JABATAN KEJURUTERAAN AWAM

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B.Eng (Hons)(Civil) (UiTM), M.Sc (StucturalEngr)(USM)

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Msc in Civil Engineering with Environmental Engineering, University of Portsmouth (UK)

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STRUKTUR KURSUS DAN JUMLAH KREDIT KEPERLUAN PROGRAM

Program ditawarkan: **Program Sarjana Muda Kejuruteraan Awam (ZK01)**

Jumlah keperluan kredit yang perlu dipenuhi untuk bergraduan adalah sepertimana jadual di bawah dan tempoh pengajian yang perlu diikuti adalah lapan (8) semester lazim. Pecahan kursus yang perlu diambil adalah seperti berikut:

KURSUS	KREDIT (AWAM)
Teras Universiti	12
Teras Fakulti	18
Teras Program	86
Elektif Program	6
*Elektif Universiti	6
JUMLAH KREDIT UNTUK BERGRADUAN	**128**

SENARAI KURSUS TERAS PROGRAM YANG PERLU DIPENUHI (86 KREDIT) :

CODE	COURSE	CREDIT
ECB 1152	Introduction to Electrical Engineering	2
ECB 1113	Applied Mechanics	3
ECB 1232	Engineering Geology	2
ECB 1213	Mechanics of Materials	3
ECB 1223	Fluid Mechanics	3
ECB 1253	Construction Materials and Technology	3
ECB 2153	Graphics and Engineering Drawings	3
ECB 2123	Engineering Hydrology	3
ECB 2223	Water Supply and Sewerage	3
ECB 2243	Geomatics	3
ECB 2233	Soil Mechanics	3

ECB 2113	Mechanics of Structures	3
ECB 2213	Structural Analysis	3
ECB 3133	Geotechnics	3
ECB 3143	Highway Engineering	3
ECB 3113	Reinforced Concrete Design I	3
ECB 3213	Reinforced Concrete Design II	3
ECB 3223	Hydraulics	3
ECB 3153	Civil Engineering Project Management	3
ECB 3243	Transportation Engineering	3
ECB 3233	Foundation Engineering	3
ECB 3354	Industrial Training	4
ECB 4113	Steel and Timber Structures Design	3
ECB 4162	Infrastructure Design Project (Capstone 1)	2
ECB 4192	Final Year Project I	2
ECB 4123	Environmental Engineering	3
ECB 4153	Engineers in Community and Ethics	3
ECB 4262	Structural Design Project (Capstone 2)	2
ECB 4252	Construction Contract, Estimation and Economics	2
ECB 4294	Final Year Project II	4

SENARAI KURSUS ELEKTIF PROGRAM (6 KREDIT):

CODE	COURSE	CREDIT
ECB 5153	Military Engineers in Humanitarian and Peacekeeping	3
ECB 5113	Introduction to Bridge Engineering	3
ECB 5123	Nuclear Biological and Chemical Contamination	3
ECB 5153	Advanced Construction Material and Technology	3
ECB 5253	Damage Assessment, Maintenance and Rehabilitation	3
ECB 5213	Introduction To Blast Loadings, Design and Demolition	3

SARJANA MUDA KEJURUTERAAN AWAM

SEMESTER 1				SEMESTER 2			
Code	**Course**	**Credit**	**Pre-Requisite**	**Code**	**Course**	**Credit**	**Pre-Requisite**
ALK1011/ PLS 1xx1	ALK / Palapes*	1		ALK1011/ PLS 1xx1	ALK / Palapes*	1	
QKX XXX2	Co-Curriculum **	2		QKX XXX2	Co-Curriculum **	2	
LAN 1012	Islamic and Asian Civilizations	2		LAN 1032	Ethnic Relation	2	
LEL 1012	English for Academic Writing	2		EFA 1203	Engineering Mathematics II (Differential	3	
EFA 1103	Engineering Mathematics I (Calculus and	3		ECB1232	Engineering Geology	2	
EFC 1103	Computing I (C and C++)	3		ECB1213	Mechanics of Materials	3	ECB1113
ECB1113	Applied Mechanics	3		ECB1223	Fluid Mechanics	3	
ECB1152	Introduction to Electrical Engineering	2		ECB1253	Construction Materials and Technology	3	
TOTAL		**16* 17****		**TOTAL**		**17* 18****	

* Courses to be taken by cadets/palapes students

** Courses to be taken by civilian students

SEMESTER 3				SEMESTER 4			
Code	**Course**	**Credit**	**Pre-Requisite**	**Code**	**Course**	**Credit**	**Pre-Requisite**
ALK2011/ PLS 2xx1	ALK / Palapes*	1		ALK2021/ PLS2xx1	ALK / Palapes*	1	
QKX XXX2	Co-Curriculum **	2		LAN 1062	Malaysian Nationhood and Military History	2	
LAN 1052	Leadership and Entrepreneurship	2		ECB2223	Water Supply and Sewerage	3	
LEL 1022	English for Oral Communication	2		ECB2243	Geomatics	3	
EFA 2203	Engineering Mathematics IIIB (CIS and OR)	3		ECB2233	Soil Mechanics	3	
ECB2153	Graphics and Engineering Drawings	3		ECB2213	Structural Analysis	3	ECB2113
ECB2123	Engineering Hydrology	3					
ECB2113	Mechanics of Structures	3	ECB1213				
TOTAL		**17*** **18****		**TOTAL**		**15*** **14****	

* Courses to be taken by cadets/palapes students

** Courses to be taken by civilian students

SEMESTER 5				SEMESTER 6			
Code	**Course**	**Credit**	**Pre-Requisite**	**Code**	**Course**	**Credit**	**Pre-Requisite**
ALK3011/ PLS3xx1	ALK / Palapes*	1		ALK3021/PLS3xx1	ALK / Palapes*	1	
EFC 1203	Computing II (Numerical methods and Engineering	3		EFA 2213	Engineering Mathematics IV (Statistics)	3	
ECB 3133	Geotechnics	3	ECB2233	ECB 3213	Reinforced Concrete Design 2	3	ECB3113
ECB 3143	Highway Engineering	3		ECB 3223	Hydraulics	3	ECB1223
ECB 3113	Reinforced Concrete Design	3	ECB2113	ECB 3243	Transportation Engineering	3	
ECB 3153	Civil Engineering Project Management	3		ECB 3233	Foundation Engineering	3	ECB3133
TOTAL		**16* 15****		**TOTAL**		**16* 15****	

INTER-SESI			
Code	**Course**	**Credit**	**Pre-Requisite**
ECB 3354	Industrial Training	4	*
TOTAL		**4**	

