

Faculty of Civil Engineering & Earth Resources

INTRODUCTION

The faculty of Civil Engineering & Earth Resources (FKASA) was established in 2002 and had its first intake of student in July 2003. Civil engineering involves the assesment, planning, design, construction, operation and maintenance of physical infrastructures such as roads, buildings, water supply system, airports, port bridges and tunnels. All these infrastructures meant to improve the quality of human life.

FKASA offers academic programs which are relevent to the need of the industry. At present, we run three (3) undergraduate programs i.e. Bachelor of Civil Engineering (BAA), Bachelor of Civil Engineering Technology (Infrastructure Management) (BTC) and Diploma in Civil Engineering (DAA)

Objectives of the faculty

The faculty was established with the following objectives:

- To produce and train of graduate engineers in the field of civil engineering.
- To conduct researchs in construction related field relevent to the needs of the industry..
- To become a center of excellence in civil engineering particulary in the East Coast of Peninsular Malaysia.
- To play a role in the East Coast Economic Regional (ECER) development by organising technological exchange and continual training programmes.

Vision of the Faculty

To be a world-class faculty in technological education in civil engineering.

Mission of the Faculty

We strive to provide excellent and innovative academic programmes which are adaptable to stakeholders' expectation, to produce highly competitive graduates through teaching, learning , research and innovation in line with the vision and mision of the University.

Curriculum Design

The academic curriculum is designed based on the following criteria:

- Faculty vision and mission
- Programme educational objectives (PEOs)
- Programmes Outcomes (POs)

- Course Outcomes (COs)
- Lesson Outcomes (LOs)

The curriculum is design in line with the vision and mission of the university. Various stake holders are communicated through various meant to give feedbacks and the type of curriculum so that they are relevant to the industry.

Teaching-Learning Methods

Lectures are conducted for most of the offered courses while tutorials are specifically designed for particular courses which require analysis and calculation. A two credit hours course for instance will be delivered by a 1+1 lecture session (50 minutes/session) or a 1+2 comprising 1 lecture session and 1 tutorial session (1 hour and 50 minutes per session). Similarly a three credit hours course will be delivered by a 1+1+1 or 1+2 lecture sessions or a 2+1 comprising 2 continuous lecture sessions (1 hour and 50 minutes) and 1 tutorial session. The lecture sessions are made compulsory for the undergraduates to achieve technical abilities, be alert of contemporary issues and understand the effect of technical solutions on economy, environment and society at global scale. Lectures are conducted in appropriate lecture hall (DK) that can accommodate 60 to 90 students per session and tutorials are conducted in lecture room (BK) that can accommodate up to 40 students. At present, the university has three lecture theatres that have seating capacity up to 250 students.

Laboratory courses are designed to ensure the ability of students to conducting experiments, analyze and interpret data. Laboratory sessions are conducted in group typical 5 person per group. Although material and equipment are red and set by the technical staff, students are required to read the lab manual before coming to lab. At the beginning of every lab session, a short briefing will be given and then students have to conduct the experiment themselves. Although some programme require the lab report to be submitted in group, every group member is assigned specific task which is used to measure the CO of individual student.

Computer laboratory for teaching computation skill, programming and language related courses are also provided for 30 to 60 students per 1 hour and 50 minutes session. University courses offered by Centre of Modern Languages and Social Sciences (CMLSS) for instance emphasise on communication skill (oral and writing).

To ensure that the assessment plan and target could be achieved, lectures are encouraged to use variety of teaching methods such as problem based learning, cooperative learning and student centered learning (SCL). The students could gain the required knowledge but are also going out with good

character, attitude and skills. As part of the CQI process, lectures performance are assessed regularly every semester by the students to get feedbacks particularly with regard to the effectiveness of the delivery mode used by the academic staff.

The evaluation of the courses and program consists of a series of coursework and final examination. The course work assessment is conducted through the semester while the final examination is set in final semester. The course work consist of test , assignment, project paper etc.

