World Scientific, 1999.

KG43203 RENEWABLE ENERGY

General overview of energy sector in the globe and Malaysia that facilitate investment in renewable energy industry; principles for effective policies in the sectors of electricity, heating and transport; overview of renewable energy policies and measures implemented in some countries; various energy policies that have been developed and implemented in Malaysia to increase energy efficiency; action plans taken to enhance renewable energy usage on national power generation.

Reference

Principles for Effective Policies (2008), ISBN 978-92-64-04220-9, International Energy Agency.;
Are IEA Member Countries on Track? (2009), ISBN 978-92-64-07568-9, International Energy Agency;
National Energy Policies, Energy Information Bureau (EIB). <http://eib.org.my/>;
Sustainable Energy Division, Ministry of Energy, Green Technology and Water, Malaysia. <http://www.kettha.gov.my/>

KG43403 ELECTRIC DRIVE IN OIL AND GAS INDUSTRY

This course provides a comprehensive coverage on design, application, testing, and maintenance of electric drives commonly used in oil and gas operations.

References

Greg Stone, Edward A. Boulter, Ian Culbert, 'Electrical insulation for rotating machines: design, evaluation, aging, testing, and repair,' Wiley-IEEE, 2004;
Philip Kiameh, 'Electrical equipment handbook: troubleshooting and maintenance,' McGraw-Hill Professional, 2003;
George Patrick Shultz, 'Transformers and Motors,' Newnes, 1997;
Hamid A. Toliyat, G. B. Kliman, 'Handbook of electric motors,' 2nd Edition, CRC Press, 2004.

KG43603 COMBUSTION TECHNOLOGY

This course enables students to understand the basic concept of fire science and combustion and related calculations as well as to expose them to the concept of explosion and detonation. In addition, the principles of fire and explosion protection and mitigation will be discussed within the context of understanding the fire and explosion development mechanism. At the end of the course, students should be able to explain and relate the fundamental knowledge of combustion, flame and explosion and its important safety aspects involving gaseous fuel utilization. Students should be able to apply general combustion and engineering principles to fires and explosion and should know the parameters involved on the initiation of both fire and explosion.

References

Drysdale D. (2003), An Introduction to Fire Dynamics, John Wiley and Sons;
Goodger, E.M. (1977), Combustion Calculations, MacMillan Press Ltd.;
Strahle, W.C. (1993), An Introduction to Combustion, Combustion Science & Technology Book Series, Vol. 1, Gordon and Breach Science Publishing.;
Turns, S.R. (1996) , An Introduction to Combustion, Mechanical Engineering Series, McGraw-Hill International Editions

KG43803 CORROSION ENGINEERING

The course gives the students with the basic for understanding the fundamental of corrosion engineering which include internal and external corrosion and methods of protection. The course content will cover the corrosion process, basic electricity, corrosion rate, methods of protection and design and installation of protection methods.

References

Ahmad Z., 'Principles of Corrosion Engineering and Corrosion Control,' Butterworth-Heinemann, 2006;
Einar M., 'Basic Corrosion Technology for Scientists and Engineers,' Institute of Materials" London, 1996;
FontanaM. G..'Corrosion Engineerins,' 3rd Edition., TataMcGraw Hill, 1986.

H2451 DIPLOMA IN PROCESS ENGINEERING (OIL AND GAS OPERATIONS)

KR04403 ENGINEERING MATHEMATICS 1

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.
Vraberger, D., Purcell, E.J., and Rigdon, S.E. (2007). Calculus. Pearson Prentice Hall. New Jersey.

KR10101 WORKSHOP TECHNOLOGY

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. The course also introduces to the introduction to workshop operations based on CAD, CAM, CIM, and regulations and engine technology and safety in the workshop.