*Completed 60 Credit Hours

SEMESTER 7				SEMESTER 8			
Code	**Course**	**Credit**	**Pre-Requisite**	**Code**	**Course**	**Credit**	**Pre-Requisite**
ECB4113	Steel and Timber Structures Design	3		ECB4262	Structural Design Project (Capstone II)	2	ECB3213 ECB4113 ECB4162
ECB4123	Environmental Engineering	3		ECB4252	Construction Contract, Estimation and Economics	2	
ECB4162	Infrastructure Design project (Capstone I)	2	ECB2113	ECB4294	Final Year Project II	4	ECB4192
ECB4192	Final Year Project I	2	***	ECB4153	Engineers in Community and Ethics	3	
ECB 5XX3	Elective I	3		ECB5XX3	Elective II	3	
TOTAL		**13* 13****		**TOTAL**		**14* 14****	

* Courses to be taken by cadets/palapes students

** Courses to be taken by civilian students

*** Completed 80 kredit hours core faculty and core programme

SINOPSIS KURSUS TERAS PROGRAM
SARJANA MUDA KEJURUTERAAN AWAM

APPLIED MECHANICS ECB 1113
MEKANIK GUNAAN
EQUIVALENT TO ECA 1223

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is a core subject for Civil Engineering students taken in the first year of their program. It is a continuation of Physics taught in Foundation Year. This course is divided into two parts: Statics and Dynamics. In Statics, students will deal with equilibrium of bodies, i.e., bodies that are at rest or moving with constant velocity. Students are exposed to the topics on resultant and resolution of forces, equilibrium of a particle, and equilibrium of rigid bodies, centre of gravity and centroid, and moment of inertia of an area.

Meanwhile Dynamics explores topics concerned with the accelerated motion of bodies. Students are exposed to the finer details of kinematics and kinetics of particles and rigid bodies. Kinematics of particles and rigid bodies discusses the relationship between displacement, velocity and acceleration against time. Kinetics of particles and rigid bodies will explain the concepts of force and acceleration (Newton's second law of motion), energy and work, and impulse and momentum.

This is a core course which provides a basic understanding to the students on the fundamental of fluid mechanics. This course focuses on fluid mechanic in civil engineering field. It will include principle of hydrostatic and hydrodynamic, application of continuity principle, and application of momentum and energy in conduit flow. Besides, this course will also expose the students on how to design and handle fluid mechanics laboratory work. In addition, students will learn how to interpret data based on lab results.

Course Outcomes

Upon completion of this course, students able to:

1. Recognize a force vector and able to express and use the concepts of resultant and resolution of forces to resolve forces and determine the resultant of a force system. Define and express the concept of the moment of a force and the moment of a couple and able to calculate the moments about a point or an axis.
2. Define and formulate the state of equilibrium of a particle and a rigid body and use the equations to solve problems involving the equilibrium of a particle and of a rigid body

3. Calculate the centre of gravity and centroid of a body, and able to calculate the moment of inertia of an area.
4. State and describe the relationships between displacement, velocity and acceleration against time and able to use such relationships to solve problems involving motions of a particle and of a rigid body.
5. Describe, utilize, and solve problems related to: the relationship between force and acceleration (Newton's second law of motion), principle of work and energy, and the principle of conservation of energy; and the principle of impulse and momentum, and the principle conservation of momentum; and able to use such relationships to solve problems involving kinetics of particle and of a rigid body and able to solve problems involving vibration.

References

1. Hibbeler, R. C. (2010). Engineering Mechanics Statics. 12th Ed. SI. Singapore: Prentice Hall.
2. Hibbeler, R.C. (2010). Engineering Mechanics: Dynamics. S.I. Edition. 12th Ed. Singapore: Prentice Hall.
3. Meriam J.L. and L. G. Kraige (2008). Engineering Mechanics, Vol 1: Statics, 6th Ed. Canada: John Wiley & Sons.
4. Meriam J.L. & L.G. Kraige. (2008). Engineering Mechanics: Dynamics. S.I. Edition. John Wiley & Sons

INTRODUCTION TO ELECTRICAL ENGINEERING ECB 1152
PENGENALAN KEPADA KEJURUTERAAN ELEKTRIK
EQUIVALENT TO ECA 1212

2 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is an introduction course for students who are not majoring in electrical and electronics engineering. It mostly covers yhe basic of circuit theories, the application aspects of transformers and electric machineries. In the circuit theory part, various analysis methods like, Ohm's Law, Kirchhoff's Law, Thevenin's Theorem, Norton's Theorem, etc will be taught. Inductive and capacitive elements would also be included. Some theory on magnetic circuit and transformer functionality will also be given. For the introductory material on electric machinery, the students will be taught about magnetic circuits, AC and DC motors generators and various aspects of energy conversion involving devices.

Course Outcomes

Upon completion of this course, students able to:

1. Understand the basic theories of electric and magnetic circuits, and electric machines.
2. Apply the above concepts to solve problems on the electric and magnetic circuits, and electric machines.
3. Analyze the circuits involving electric and magnetic circuits, and electric machines.

References

1. Giorgio Rizzoni, "Fundamentals of Electrical Engineering", McGraw Hill, 2009
2. Alexander and Sadiku, *Fundamentals of Electric Circuits, 4th ed.* McGraw Hill, 2009.
3. Thomas L. Floyd, "Electronic Devices", 8th Edition, Pearson Education 2007
4. Robert L. Boylestad, "Introductory Circuit Analysis", 8th Edition, Prentice Hall, 2000

MECHANICS OF MATERIAL ECB 1213
MEKANIK BAHAN
EQUIVALENT TO ECA 2123

3 Credit Hours

Pre-requisite: ECB1113 – Applied Mechanics

Course Synopsis

This is core course of Civil Engineering programme. In this course, students will be introduce to the principle of stress and strain occurred when a various type of external and internal load applied within a rigid body extend to members or elements. Further, students will be exposing to the various method to determine the displacement and transformation of stress and strain. Finally students will be taught on critical load for buckling column.

Course Outcomes

Upon completion of this course, students able to:

1. Identify the appropriate formulae to calculate the stress in an uniformly loaded specimen for the following loading configurations: uniaxial tension and compression; torsional loading; direct shear; and bending under statically determine conditions.
2. Determine internal load distributions and draw bending moment diagrams and torque position diagrams for beams and shafts with step change in cross-section.
3. Determine displacement and strain in members with step changes in loading and/or radius given the loading and modulus or loading and stress-strain curve. Students will be able to calculate these displacements for uniaxial tension and compression; torsion.
4. Transform the state of stress at a point in a material to determine principal stresses; maximum shear stress and the orientation of the stress element.
5. Calculate the critical load for the buckling of a pin supported column and determine if the failure mode is compression or buckling.

References

1. Hibbeler, R. C. (2010). Mechanics of Materials. 8th Ed. SI. Singapore: Prentice Hall.
2. Hibbeler, R. C. (2010). Engineering Mechanics Statics. 12th Ed. SI. Singapore: Prentice Hall.
3. Ferdinand P. Beer, E Russell Johnston Jr., John T. De Wolf. (2002). Mechanics of Materials.3rd Edition: McGraw-Hill International Edition
4. James M. Gere (2000). Mechanics of Materials. 5th Edition: Brooks/Cole Thomson Learning.