Emphasis to the Students

The necessity for strong soft skills which comprises of critical thinking, problem solving skills, leadership, positive values, team working, language proficiency and communication skills is highly emphasized for students' learning. The issue of soft skills acquisition is critical as the future industry leaders in Malaysia are expected to be equipped with both technical and leadership skills in order to be at the top. Realising the importance of soft skills, the faculty requires all students to pass two soft skill courses offered during the second and the third year of study. Soft skills elements such as positive values, leadership, team working, communication and learning capability are evaluated. Students who are incompetent are required to attend soft skills clinic as the remedial programme. They need to re-register the courses again if failing the soft skills clinic. All clinics are conducted during selected weekends at suitable locations according to the needs of the clinic. Although these courses are not graded, however students are pushed to prove good conduct according to the desired ethics in order to pass the courses. In addition, specifically designed co-curriculum activities that forms part of the compulsory university courses are offered by the Co-curriculum Unit of the university. These activities emphasize on teamwork and ethics of the students.

Contribution of the Faculty in Industrial Development

As the world is rapidly gearing towards globalisations, the emergence of borderless countries has resulted in greater competition for jobs, thus leading to competitive job market. However, the courses are still conventionally taught by focusing on the development of sound fundamental knowledge. Hence, in order to produce competent local and global engineers, additional values must be incorporated in the academic syllabus. Thus, besides imparting fundamentals knowledge, the programmes are blended with both technical and soft skills as to ensure the graduates are fully competent with industrial requirements. For instance, in civil engineering programmes, laboratory courses are offered as to expose the students to the actual industrial environment. Furthermore, students are encouraged to be involved in design project and participate in exposition/competition whereby they create self-learning activities under the guidance of competent academicians.

PROGRAMMES OFFERED

The faculty offer 2 programm of study for the session 2013/2014

- Bachelor of Civil Engineering (BAA)
- Bachelor of Engineering Technology (Infrastructure Management) (BTC)
- Diploma in Civil Engineering (DAA)

The faculty emphasize the role of stakeholder in the development and improvement of the programs that are conducted. For example, we have identified the following stakeholders which contribute to the program outcomes and graduate employability.

- Student, alumni and parents
- Employer & industry
- University & faculty advisory board/ panel

The faculty has as number of advisory panels to give advise and feedback matters pertaining to academic and graduate employability. Such panels are Board of Studies and Industrial Advisory Panel. The members of the panels meet with the faculty members from time to time for program improvement

The role of these various stakeholders can be explained in Figure I. By having this system of quality management involving all parties, we hope to produce graduates of outstanding quality who possess the required attributes.

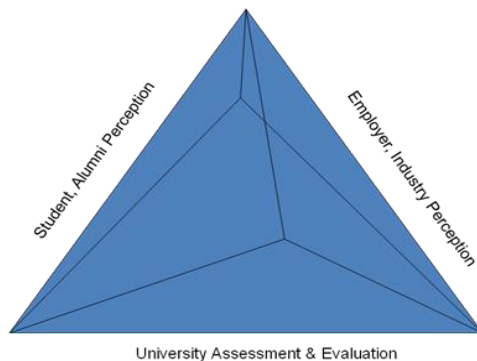


Figure 1 Continual quality improvement (CQI) triangulation process
(Source: EAC)

Outcome Based Education (OBE) Approach

Since middle of year 2006, the faculty had conducted the programmes based

on outcome based education approach (OBE). In the nutshell OBE is the approach that faculty has been adopting as to get the programme accredited and quality/employability of graduates can be improved. OBE is objective driven and after determining the PEOs and POs, we have to set appropriate methods to achieve them. Suitable tools are used to measure and evaluate the attainment of the outcomes and the evaluation results.

DEGREE PROGRAMMES

A. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- i. **BACHELOR OF CIVIL ENGINEERING – BAA**
- ii. **BACHELOR OF ENGINEERING TECHNOLOGY
(INFRASTRUCTURE MANAGEMENT) - BTC**

The program educational objectives of civil engineering program at UMP are to prepare it's graduates to :

PEO 1

Function successfully in a professional environment by utilizing and enhancing their problem solving and communication skills.