References

Bawa, H.S. and Pant, G.B. 2000. Workshop Technology, Vol. 1. McGraw-Hill.
Krar, S.F. 2004. Illustrated Dictionary of metal working & Manufacturing, McGraw-Hill.
Nanfara, F., Uccello, T. and Murphy D. 2004. The CNC Workshop - A Multimedia Introduction to CNC Addison-Wesley, USA.
Parnley, R.O. 1997. Standard Handbook of Fastening & Joining, 3rd Ed. McGraw-Hill.
Walsh, R.A. 2006. Machining and Metal Working Handbook, 2nd Ed. McGraw-Hill, USA.

KR10303 HYDROCARBON CHEMISTRY

This course provides student with the basic knowledge of the structure, namings and properties of hydrocarbon. This course also deals with chemical reactions and synthesis of industrial importance with focus to hydrocarbon. It covers the basic terminology and understanding of hydrocarbon chemistry, introduce students to the principles of chemistry to hydrocarbon situations including reaction equations.

References

The Chemistry of Hydrocarbon Fuels Harold H. Schobert 1990
Hydrocarbon Chemistry, [George A. Olah](#), [Arpad Molnar](#), [G. K. Surya Prakash](#) 2018
Handbook of Industrial Hydrocarbon Processes [James G. Speight] 2010

KR10503 FLUID MECHANICS

The course introduce fluid behaviour which covers the physics of fluid, classification of flow, fluid statics, fluid dynamics, the application of Bernoulli, continuity, and momentum equations, friction flow in pipes includes the use of Moody chart, flow metering and pumping.

References

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.

KR10703 INTRODUCTION TO OIL AND GAS ENGINEERING

This course introduces students to various disciplines in oil and gas engineering. The contents of the course includes the origin, migration, accumulation and the exploration of oil and gas, the types and properties of reservoir rocks and reservoir fluid, and type of formation evaluation. This course also briefly discuss the operation and equipment used in drilling, well completion and production of petroleum. This course is conducted by normal lectures, classroom discussion, group project and presentation.

References

Van Dyke, K. 1997. Fundamentals of Petroleum. 4th Edition. University of Texas at Austin: Petroleum Extension Service.
Archer, J.S. & Wall, C.G. 1988. Petroleum Engineering: Principles and Practice. London: Graham & Trotman.
Conaway, C. F. Petroleum Industry: A Non-technical Guide. London: Penwell Books.

KR05503 ENGINEERING MATHEMATICS 2

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].

KR10203 ENGINEERING SCIENCE

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.

References

Hibbeler, R.C. 2017. Engineering Mechanics: Statics & Dynamics, 14 ed. Singapore: Prentice Hall;
Bedford, A. & Fowler, W. 2008. Engineering Mechanics: Statics & Dynamics, 5 ed. Singapore: Prentice Hall.

KR10401 LABORATORY 1

This course covers hands on the field related to the Fluid Mechanics. This include hands on the calculation of pressure drop across valves, elbows and in pipes, verification of Bernoulli's equation, friction losses in pipes and classification of flow types. Candidate who is undertake this course needs to follow the experiment procedure, answer questions given, analyse the situation and present through report writing and oral on the analysis of overall experimental results.

References

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.

KR10603 THERMODYNAMICS

This course introduces the principles of engineering thermodynamics. The scope of the course covers basic concepts and definitions; the thermodynamic system, properties, phase equilibrium of pure substances, equations of state for gases, tables of thermodynamic properties, work and heat. First law of thermodynamics; thermodynamic cycles, change of state, internal energy, enthalpy, specific heat; open systems, steady-state and transient processes. Second law of thermodynamics; reversible and irreversible processes, the Carnot cycle, the thermodynamic temperature scale, and the entropy concept. Thermodynamic gas power cycles, vapor power cycle and refrigeration cycles. The understanding of thermodynamics is required as an Engineer to mathematically model and solve engineering problems.

References

Cengel Y.A. and Boles M.A. 2018. Thermodynamics: An Engineering Approach, 9th Edition. McGraw-Hill: USA;
Moran, M.J. and Shapiro, H.N. 2008. Fundamentals of Engineering Thermodynamics, 6th Edition. John Wiley & Sons: USA;
Sonntag, R.E., Borgnakke, C., and Wylen, G.C.V. 1998. Fundamentals of Thermodynamics, 5th Edition. John Wiley & Sons: USA.