FLUID MECHANICS ECB 1223
MEKANIK BENDALIR
EQUIVALENT TO ECA 2113

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is a core course which provides a basic understanding to the students on the fundamental of fluid mechanics. This course focuses on fluid mechanic in civil engineering field. It will include principle of hydrostatic and hydrodynamic, application of continuity principle, and application of momentum and energy in conduit flow. Besides, this course will also expose the students on how to design and handle fluid mechanics laboratory work. In addition, students will learn how to interpret data based on lab results.

Course Outcomes

Upon completion of this course, students able to:

1. Identify and describe some Fluid Mechanics theories.
2. Identify, analyze and solutions to problems related to Fluid Mechanics
3. Describe, utilize, and solve problem related to steady flow in pipe networks using quantity balance and head balance methods.
4. Describe, utilize, and solve problem of pumping system.
5. Design and handle laboratory work. Ability to collect, analyse and interpret data. The ability to report laboratory work in fluid mechanics.

References

1. Yunus, A. C., John M. Cimbala, (2006). *Fluid Mechanics: Fundamentals and Applications*, McGraw Hill.
2. Fatimah, M. N., Faridah, J. S., and G. K. Goh (1991). *MekanikBendalirUntukKejuruteraanAwam*. UTM, Johor: Unit PenerbitanAkademik.
3. E. John Finnermore, Joseph B. Franzini, (2006). *Fluid Mechanics with Engineering Application*, Tenth Edition, McGrawHill.
4. Anthony Esposito (1998). *Fluid Mechanics with Applications*, Prentice Hall.

ENGINEERING GEOLOGY ECB1232
KEJURUTERAAN GEOLOGI

2 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is a fundamental subject that will expose students in understanding to the phenomenon concept of earth formation and discussing on relationship between geology and civil engineering. The topics covered include mineral and rock properties and behaviour along with the process of earth and soil formation. Rocks classification and distribution on earth surface and subsurface will also be discussed accordingly. Geological exploration will also be exposed in general approach. Other than that, it will discuss on geological factors that are tend to affect certain engineering project as a whole.

Course Outcomes

Upon completion of this course, students able to:

1. Able to describe the fundamental concept of earth formation, relationship between geology and civil engineering
2. Able to define the function and distribution of ground water, and superficial deposit.
3. Able to describe underground and subsurface rock distributions
4. Able to describe geological exploration and geologic factors in civil engineering study.

References

1. McLean, A. C. (1985).*Geology for Civil Engineer*. E & F N Spon, London.
2. Physical Geology 14th Edition (International Edition) by Charles (Carlos) Plummer, Diane Carlson, Lisa Hammersley, 2013, McGraw-Hill, New York.
3. Exploring Geology 3rd Edition (International Edition) by Stephen Reynolds, Julia Johnson, Paul Morin, Chuck Carter, 2013, McGraw-Hill , New York.

CONSTRUCTION MATERIAL AND TECHNOLOGY ECB1253
BAHAN DAN TEKNOLOGI PEMBINAAN
EQUIVALENT TO ECA 2133

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This subject is divided into two parts, the first part will address on the types of materials used in the construction industry, meanwhile the second part of the subject will exposed to the student on the construction technology that is applied in the construction industry which includes foundation, formworks, retaining wall, scaffolding, and also type of construction plant and machinery used in the construction sites.

Course Outcomes

Upon completion of this course, students able to:

1. Recognize the characteristics and properties of different types of construction materials
2. Explain and identify the usage and application of different types of construction materials in construction industry
3. Understand site layout, temporary facilities, construction plants and machineries used in the construction sites
4. List and describe the type of foundation, scaffolding, retaining wall ,and formworks used in construction sites

References

1. Marotta, Theodore W., Basic Construction Materials, Seventh Edition, Pearson Prentice Hall: New Jersey, 2005.
2. Chudley. R. Advanced Construction Technology, 3rd Edition . Kuala Lumpur; Addison Wesley Longman Limited , 2002.
3. Neville A.M. and Brook J.J. Concrete Technology. Longman. 1990.

MECHANICS OF STRUCTURES ECB 2113
MEKANIK STRUKTUR
EQUIVALENT TO ECA 2223

3 Credit Hours

Pre-requisite: ECB1213 – Mechanics of Materials

Course Synopsis

This is core subject. It will expose the students to the mechanics of structures and fundamental of structural analysis. The topics covered include introduction to structures and loads, analysis of statically determinate structures and trusses, analysis of cables and arches, influence lines, analysis of statically indeterminate structures, analyse deflection and displacement using various method.

Course Outcomes

Upon completion of this course, students able to:

1. Identify type of support and number of reactions, including stability of statically determinate structure
2. Analyse statically determinate structures including internal loadings in structural members
3. Analyse of cables and arches, and influence line for statically determinate structure.
4. Analyse statically indeterminate beam and frame using virtual work method, slope and deflection, and moment distribution methods.

References

1. Hibbeler, R. C. (2010). Structural Analysis. 6th Ed. SI. Singapore: Prentice Hall.
2. Meriam J.L. & L.G. Kraige. (2003). Engineering Mechanics: Static. S.I. Edition. John Wiley & Sons
3. Beer, F P and Johnson, E. R. (1990). Vector Mechanics For Engineers: Static and Dynamics. Singapore: McGraw Hill.
4. Beer, F. P., E. R. Johnston and E. R. Eisenberg (2004). Vector Mechanics For Engineers: Statics, 7th Ed (Int.). New York: McGraw Hill.

ENGINEERING HYDROLOGY ECB2123
KEJURUTERAAN HIDROLOGI
EQUIVALENT TO 2213

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

The course emphasizes hydrology and its application in the field of engineering especially those related to water resources. Interdisciplinary aspects of hydrology that will be introduced and discussed are the understanding of the hydrological processes. These processes are precipitation, evaporation, transpiration, surface runoff, infiltration and interception. Some processes will be discussed in more detail as compared to the others. An introduction to flood estimation will be highlighted together with the basic analysis and concept design in accordance to local guideline of Urban Storm water Management Manual for Malaysia (MSMA). Frequency analysis is the final topic to be discussed in this subject. A brief introduction to the hydrological modelling processes will be introduced as a basic requirement to the understanding to the empirical and numerical modeling concepts.

Course Outcomes

Upon completion of this course, students will be able to:

1. Describe the basic concepts of hydrological cycle, river basin and application of the water balance.
2. Apply the techniques, skills and use various hydrological data such as rainfall data, river flow measurement data and hydrological losses data.
3. Conceptualize, develop and able to solve hydrological problem such as flood routing, hydrograph analysis, Modified Rational Method, and frequency analysis.
4. Associate the course content to the present hydrologic design Guidelines; Hydrological Procedures (HP) and Urban Storm water Management Manual for Malaysia (MSMA).
5. Work in a team or individually to solve problems and produce written report.