PEO 2

Become dynamic, creative and innovative engineers through leadership within sustainable environment in their work place, companies, engineering and civic societies.

PEO 3

Nurture professionals in the fields of engineering and technology who are engaged in life-long learning, stay informed of the emerging technologies and contemporary issues.

B. PROGRAM OUTCOMES (POs)

Degree POs are specific statements regarding graduates' knowledge, skills and attitudes that describe what students are expected to know and be able to perform or attain by the time of graduation. Consistent with world-class engineering programme, the POs for graduates are as follows:

- PO1 **Engineering Knowledge** - Apply knowledge of mathematics, science, engineering fundamentals and an engineering specializations to the solution of complex civil engineering problems;
- PO2 **Problem Analysis** - Identify, formulate, research literature and analyse complex civil engineering problems reaching

substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;

- PO3 **Design/Development of Solutions** - Design solutions for complex civil engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations;
- PO4 **Investigation** - Conduct investigation into complex civil engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data,
- PO5 **Modern Tool Usage** - Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex civil engineering activities, with an understanding of the limitations;
- PO6 **The Engineer and Society** - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional civil engineering practice;
- PO7 **Environment and Sustainability** - Understand the impact of professional civil engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development;
- PO8 **Ethics** - Apply ethical principles and commit to professional ethics and responsibilities and norms of civil engineering practice;
- PO9 **Communication** - Communicate effectively on complex civil engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;
- PO10 **Individual and Team Work** - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;
- PO11 **Life Long Learning** - recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
- PO12 **Project Management and Finance** - Demonstrate knowledge and understanding of civil engineering and management principles

and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments;

DIPLOMA PROGRAMME

A. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

i. DIPLOMA IN CIVIL ENGINEERING (DAA)

In three to four years after graduation, our diploma holders shall possess the following attributes:

PEO 1

Technically Competent ; Produce quality of works at par with counterparts in the global markets

PEO 2

Professionally attached to work place and the societies: Contribute as skillful assistant/associate Civil Engineers with desires to grow intellectually and professionally within local and global environment.

PEO 3

Internalizing Lifelong Learning: Stayed informed to emerging technologies and contemporary issues and challenges facing career in the future

B. PROGRAMS OUTCOMES (POs)

Upon graduation, the graduates shall demonstrate:

- PO 1 Knowledge in required disciplines
- PO 2 Adequate technical and practical competency
- PO 3 Competency to think critically and scientifically
- PO 4 Effective communication skills
- PO 5 Competency to undertake social responsibility
- PO 6 Interest for lifelong learning and information management
- PO 7 Competency in management and entrepreneurship
- PO 8 Professionalism and good values, conduct and ethics
- PO 9 Competency in leadership

LABORATORIES AND FACILITIES

Laboratories at the faculty comprises of all disciplines in civil engineering and earth resources including those for information and computing technologies.

These laboratories are listed as follows:

- Light and heavy structural lab
- Concrete & Material lab
- Highway & traffic lab
- Soil mechanics & geotechnics lab
- Environmental engineering lab
- Hydraulic & hydrology lab
- Surveying lab
- Construction lab
- Computer/CAD/CAE lab

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BACHELOR OF CIVIL ENGINEERING (BAA)