KR10803 MATERIAL SCIENCE AND ENGINEERING

This course involve the introduction of Materials Engineering. Topics include classification of materials (metals, ceramics, polymers, composites and semiconductors); atomic bonds; crystal structure; crystalline defects and solid solutions; and phase diagrams. Main emphasis is on metals because metals are structurally the simplest to characterize and a sound knowledge of structure-property relation of metals can be extended to the study of ceramics and polymers. The course also deals with mechanics of materials. Topics cover stress and deformation of members under axial loading, torsion in circular shafts, analysis and design of beams for bending, and stress transformation.

References

W.F. Smith and Javad Hashemi, Foundations of Materials Science and Engineering, 5th Ed. in SI Units, MGrav-Hill International, 2011.

F. P. Beer, E. R. Johnston, Jr. and J. T. DeWolfe, Mechanics of Materials, 5th Edition (SI Units), McGraw-Hill, 2008 OR LATEST EDITION

KR20102 FUNDAMENTALS OF ELECTRICAL ENGINEERING

This course is developed to provide fundamental of electrical engineering to the students. Students learn basic electrical theory such as resistance, current, voltage, power and energy. The basic electrical measurement and calculation.

References

Rob Zachariason, Electrical Safety, Delmar, Cengage Learning, United State of America, 2012.

D C Kulshreshtha, Basic Electrical Engineering, Revised 1st Edition, Tata McGraw Hill Education Private Limited, India, 2012.

Brian Scaddan, Electrical Installation Work, Seventh Edition, Elsevier Ltd., Italy, 2011.

Massimo A. G. Mitolo, Electrical Safety of Low-Voltage Systems, The McGraw-Hill Companies, Inc., United State of America, 2009.

B. L. Theraja and A.K. Theraja, A Textbook of Electrical Technology in S.I. Units. Volume 1: Basic Electrical Engineering, 23 Rev Ed Edition, S. Chand & Company Ltd, India, 2006.

KR20303 ENGINEERING DRAWING

This course enable student to learn the graphical language of drafting by learning to represent an object using isometric and orthographic drawings, lettering and line techniques, tolerances, dimensioning and sectioning, multiple views, free hand sketching using engineering drawing tools and AutoCAD. This will give the students basic knowledge to prepare drawings required for construction, production, process layout, fabrication and manufacturing which are an important engineering communication method.

References

Ostrowsky, O., Engineering Drawing with CAD Applications, 1989.

Mohd. RamzanMainai, BadriAbdul Ghani, YehyaSamiari, LukisanKejuruterran, AsasUniversitiTechnologiMalaysia.

JecenC. HelseJ.D. Engineering Drawing and Design, Mc GrawHill

Bhatt. N. D. & Panchal V. M. Engineering Drawing, CharotarPublishing House Anand, India

Venugopal, K., Engineering Drawing, New Age International (p) Ltd. Publishers, New Delhi, India

Boundy, A. W., Engineering Drawing, Mc. GrawHill

KR20501 LABORATORY 2

This course will support Thermodynamic and Material Science and Engineering subjects. The topic cover stress and deformation of members under axial loading, torsion in circular shafts, analysis and design of beams for bending, and stress transformation. For Thermodynamic, the laboratory covers principles of classical thermodynamics. Develops understanding of mass, energy, heat, work, efficiency, ideal and real thermodynamic cycles and processes. Covers first and second laws of thermodynamics, perfect gas law, properties of real gases, and the general energy equation for closed and open systems.

References

W.F. Smith and Javad Hashemi, Foundations of Materials Science and Engineering, 5th Ed. in SI Units, MGrav-Hill International, 2011.