References

1. Martin W., Robert K., Ron E., (1997). HYDROLOGY: Water Quantity and Quality Control. 2nd Edition. Jon Wiley & Sons, Inc.
2. Victor M. P., (1989). ENGINEERING HYDROLOGY: Principles and Practices. Prentice-Hall, Inc.
3. David C., (2006). Water-Resources Engineering. 2nd Edition. Pearson Education, Inc.
4. Ayob K. Zulkifli Y. Kawi B., (2007). HidrologiAsas. Pearson Prentice Hall.

GRAPHICS AND ENGINEERING DRAWING ECB2153
GRAFIK DAN KEJURUTERAAN LUKISAN
EQUIVALENT TO ECA 2143

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This course will expose students to knowledge and understanding of fundamental technical drawing. It will cover basic principles of technical drawing such as dimension, scale, type of lines and also orthographic and isometric drawings, and also introduction to computer aided drawing software. Students will also be introduced to architectural and structural drawings so that they will be able to draw, interpret and understand construction and engineering drawings.

Course Outcomes

At the end of this course students will be able to:

1. Appreciate technical drawing rules and apply the knowledge using technical drawing instrument.
2. Project and visualize orthographic views, isometric views and oblique views of different objects of various shapes, using technical drawing rules and principles.
3. Comprehend and produce architectural and structural drawing.
4. Work in a group and carry out both architectural and structural drawing project.

References

1. Elsheikh, Ahmed. Introduction to Drawing for Civil Engineers. 1995. McGraw-Hill International
2. David L. Goetsch. Structural Drafting. 1994. Delmar Publisher Inc.
3. Mark W. Huth. Understanding Construction Drawing. 2005. Thomson Delmar Learning
4. Yarwood, A. Introduction to AUTOCAD 2008-2D and 3D Design. 2007. Elsevier Ltd.

GEOMATICS ECB 2243
GEOMATIK
EQUIVALENT TO ECA 2243

3 Credit Hours

Pre-requisite : NIL

Course Synopsis

This course provides the basic theory and practice of surveying to civil engineering students. Methods of establishing horizontal & vertical controls for construction and design are explained and compared. Detailing for producing site plans, area and volume estimations, road curves geometric design are also discussed. Error analysis and adjustment are described. The concept of field survey automation and the usage of software are explained. Common methods of field producers, bookings and reduction of observations are adopted. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to analyses errors so that standard accuracies are met. At the end of the course students are expected to be able to plan, execute, compute and analyses surveying works involved in establishing horizontal & vertical controls and producing plans for civil engineering applications, perform area calculations and volume estimation for earthwork activities in civil engineering. Students should demonstrate effective communication and good collaborative skills.

References

1. Uren, J. and W.F Price, 2006. Surveying for Engineers, The Macmillan Press Ltd. & ELBS, London Fourth Edision.
2. McCormac, J.C., 1991. Surveying: Fundamentals, 2nd. Ed., Prentice Hall, Englewood Cliffs, New Jersey.
3. Shepperd, F.A., 1981. Advanced Engineering Surveying – Problem & Solution, Edward Arnold, London.

STRUCTURAL ANALYSIS ECB2213
ANALISIS STRUKTUR
EQUIVALENT TO ECA 3123

3 Credit Hours

Pre-requisite: ECB2113

Course Synopsis

This is a core course which provides a basic understanding to the students on the analysis methods for statically indeterminate structures of beam, frame and truss. These structures can be analyses using flexibility and stiffness matrix approaches. Through this analysis, the reactions, internal shear and moments, deflection, slope and support reaction of the structures can be determined. Besides, this course also covers the fundamental of plastic analysis method for both beam and frame structures. In addition, students also will be introduced to finite element method and experienced to analyses various types of structures by using available computer software such as STAAD.Pro V8i and Prokon.

Course Outcomes

Upon completion of this course, students able to:

1. Define and explain the significance of structural analysis in the Civil Engineering context.
2. Analyse beams, frames and trusses using Flexibility method.
3. Analyse beams, frames and trusses using Stiffness method.
4. Analyse beams and frames using Plastic analysis method.
5. Apply the fundamental Finite Elements Method and analyse the structures using computer software.

References

1. Aslam Kassimali (2011). Structural Analysis 4th Edition. SI Edition. CENGAGE Learning.
2. R. C. Hibbler (2009). Structural Analysis 7th Edition in SI Units. Prentice Hall.
3. Yusof Ahmad (2004). TeoriStruktur. UniversitiTeknologi Malaysia, Skudai, Johor DarulTakzim, Malaysia.
4. Daryl L. Logan (2007). A First Course in the Finite Element Method 4th Edition. International Student Edition. Thomson.

WATER SUPPLY AND SEWERAGE ECB 2223
SISTEM SALIRAN AIR DAN PEMBENTUNGAN
EQUIVALENT TO ECA 3113

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This subject consists of two main branches in Civil Engineering; water supply and sewerage. Water supply consists of hydrologic cycle, water resources determination, water intake, water treatment processes, water quality control and disinfection, and water distribution system. Sewerage consist of wastewater management related regulations, wastewater properties and effects to environment, sewer systems and removal of suspended matter, dissolved organic matter and colloid using physical, chemical and biological processes. It also includes the removal of nutrients and sludge management.

Course Outcomes

At the end of this course students able to:

1. Understand and describe the basic concepts of chemistry and microbiology related to water supply and sewerage treatment technology
2. Apply and distinguish the methods commonly used in treating water supply and sewerage
3. Calculate and design systems of unit operations of water supply and sewerage to achieve the required treatment.
4. Design and handle laboratory work. Ability to collect, analyse and interpret data. The ability to report laboratory work in water supply and sewerage treatment.

References

1. Davis, M. L. and Cornwell, D. A. (2008). Introduction to Environmental Engineering. 4th ed. McGraw Hill.
2. American Water Works Association/American of Society of Civil Engineer (1998). Water Treatment Plant Design. 3rd Ed. McGraw Hill.
3. Hammer, M.J., (1996): Water and Wastewater Technology. 3rd Ed. Prentice-Hall Inc.
4. Malaysian Water Association (1998). Guideline for Developers:
   Volume 1: Sewerage Policy for New Development
   Volume 2: Sewerage Works Procedure
   Volume 3: Sewer Networks and Pumping Stations
   Volume 4: Sewage Treatment Plants
   Volume 5: Septic Tanks

SOIL MECHANICS ECB2233
MEKANIK TANAH

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This fundamental subject is tend to discuss the principle of mechanics of soil and its application towards civil engineering field. It will provide an understanding on the properties and behaviour of soil in terms of physical appearances, chemical constitution and their relationship against each other's. It will also discuss on seepage phenomenon in which occurs due to the effect of water in soil. Exposure on shear strength theory and effective stress in soil will also be provided in this syllabus. Other than that, lateral earth pressure and slope stability will also be discussed in general along with consolidation theory. Another topic of subsoil exploration will be discussed in which related to investigation techniques.

Course Outcomes
At the end of this course students able to:

1. Able to describe the fundamental characteristic of soil such as origin of soil, particle size distribution and classification, soil composition and plasticity.
2. Able to describe the effect of capillarity in soil, permeability, seepage and solve the problem related to the flow net in a dam structure.
3. Able to define shear strength in soil, laboratory triaxial test, vane shear test and conduct lab test to determine the shear strength paramaters.
4. Able to utilise and apply suitable techniques to calculate soil stresses in a soil mass.

References

1. Craig, R. F. (1993). *Soil Mechanics.* Chapman and Hall, London.
2. Das, B. M., (2005). *Fundamentals of Geotechnical Engineering Second Edition,* Thomson.
3. R Whitlow, (2001). *Basic Soil Mechanics, Fourth Edition,* Prentice Hall.
4. Budhu, M., (2000). *Soil Mechanics & Foundations*, John Wiley & Sons.

REINFORCED CONCRETE DESIGN 1 ECB 3113
REKABENTUK KONKRIT BERTETULANG 1

3 Credit Hours

Pre-requisite: ECB2113 – Mechanics Of Structures

Course Synopsis

Reinforced Concrete (RC) Design 1 is a core civil engineering subject which provides students to the basic theory and design procedures for reinforced concrete structures according to Eurocode 2 (EN 1992). In this course, the syllabus only coversmechanical properties of reinforced concrete, limit state design, analysis of the structure at the ultimate limit state, analysis of the section, shear, torsion, anchorage, curtailment, connections, serviceability, durability and stability. Besides, this course also focuses more to the design of reinforced concrete beams and slabs in various situations. In addition, students have to work in group and are required to conduct a Reinforced Concrete design project, where they are asked to analyse, design and draw detailed drawing of given structures using manual calculation. This course is a Pre-requisite subject to Reinforced Concrete (RC) Design 2 and Capstone Project 2.

Course Outcomes

At the end of this course students able to:

1. Elaborate on basic principles of structural analysis and design, mechanical properties of reinforced concrete, limit state design. Also, analysereinforced concrete structures at ultimate limit state.
2. Analyse the section, shear, and torsion. Also, identify the requirement of anchorage, curtailment and member connections, serviceability, durability and stability.
3. Analyse, design and produce detailed drawing for reinforced concrete beam and slab.
4. Work in a group and carry out project on various reinforced concrete structures.

References

1. Mosley, B., Bungey, J., &Hulse, R. 2007. Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan.
2. Martin, L.H. &Purkiss, J.A. 2006. Concrete Design to EN 1992, 2nd Ed. Oxford: Butterworth-Heinemann.
3. BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildingsLondon: BSi.
4. NA to BS EN 1992-1-1:2004**.** UK National Annex toEurocode 2: Design of Concrete Structures. London: BSi.

GEOTECHNICS ECB3133
GEOTEKNIK

3 Credit Hours

Pre-requisite: ECB2233 – Soil Mechanics

Course Synopsis

This subject is one of the core subjects, which will provide solid background knowledge to student about the principles of geotechnical engineering and practices. It will provide an understanding in conceptual design of civil and geotechnical engineering structures. Fundamental topics for the subject include soil compaction and will also covers shear strength of soil and seepage calculation with analysis. Lateral earth pressure and analysis of slope stability are other important topics to be discussed along with compressibility, and consolidation of soils.

Course Outcomes
At the end of this course students able to:

1. Able to describe the fundamental of soil compaction, test and application.
2. Able to describe and analyse the lateral earth pressure, checking stability of retaining wall structures and applying few methods of analysis.
3. Able to define concept of slope stability, slope movement and instability, and applying slope stability analysis.
4. Able to understand compressibility in soil, consolidation and settlement, and apply consolidation concept through understanding on degree and rate of consolidation.

References
1. Das, B. M., (2010), *Principles of Geotechnical Engineering Seventh Edition,*Cengage Learning.
2. J.N. Cernica, (1995), *Geotechnical Engineering: Soil Mechanics*, John Wiley & Sons

HIGHWAY ENGINEERING ECB3143
KEJURUTERAAN LEBUHRAYA
EQUIVALENT TO ECA 3143

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is a compulsory course that will expose students to the fundamental theory of Highway Engineering. This course emphasize on highway earthwork, operations and equipment, highway materials, highway drainage, geometric design of roads and furniture, pavement design and highway maintenance and rehabilitation. Students are required to carry out laboratory testing at the highway laboratory besides attending lectures and tutorials. Students are required to write reports on all laboratory testing, analyze and solve problems related to laboratory testing and tutorials. Besides, the students will be exposing to software for road geometric design and they are required to carry out mini project in groups.

Course Outcomes

At the end of this course students able to:

1. Identify and distinguish highway earthwork, operations and equipment, and solve problems related to earthwork operations (C4, A3).
2. Describe, identify and compare the highway materials and tests (C4, A3).
3. Recognize, compare and classify types of highway drainage (C4, A3).
4. Analyze and design the geometric of roads and furniture (C6, A4).
5. Analyze, design and recommend the structural thickness of flexible pavement using JKR method and rigid pavement using PCA method (C6, A5).
6. Describe and compare road maintenance and rehabilitation method (C4, A3).

References

1. Garber, N.J. and Hoel, L.A. (2010). Traffic and Highway Engineering. SI Ed. Cengage Learning.
2. ArahanTeknikJalan 5/8 – Manual on Pavement Design. JabatanKerja Raya.
3. REAM GM2/2002 – A Guide on Geometric Design of Roads. Road Engineering Association Malaysia.
4. Wright, P.H. and Dixon, K.K. 2004. Highway Engineering. 7th. Ed. John Wiley & Sons.

CIVIL ENGINEERING PROJECT MANAGEMENT ECB 3153
PENGURUSAN PROJEK KEJURUTERAAN AWAM
EQUIVALENT TO ECA 3233

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

The course starts with the project management concept, role of project manager and function of project management from inception until completion. The second part of the course will include the usage of tools available in construction management particularly in the application of planning and scheduling technique using Gantt Chart and network technique. The course will also expose the student on the application of scheduling software available in the market.

Course Outcomes

At the end of this course students able to:

1. General concept of project management principles.
2. Describe project organisation structure
3. Ability to develop a project work programme using planning tools

References

1. Project Management in Malaysia by Andrew A. L. Tan.
2. Barrie, D.S and Paulson, B.C, Profesional Construction Management, McGraw Hill (1999).
3. Harris, F. and McCaffer, R, Modern Construction Management, Publishing , London (1995)

REINFORCED CONCRETE DESIGN 2 ECB 3213
REKABENTUK KONRIT BERTETULANG 2

3 Credit Hours

Pre-requisite : ECB 3113 – Reinforced Concrete Design 1

Course Synopsis

Reinforced Concrete (RC) Design 2 is a core civil engineering subject that exposed students to a wider scope of reinforced concrete design. As a continuation to the Reinforced Concrete Design 1, this subject covers analysis and design of column, foundations, staircase, and retaining walls. Furthermore, students will be introduced to basic principles of prestressed concrete and design procedure of composite construction. Students have to work in group and are required to conduct a Reinforced Concrete design project, where they are asked to analyse, design and draw detailed drawing of a given structures using manual calculation. Student also will be exposed to function and use of Reinforced Concrete design software. This course is a Pre-requisite subject to Capstone Project 2.