F. P. Beer, E. R. Johnston, Jr. and J. T. DeWolfe, Mechanics of Materials, 5th Edition (SI Units), McGraw-Hill, 2008 OR LATEST EDITION

KR20703 ACTS, REGULATIONS AND CODES OF PRACTICES

The course covers local acts and regulations as well as local and international codes of practices related to oil and gas system. The information is required to make sure that the operations of the plant are secure and safe.

References

- ASME B31.4. Pipeline Transportation Systems for Liquids Hydrocarbons and others Liquids. 1998.
ASME B31.8. Gas Transmission and Distribution Piping Systems. 2012.
Malaysian Standard 830. Code of Practice for the Storage, Handling and Transportation. 2013.
Gas Supply Acts 1993 and Gas Supply Regulations 1997. 2010.
Malaysian Standard 930. Code of Practice for the Installation of Fuel Gas Piping System and Appliances. 2017.
National Fire Protection Association 58. Liquefied Petroleum Gas Code. 2017
National Fire Protection Association 54. National Fuel Gas Code. 2012
Petroleum Acts (Safety Measures) 1984.

KR20903 MATERIAL AND ENERGY BALANCES

Material and Energy Balances introduces engineering approach to solve process-related problems: breaking a process down into its components, establishing the relations between known and unknown process variables, application of natural laws to obtain the desired problem solution. It prepares students to formulate and solve material and energy balances on chemical process systems and lays the foundation for subsequent course such as separation process.

References

- Felder R.M. and Rousseau R.W., Elementary Principles Of Chemical Processes, 3rd Edition John Wiley and Sons, 2005

KR21103 PETROLEUM GEOLOGY

This course exposes the students with the introduction of geology, physical geology, petroleum geology, sedimentology and applied geophysics to the search for and production of oil and gas. Explanation will be given on the earth physical & chemical properties, geology time, source rocks, kerogen, the concept of maturity of organic matter, and the process of generation of petroleum. The topics on sedimentology and stratigraphy will also be included, to give the knowledge of reservoir rock characteristics and identifying areas of petroleum accumulation. The processes of migration, entrapment of petroleum, types of sedimentary basins and petroleum system will also be discussed to give an idea of the locations and distribution of oil and gas fields around the world as well as its relationship to the zone of seismicity.

References

- Selly, R.C., (2014). Elements of Petroleum Geology. 3rd Ed. Academic Press. Toronto.
Hunt, J.M.D. (1995). Petroleum Geochemistry and Geology. 2nd ed., San Francisco.
Levorsen, A.R. (2006). Geology of Petroleum. 2nd Ed. W.H. Freeman.
Gluyas, J and Swarbrick, R. (2006). Petroleum Geoscience. Blackwell Science Ltd.

Knut Bjørlykke (2010). Petroleum Geoscience: From Sedimentary Environments to Rock Physics. Springer.
Lutgens, F.K., Tarbuck, E.J. and Tasa, D.G. (2014). Essentials of Geology. 12th ed., Pearson Prentice Hall.
Tarbuck, E.J., Lutgens, F.K. and Tasa, D.G. (2013). Earth: An Introduction to physical Geology. 11th ed., Pearson Prentice Hall.
Chernicoff, S. and Whitney, D. (2007). Geology: An Introduction to Physical Geology. Pearson Prentice Hall.

KR20202 HEALTH, SAFETY AND ENVIRONMENT

This course is to deliver the knowledge and understanding to the student in the area of Health, Safety and Environment (HSE). HSE is a very important area in the field of Oil and Gas. 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

The Commission of the European Communities, Safety and Health in the Oil and Gas Extractive Industries, Springer, 1st edition, 2009.
Jayakumar & Retneswari, Occupational Health for Health Care Professionals- Caring for the Careers, Malaysia Medical Association, Kuala Lumpur, 2009.
Maimunah Aminuddin, Safety and Health at Work, Best HR and Employment Practices Series, LexisNexis, 2006.