Course Outcomes

At the end of this course students able to:

1. Analyse, design and produce detailed drawing for reinforced concrete columns and foundations.
2. Analyse, design and produce detailed drawing for reinforced concrete staircase and retaining walls.
3. Describe and explain the basic principles of prestressed concrete and design procedures of composite construction.
4. Work in a group and carry out project on various reinforced concrete structures.

References

1. Mosley, B., Bungey, J., &Hulse, R. 2007. Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan.
2. Martin, L.H. &Purkiss, J.A. 2006. Concrete Design to EN 1992, 2nd Ed. Oxford: Butterworth-Heinemann.
3. BS EN 1992-1-1:2004. Eurocode 2: Design of Concrete Structures. Part 1-1: General rules and rules for buildingsLondon: BSi.

HYDRAULICS ECB 3223
HIDRAULIK
EQUIVALENT TO ECA3213

3 Credit Hours

Pre-requisite: ECB1223 – Fluid Mechanics

Course Synopsis

The aim of this course is to give knowledge, understanding and able to design open channel hydraulics (erodible and non-erodible). This course also identifies open channel flow classification, design of channel section dimensions, flow characteristics in open channel, sediment transport. This course also introduces commercial software which is used in open channel design.

Course Outcomes

Upon completion of this course, students will be able to:

1. Describe characteristics of open channel flow and application of various channel design equations.
2. Calculate and define flow profile along an open channel due to structures in the channel.
3. Calculate and evaluate rapidly and gradually varying flow in open channel.
4. Apply the appropriate analytical concept for various types of flow condition in open channels and sediment transport.
5. Work in a team or individually to solve problems and produce written report.

References

1. Hubert Chanson. 2004. Hydraulics of Open Channel Flow. 2nd Edition. Butterworth-Heinemann
2. Terry W. Sturn (2001). Open Channel Hydraulics. McGraw Hill- Higher Education
3. Amat Sairin Demun (1997) Hidraulik Saluran Terbuka Dengan Penggunaan Komputer,Penerbitan Universiti Teknologi Malaysia, Skudai Johor
4. Fatimah, M(1996), HidraulikKejuruteraanAwam , Teori, MasalahdanPenyelesaian, Penerbitan Universiti Teknologi Malaysia, Skudai, Johor. (*Translation of Featherstone, R.E dan Nalluri, C., Civil Engineering Hydraulics – Essential Theory with Worked Examples)*

FOUNDATION ENGINEERING ECB3233
KEJURUTERAAN ASAS
EQUIVALENT TO ECA 5253

3 Credit Hours

Pre-requisite: ECB3133 – Geotechnics

Course Synopsis

In this subject, the application of soil mechanics principles to foundation design will be highlighted. The course covers the following topics; site investigation, shallow foundation; deep foundation; soil dynamic; foundation instrumentations and field testing; and machine foundation.

References

1. Bujang Kim Huat, Faisal Hj Ali, Hussaini Omar, Haruant Sigh (2006), Foundation Engineering; Design and construction in tropical soil. Taylor & Francis group.
2. Das, B.M (Sixth ed), Principles of Foundation Engineering, Thomson, California.
3. Tomlinson and Michael, J. (1995), Pile Design and Construction, 6th. Edition. John Wiley and Sons, New York.
4. Bowles, J.E (1996), Foundation Analysis and Design, MacGraw Hill International editions.

TRANSPORTATION ENGINEERING ECB3243
KEJURUTERAAN TRANSPORT
EQUIVALENT TO ECA 3243

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is a compulsory course that will expose students to the fundamental theory of Transportation Engineering. The content of the course gives knowledge, understanding and synthesis in major field of transportation engineering. This course emphasize on traffic engineering studies, traffic flow characteristics, traffic control, traffic management, traffic analysis techniques, transit operation and public transport, parking, transportation safety, transportation system issues and challenges. Students are required to carry out field experiments besides attending lectures and tutorials. Students are required to write reports on all experiments, analyse and solve problems related to experiments and tutorials. Besides, the students are required to carry out mini project in groups.

Course Outcomes

At the end of this course students able to:

1. Identify, analyze, design and summarize road traffic control and management system (C6, A5).
2. Recognize and distinguish traffic engineering studies; demonstrate and analyze the traffic flow characteristics (C5, A4).
3. Describe and express the concept of transit operation; prepare, classify and design the public transport and parking facilities (C4, A3).
4. Express the importance of transportation safety, identify the deficiencies in transportation system and recommend countermeasures to overcome the deficiencies in transportation system (C6, A4).

References

1. Garber, N.J. and Hoel, L.A. (2010). Traffic and Highway Engineering. SI Ed. Cengage Learning.
2. Banks, J.H. 2002. Introduction to Transportation Engineering. 2nd Ed. McGraw-Hill.
3. Kutz, M. Handbook of Transportation Engineering. 2004. McGraw-Hill.
4. Wright, P.H. and Ashford, N.J. 1998. Transportation Engineering: Planning & Design. 4th. Ed. New York: John Wiley.
5. ArahanTeknikJalan 13/87-Manual on a Guide to the Design of Traffic Signal. JabatanKerja Raya.
6. REAM GM2/2002 – A Guide on Geometric Design of Roads, Road Engineering Association Malaysia

INDUSTRIAL TRAINING ECB 3354
LATIHAN INDUSTRI
EQUIVALENT TO ECA 3314

Pre-requisite: 60 Credits Hours Completed

Course Synopsis:

Industrial training exposed the students to the real work setting in various industries or military units for 10 weeks. The students are placed in industries or military units that best suit their area of studies. It is an experimental learning that require the students to learn the process and able to apply their knowledge acquired in actual industrial setting. The knowledge acquire during practical training may be used later in final year class as well as to equip them with sufficient knowledge for their job.

Course Outcomes:
Upon completion of this course, students will be able to:

1. Expose students to engineering experience and knowledge, which are required in industry and not taught in the lecture rooms
2. Apply the engineering knowledge taught in the lecture rooms in real industrial situations
3. Gain experience on engineering procedural work flow management and implementation, technical report writing in engineering works/projects to face real problems in engineering field
4. Practice students to responsibilities and code of ethics as engineers

Reference:
Industrial Training Guideline. Industrial Training Committee, Faculty of Engineering, UPNM

STEEL AND TIMBER STRUCTURES DESIGN ECB 4113
REKABENTUK STRUKTUR KELULI DAN KAYU
EQUIVALENT TO ECA 4123

3 Credit Hours

Pre-requisite: ECB 2113 – Mechanics Of Structures

Course Synopsis

This course will provide students with the theoretical understanding and skills in designing steel and timber structures. Students will be educate on the concept and design method used. For steel design, the limit state design concept that based on plastic theory is used to design compression members, tension members, beam, trusses, and connections. For timber structures, the concept of permissible stress that based on elastic theory is used. The topics covered include the design of flexural, compression and tension members. Furthermore, the students will be trained to design using software.

Course Outcomes

Upon completion of this course, students able to:

1. Describe the steel and timber design concept and elaborate the advantages and disadvantages of steel and timber structures compared to other types of structure.
2. Analyse actions on structure, calculate design loads and analyse structural elements.
3. Design steel structures, i.e. beams, columns, and connections, using current code of practice.
4. Design timber structures i.e. beams and columns.
5. Work in a team, to prepare structural design report, drawing plan and structural element detailing, professionally and ethically, and to present it with standard communication skill.

References

1. L.H. Martin & J.A. Purkiss, *Structural Design of Steelwork to EN 1993 and EN 1994 3rd Edition*, Butterworth-Heinemann, UK, 2008.
2. N.S. Trahair, M.A. Bradford, D.A. Nethercot and L. Gardner, *The Behaviour and Design of Steel Structures to EC3 4th Edition*, Taylor & Francis, 2009.
3. British Standard Institution, *BS EN 1990:2002, Eurocode – Basis of Structural Design,* BSI, 2002.
4. British Standard Institution, *BS EN 1991-1-1:2002, Eurocode 1– Actions on Structures,* BSI, 2002.
5. British Standard Institution, *BS EN 1993-1-1:2005, Eurocode 3–Design of Steel Structures- Part 1-1: General Rules & Rules For Buildings,* BSI, 2005.
6. British Standard Institution, *BS EN 1993-1-1:2005, Eurocode 3–Design of Steel Structures- Part 1-8:Design of Joints,* BSI, 2005.

ENVIRONMENTAL ENGINEERING ECB 4123
KEJURUTERAAN ALAM SEKITAR
EQUIVALENT TO ECA 5143

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This course covers broad aspects of environmental pollution and control. Students are exposed to subject matters related to water, air and soil pollution. Sources, effects, engineering control measures and related laws and regulations are discussed. Other topics include solid and hazardous waste management, environmental impact assessment and environmental management system.

Course Outcomes

At the end of this course students able to:

1. Identify and discuss on pollutants and their effects to environment especially human.
2. Understand some concepts related to pollutant dispersion and self cleansing of environmental system.
3. Identify and make simple design of pollution control methods or equipment.
4. Understand some of the Malaysian laws and regulations pertaining to environmental pollution control and concepts of environmental impact assessment and environmental management system.

References

1. Davis, M.L and Cornwell, D.A, Introduction to Environmental Engineering, 4th Edition, McGraw Hill, (2008).
2. Peavy, H.S, Donald, R.R and George, T, (1985), Environmental Engineering, McGraw Hill, 1985RC & Steel Design
3. Environmental Quality Act and Regulations (Act 127)

INFRASTRUCTURE DESIGN PROJECT (CAPSTONE 1) ECB 3252
PROJEK REKABENTUK STRUKTUR INFRA
EQUIVALENT TO ECA 3252

2 Credit Hours

Pre-requisite: NIL

Course Synopsis

This course is tailored to expose and familiarize students to relevant design code requirements for civil engineering/infrastructure works. The subject focuses on the implementation of infrastructure design and technical report writing of the proposed projects. Working in groups, student will simulate design team effort preparing local authorities submission procedures for approval of infrastructure works. The content on this subject covers basic infrastructure such as earthworks design, road and drainage design, water reticulation design, sewerage reticulation design and environmental management pertaining to impact assessment.

Course Outcomes

At the end of this course students able to:

1. Able to use code of practice, manual and guidelines to perform earthworks design, sewerage water reticulation design, external water reticulation design, and drainage system design and perform EIA report.
2. Able to work in a project team and produced a technical report on the project.
3. Able to present information and express idea clearly through oral modes

References

1. AktaJalan ,Parit and Bangunan 1974.
2. Urban Strom Water Management Manual (MASMA), 2001.
3. MWA Design Guideline for water supply system, 1992.
4. ArahanTeknikJalan

FINAL YEAR PROJECT 1 ECB4192
PROJEK TAHUN AKHIR 1
EQUVALENT TO ECA 4142

2 Credit Hours

Pre-requisite: Student has taken 80 credits of Core Faculty and Core Programme.

Course Synopsis

All students are required to conduct a final year project for 2 semesters before graduating. Students are required to identify problem(s) related to their project, propose solution to the problem(s), and gather relevant information to solve the problem(s). The Final Year Project 1 introduces the research methodology to students. Students are required to initiate a research on a selected topic in a systematic manner, conduct intensive literature review, propose solution(s) to the problem (s) and write a project proposal. Students are required to present their project proposal.

Course Outcomes

At the end of this course students able to:

1. Understand, seek and define the research topic, objectives and scope of work. (C3, A3).
2. Search information related to research project. (C5, A4).
3. Design the project methodology to achieve the expected outcome. (C6, P7).
4. Write a proper project proposal report and technical abstract. (C6, A5).
5. Present information and express ideas clearly, effectively and confidently through written and oral modes. (C6, P5).

References

Students are expected to find their own reference materials.

ENGINEERING CONTRACT, ESTIMATION AND ECONOMY ECB4252
KEJURUTERAAN KONTRAK, ANGGARAN DAN EKONOMI
EQUIVALENT TO ECA 4233

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This course consists of three parts. The first part will expose students to the introduction of the construction contracts, types of tender, tendering process and the preparation of tender documents, and strategy in tendering. Meanwhile, the second part covers the introduction to the methods of estimating and the preparation of the Bill of Quantities for construction project. The third part will expose student to the engineering economy.

Course Outcomes

At the end of this course students able to:

1. Able to apply the basic knowledge regarding construction tender and contract.
2. Able to estimate the cost of building elements and civil engineering works
3. Able to do basic calculation in engineering economy
4. Able to understand cost concept in engineering works
5. Able to work in a team or individually to solve problems and produce written report

STRUCTURAL DESIGN PROJECT (CAPSTONE II) ECB4262
PROJEK REKABENTUK STRUKTUR
EQUIVALENT TO ECA 4153

2 Credit Hours

Pre-requisite: ECB 3213 – Reinforced Concrete Design 2, ECB 4113 – Steel and Timber Structures Design & ECB 4162 – Infrastructure Design Project (Capstone 1)

Course Synopsis
This course is to provide an understanding and skills in designing civil engineering structures. In this course, students will be trained to work effectively in a team and will be able to carry responsibility for individual task. Furthermore students will be trained to produce report and present the project with effective communication skill. The students will either continue the project given from previous Capstone 1 course project, or from new requirement, new sketch, or site visit to a proposed new building project. For Capstone 2, students are required to start with preparing design concept for a structure. Then to prepare functional and structural layout plan, to analyse and design the structure, and detailing on the structural elements. The students are also required to produce sample take-off sheet, cost estimation and project planning and scheduling.