KR20403 WORK ETHICS

Work ethics is about relationships, values, justice, and identity (personal, professional, corporate, national and global). It also concerns the intersection between professionals and ethics and is fundamental to the relationships between societies at large. This course will provide answers such as "Why does the modern corporation exist in the first place?", "How does it treat its stakeholders?" and other questions related to work ethics. This course also will discuss on the purpose, values, and transactions of and between individuals, groups, and companies and their global alliances. With this in mind, students and professionals need straightforward frameworks to thoughtfully and objectively analyse and then sort through complex issues in order to make decisions that are related to ethics, economics, social, legal and spiritual values.

References

Joseph W. Weiss, Business Ethics – A Stakeholder and Issues Management Approach, 5th Edition, Thomson South-Western, 2009.
Anne T. Lawrence and James Weber, Business and Society: Stakeholder Relations, Ethics and Public Policy, 12th Edition, McGraw Hill Education, 2008.
Archie B. Carroll and Ann K. Buchholtz, Business and Society – Ethics and Stakeholder Management, 6th Edition, Thomson South-Western, 2006. Manuel G. Velasquez, Business Ethics – Concepts and Cases, 6th Edition, Pearson Education, 2006.
Shaw, William H., Business Ethics. 5th edition, Wadsworth Publishing Company, 2005.

KR20601 LABORATORY 3

This course covers the practical works related to material and energy balances. The tested unit operations include distillation unit, packed column, extractor, evaporator, plate-and-frame heat exchanger and shell-and-tube heat exchanger.

References

Felder R.M. and Rousseau R.W., Elementary Principles Of Chemical Processes, 3rd Edition John Wiley and Sons, 2005

KR20803 PROCESS UTILITY AND FACILITIES

This course helps to develop knowledge and skills in process utilities and facilities which are made up of chemical injection, diesel fuel system, potable water system, air-conditioning system, instrument air system, service water system, and drainage system.

References

Skinner D. R., Introduction to Petroleum Production, Volume 1: Reservoir Engineering, Drilling, Well completions, Gulf Publishing Company, Houston, Texas, 1964.

Skinner D. R., Introduction to Petroleum Production, Volume 2: Fluid flow, Artificial lift, Gathering systems, and Processing, Gulf Publishing Company, Houston, Texas, 1964.

Skinner D. R., Introduction to Petroleum Production, Volume 3: Well site facilities: Water handling, storage, instrumentation, and Control system, Gulf Publishing Company, Houston Texas, 1981.

Håvard D., Oil and Gas Production Handbook – An Introduction to Oil and Gas Production, ABB ATPA Oil and Gas, Zurich Switzerland, 2006.

Exploration and Production Department, Introduction to Oil and Gas Production, 5th Ed., American Petroleum Institute, Washington, 1996

KR21003 PROCESS CONTROL AND INSTRUMENTATION

Instrumentation and Control course prepares the students with basic techniques and knowledge of instrumentation and control system. Instrumentation and control system theory and concept and its application in engineering will be covered. This subject will discuss about the concepts in control system; open and closed loop system; components of control loops, and symbols, piping and instrumentation diagram; controller algorithm and tuning; process control loop; single control loop and multivariable control system.

References

Skinner D. R., Introduction to Petroleum Production. Volume 1: Reservoir

Nise, N.S. Control System Engineering, 4th Ed., John Wiley & Sons, USA, 2003.

Johnson, C.D., Process Control Instrumentation Technology, 7th Ed., Prentice Hall, New Jersey, 2002.

Ghosh, A. K. Introduction to Instrumentation and Control, Prentice Hall, New Jersey, 2002.

KR21203 SEPARATION PROCESS

This course is an introduction to separation processes. This course will introduce to students the mechanism of separation processes and the equipment such as distillation unit, absorption packed column, liquid-liquid extraction and evaporator.

References

Geankoplis, C.J., 2014, Transport Processes and Separation Process Principles, 4th Edition (New International Ed.), Pearson Education Ltd.

McCabe, W. L. and Smith, J. C. 2001. Unit operations of chemical engineering, 4th Ed. New York: McGraw-Hill.

Henley, E.J., Seader, J.D. and Roper, D.K. 2011, Separation Process Principles, 3rd Edition, John Wiley & Sons.