Course Outcomes
At the end of this course students able to:

1. Prepare structural design concept base on client requirement including preparing functional and structural layout plan. C4, P2
2. Analyse and design selected structure including drawing and detailing. C5, P4
3. Produce sample take-off sheets and performed cost estimation. C3
4. Professionally prepare full report including plan for project implementation. C6, P3

References

1. Martin, L.H. &Purkiss, J.A. 2006. Concrete Design to EN 1992, 2nd Ed. Oxford: Butterworth-Heinemann.
2. Mosley, B., Bungey, J., & Hulse, R. 2007. Reinforced Concrete Design to Eurocode 2, 6th Ed. Hampshire: Palgrave Macmillan.
3. Hibbeler, R.C. 2006. Structural Analysis. 6th. Edition SI. Singapore: Prentice-Hall.
4. British Standard. 2004. BS EN 1992-1-1:2004, Eurocode 2: Design of Concrete Structures. London: BSi.

FINAL YEAR PROJECT 2 ECB4294
PROJEK TAHUN AKHIR 2
EQUIVALENT TO ECA 4244

4 Credit Hours

Pre-requisite: ECB4192 – Final Year Project 1

Course Synopsis

All students are required to conduct a final year project for 2 semesters before graduating. Students are required to identify problem(s) related to their project, propose solution to the problem(s), and gather relevant information to solve the problem(s). The Final Year Project 2 is the extension of Final Year Project 1. Students are required to complete data collection and analysis, write a dissertation and technical paper. Students are required to present their findings.

Course Outcomes

At the end of this course students able to:

1. Conduct research in a systematic way. (P7, A4).
2. Interpret, analyze, discuss and make conclusion based on the research findings. (C6, A4).
3. Write a good thesis and technical paper based on the research. (C6, A5).
4. Present information and express ideas clearly, effectively and confidently through written and oral modes. (C6, P5).

References

Students are expected to find their own reference materials.

SINOPSIS KURSUS ELEKTIF PROGRAM
SARJANA MUDA KEJURUTERAAN AWAM

INTRODUCTION TO BLAST LOADING, DESIGN AND DEMOLITION ECB 5213
PENGENALAN KEPADA DAYA LETUPAN, REKABENTUK DAN KEMUSNAHAN

3 Credit Hours

Pre-requisite: NIL

Course Synopsis:

This course is designed to give a basic knowledge to students on the nature and effects of blast loading and the design of structures to resist such loading. In this course, students will be exposed to the types and nature of blast loading (i.e. air blast, internal blast, underground shock, and underwater explosion), structural response and the design concept used to mitigate the effects of blast loading (including introduction to the TM1300 code). At the end, the course will look at techniques in explosive as well as mechanical demolition of structures.

Course Outcomes
At the end of this course students able to:

1. Understand type of explosive used for demolition of building structure.
2. Explain the fundamental of balst and effect of structure.
3. Be able to describe the demolition technique using explosive

References:

1. G. Mays*(Ed)*. Blast Effects on Buildings: Design of Buildings to Optimize Resistance to Blast Loading. Thomas Telford, 1995.
2. Baker, *et al*. Explosion Hazards and Evaluation. Elmsterdam. 1983
3. Military Engineering Volume IX. Assessment, Strengthening, Hardening, Repair and Demolition of Existing Structures. Army Code No. 71523. Ministry of Defence, UK, 1992.

INTRODUCTION TO BRIDGE ENGINEERING ECB 5113 (PENGENALAN KEPADA KEJURUTERAAN JAMBATAN)

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This elective course introduce students to the basic concepts, theory and procedures for analyzing and designing various bridges' elements based on several code of practice such as British Standard, and Eurocodes. This syllabus covers topics on introduction to basic function, types and arrangement of bridges, general types of bridge loadings, effects temperature and shrinkage, bridge deck analysis, design of substructure. Furthermore the students will be exposed to design concepts and construction of prestressed concrete bridge, long span bridges (suspension bridges and cable-stayed bridges) and also other two types of bridges military; portable bridges and floating bridges. Besides, students also have to work in group and are required to conduct a mini design project, where they are asked to analyse, and design a given structures using computer software.

Course Outcomes

At the end of this course students able to:

1. Define and describe the function, types and basic arrangement of bridges, general types of bridge loadings, dan effects temperature and shrinkage.
2. Identify, calculate and analyse the applied loads on bridge deck based on two code of practice which is British Standard, and Eurocodes. Also, analyse, and design bridge substructure such as abutment and pier.
3. Explain design concepts and construction of prestressed concrete bridge, long span bridges (suspension bridges and cable-stayed bridges) and also other two bridges military; portable bridges and floating bridges.
4. Work in a team, seeking contemporary knowledge to prepare bridge design report, drawing plan and bridge element detailing, professionally and ethically, and to present it with standard communication skill.

References

1. M Imran Rafiq (2009). Bridge Deck Loading and Analysis. University of Surrey, UK.
2. M Imran Rafiq (2009). Prestressed Concrete Bridge Design. University of Surrey, UK.
3. Ryall, M.J.; Parke, G.A.R. and Harding, J.E. (2001). Manual of Bridge Engineering, Published by Thomas Telford, UK.
4. BS 5400-1:1988. Steel, concrete and composite bridges - Part 1: General statement. London: BSi.

NUCLEAR, BIOLOGICAL AND CHEMICAL CONTAMINATION ECB5123
PENCEMARAN NUKLEAR, BIOLOGI DAN BAHAN KIMIA
EQUIVALENT TO ECA 5213

3 Credit Hours

Pre-requisite: NIL

Course Synopsis

This is an elective course introducing students to nuclear, biological and chemical (NBC) pollution. The pollutants or agents are either planned or accidentally released to the environment. It wil discuss on causes and sources, main effects/symptoms of the pollution. It will also discuss on basic methods and procedures of detection, decontamination and protection. Main equipments for detection, protection and decontamination will also be discussed especially for the safety of military personnel or public.

Course Outcomes

At the end of this course students able to:

1. Describe the properties and concepts of how NBC agents affecting human and the environment.
2. Explain and utilize the standard procedures of marking contaminated site and identify the decontamination methods and procedures
3. Identify and solve problems on basic principles of transmission, dissemination and detection of the agents and the factors affecting the spread.
4. Plan strategies and the steps need to be taken during NBC contamination for self and mass protection.

References

1. Davis, M.L and Cornwell, D.A, Introduction to Environmental Engineering, 4th Edition, McGraw Hill, (2008)
2. Malaysia Environmental Quality Act and Regulations (Act 127)
3. Woodside, G, Hazardous Materials and Hazardous Waste Management
4. Yadav, M.S, Nuclear Weapons and Explosions, Environmental Impacts and Other Effect.