KR21403 OIL AND GAS PRODUCTION OPERATIONS

This course provides a wide range of coverage on upstream process production operation such as gas and liquid disposal, process operation, separation, wellhead, header and flowline, static and rotating equipment, crude stabilization, gas treatment, contamination removal, gas dehydration and crude quality management as well as technology for enhanced production.

References

- "Petroleum Production Engineering: A Computer-Assisted Approach" by Boyun Guo, Lyons, W. C. and Ali Ghalambor (2007).
- "Principles of Oil Well Production" by Nind, T.E.W. (1981).
- "Petroleum Engineering Handbook" by Bradley, H.B. (1987).
- "Surface Operation in Petroleum Production" by Chilingarian, G.V., J.O. Robertson, and S. Kumar (1987).
- "Petroleum Engineering Handbook – Production Operations Engineering" by Larry W. Lake (2007)

KR30104 FINAL YEAR PROJECT

The final year project consists of either industry-based or practiced-oriented projects, which provide the introduction of a real professional approach to engineering studies and practices. The students will develop the techniques in literature review and information prospecting.

References

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

KR30303 PROJECT MANAGEMENT AND ENTREPRENEURSHIP

This course introduces students on how to become a successful project manager as well as entrepreneur in oil and gas industries. The contents of the course include project formulation; project analysis; project monitoring and control; financing and managing the resources; project report; fundamentals of entrepreneurship; micro, small and medium enterprises; rural entrepreneurship; scheduling; and project mindset.

References

- Gido, J., Clements, J.P. (2003) Successful Project Management. Thomson-South-Weston, 2nd Edition.
- Ghattas, R.G., McKee, S.L. (2001) Practical Project Management. Prentice Hall, 1st Edition.
- Cecile, F., Christopher, B., Charles, F. (2018) Entrepreneurship and Project Management Relationships. International Journal of Managing Projects in Business.

KR30501 LABORATORY 4

This course will support Process Control and Instrumentation subject. It covers the practical needed for the student to understand basic techniques and knowledge of instrumentation and control system. The task include open and closed loop system; components of control loops, and symbols, piping and instrumentation diagram; controller algorithm and tuning; process control loop; single control loop and multivariable control system.

References

Skinner D. R., Introduction to Petroleum Production. Volume 1: Reservoir
Nise, N.S. Control System Engineering, 4th Ed., John Wiley & Sons, USA, 2003.
Johnson, C.D., Process Control Instrumentation Technology, 7th Ed., Prentice Hall, New Jersey, 2002.
Ghosh, A. K. Introduction to Instrumentation and Control, Prentice Hall, New Jersey, 2002.

KR30703 OIL AND GAS TRANSPORTATION AND STORAGE

The course introduces students to connect the relationship between upstream and downstream sector which covers both theories and calculations. The contents of the course include method of transportation, liquid and gas transmission systems, regulation and measurement and storage system. This course is conducted through lectures, group assignments, and presentations.

References

Ikoku, C.U. (1984). Natural Gas Production Engineering. New York: John Wiley and Sons.
Gas Processes Suppliers Association (1972). Engineering Data Book. Tulsa, Oklahoma: GPSA.
Guo, B. and A. Ghalambor (2005). Natural Gas Engineering Handbook. Houston, Texas: Gulf Publishing.
Smith, R.V. (1990). Practical Natural Gas Engineering. 2nd Ed.. London: Pennwell.
Kumar, S. (1987). Gas Production Engineering. Houston, Texas: Gulf Publishing.
Beggs, H.D. (1984). Gas Production Operations. Houston, Texas: OGCI.
American Gas Association Inc. (1959). Gas Engineers Handbook. New York: Industrial Press.
Katz, D.L. (1959). Handbook of Natural Gas Engineering. New York: McGraw Hill.

KR30903 OPERATION AND MAINTENANCE MANAGEMENT

This subject enables students to acquire the fundamental knowledge of testing and operation principles and maintenance management related activities in oil & gas process plant.

References

J. H. Gary. (2016) Petroleum Refining: Technology and Economics. 4th ed. New York: McGraw-Hill.
Ken Arnold and Maurice Stewart (1989, 1999) Surface Production Operation, Volume 1, Second Edition. Houston, TX: Gulf Publishing Company.
Ken Arnold and Maurice Stewart (1989, 1999) Surface Production Operation, Volume 2, Second Edition. Houston, TX: Gulf Publishing Company.

KR33112 ENVIRONMENTAL TECHNOLOGY IN THE OIL AND GAS INDUSTRY

This course will discuss about the environmental technology which are practice is the oil and gas industry. It also covers the environmental control technology for oilfield processes, well integrity, and produced water, oilfield disposal control, production discharges to marine environment, pipeline technology, environmental management and technology in oil refineries, distribution and marketing of petroleum product. By the end of the class, student should also be able to describe principle of environmental control technology and solve environmental control engineering problems related to the oil and gas industry.

References

- Stefan T. Orszulik, Environmental Technology in the Oil industry, 2nd Ed. Springer Hampshire UK, 2008.
- Skinner D. R., Introduction to Petroleum Production, Volume 3: Well site facilities: Water handling, storage, instrumentation, and Control system, Gulf Publishing Company, Houston Texas, 1981.
- Law of Malaysia, Environmental Quality Act, 1974 (Act 127).
- Zhiguo G. Environmental Regulation of Oil & Gas, Kluwer Publishing, London UK, 1998.

KR33312 ENHANCED OIL RECOVERY

This course covers the Enhanced Oil Recovery (EOR) technology which explains about theory, processes and current practices in oil and gas fields. The subjects covers includes, Introduction to Enhanced Oil Recovery, Fluid Flow in Permeable Area, Phase Behavior and Fluid Properties, Displacement Efficiency, Volumetric Sweep Efficiency, Mobility Control Requirement in EOR Processes, Gas Injection, Carbon Dioxide Flooding, Polymer Flooding, Surfactant Flooding, Steam Flooding, Miscible Flooding, Alkaline Flooding and Microbial Method. EOR is important for the production of marginal oil and gas production specially relating to exhausting and matured wells.

References

- James J. Sheng, Modern Chemical Enhanced Oil Recovery: Theory and Practice, Elsevier, 2011
- Erle C. Donaldson, George V. Chilingarian and The Fu Yen, Enhanced Oil Recovery II: Processes and Operations, Elsevier, 1989
- Larry W. Lake, Enhanced Oil Recovery, Prentice Hall, 1989
- Skinner D. R., Introduction to Petroleum Production, Volume 1: Reservoir Engineering, Drilling, Well completions, Gulf Publishing Company, Houston, Texas, 1964.
- Skinner D. R., Introduction to Petroleum Production, Volume 2: Fluid flow, Artificial lift, Gathering systems, and Processing, Gulf Publishing Company, Houston, Texas, 1964.

KR33512 GAS RETICULATION AND STORAGE

This subject enables students to acquire the fundamental knowledge of liquefied petroleum gases (LPG), natural gases (NG) and liquefied natural gases (LNG) storage. The course also emphasizes on gas reticulation systems which include service pipe sizing, pipe route, pressure testing and corrosion protection systems.

References

- Australia/New Zealand Standard 1596. The Storage and Handling of LPG Gas. 2008.
- Leary, F. Gasfitting. Liquefied Petroleum Gas. Technical School Division. Education Department of Victoria. 1983
- Malaysian Standard 830. Code of Practice for the Storage, Handling and Transportation. 2013.
- Malaysian Standard 930. Code of Practice for the Installation of Fuel Gas Piping System and Appliances. 2017.
- National Fire Protection Association 58. Liquefied Petroleum Gas Code. 2017
- Steward, M. Design and Operation of Piping, Pipelines and Gas Disposal Systems. International Training and Development. USA. 1995

KR30005 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 5 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.