YEAR	FIRST	SECOND	THIRD	FOURTH
SEM	FIRST & SECOND	FIRST & SECOND	FIRST & SECOND	FIRST & SECOND
	BAA1113 Engineering Mechanics	BAA2113 Theory of Structures	BAA2213 Reinforced Concrete Design I	BAA3922 Research Methodology & Pre-Project
	BAA1112 Engineering Drawing	BAA2713 Fluids Mechanics	BAA3813 Hydrology & Water Resources	BAA3223 Steel & Timber Design
	BAA1312 Civil Engineering Materials	BAA2513 Soil Mechanics & Geology	BAA2413 Highway & Traffic Engineering	BAA4513 Foundation Engineering
	BAA1133 Mechanics of Materials	BAA2921 Engineering Laboratory II	BAA3012 Law of Contract & Estimation	BAA4222 Engineer in Society
	BAA1323 Engineering Surveying	BAA2123 Structural Analysis	BAA3921 Engineering Laboratory IV	BAA4023 Project for Professional Practices
	BAA1912 Engineering Surveying Fieldwork	BAA2723 Hydraulics	BAA3213 Reinforced Concrete Design II	BAA4914 Final Year Project
	BAA1931 Engineering Laboratory I	BAA2012 Computer Programming	BAA3023 Project Management in Construction	BAA4*23 Elective 1
	BAA1322 Construction Engineering	BAA2941 Engineering .Laboratory III	BAA3513 Geotechnical Engineering	BAA4*23 Elective 2
	*BAA1331 Engineering Surveying Camp (10 Days)		BAA3312 Building Services & Maintenance	BAA4*23 Elective 3
			BAA3613 Environmental Engineering	
96	19	19	26	26
34	BAA4976 INDUSTRIAL TRAINING (LI) 12 WEEKS			
130	Total Unit For Graduation			
*Course begins in the first semester but total credits are given upon completion of the second semester.				
University Required Courses : Applied Calculus, Technical English, Technical English, Islamic And Asian Civilisations I, Co-Curriculum I&II, Ordinary Differential Equations, Academic Report Writing, Ethnic Relations, Soft Skills 1&2, Applied Statistics, Foreign Languages Level 1&2, Technopreneurship				

BACHELOR OF ENGINEERING TECHNOLOGY (BTC)

YEAR	FIRST	SECOND	THIRD	FOURTH	
SEM	FIRST & SECOND	FIRST & SECOND	FIRST & SECOND	FIRST	
ENGINEERING TECHNOLOGY CORE COURSES	BET1114 Introduction to Engineering Design	BET2483 Problem Solving and Analysis	BAA4222 Engineering Society	BET 4783 Final Year Project 2	
	BET1123 Introduction to Civil Engineering	BET1263 Geology and Geomechanics	BET3583 Engineering Management	BET4774 Technology Design Project	
	BET1142 Introduction to Engineering Surveying	BET2333 Structural and Building Technology	BET3593 Quality Performance Management	BAA4**3 Elective 1	
	BET1253 Introduction to Engineering Problem Solving	BET 1472 Green Technology	BET 2492 OSHA	BAA4**3 Elective 2	
	BET2344 Spatial Science Engineering	BET2413 Accounting for Decision Making	BET3523 Job Organization	BAA4**3 Elective 3	
	BAA1113 Engineering Mechanics	BET2413 Organizational Behaviour	BET3583 Research Methodology	BAA4**3 Elective 4	
	BAA1312 Civil Engineering Materials	BET2371 Construction Engineering	BET2573 Construction Methods		
	BET 1213 Engineering Practice 1	BET3513 Human Resources Management	BET3683 Final Year Project 1		
		BET 1413 Engineering Practice 2	BET3634 Structural Design		
			BET3633 Introduction to Law		
			BET1613 Engineering Practice 3		
	116	24	26	35	19
	29	University Required Courses : Applied Calculus, Technical English, Technical Writing, Islamic And Asian Civilisations 1,Co-Curriculum I&II, Ordinary Differential Equations, Academic Report Writing, Ethnic Relations, Soft Skills 1&2,Applied Statistics, Foreign Languages Level 1&2,Technopreneurship			
	145	Total Unit For Graduation			

*Course begins in the first semester but total credits are given upon completion of the second semester

Elective course to be offer in degree level:

NO.	CODE	COURSE	CREDIT HOUR
1	BAA4223	Pre-Stressed Concrete Design	3
2	BAA4243	Advanced Concrete Design	3
3	BAA4233	Finite Element	3
4	BAA4253	Bridge Engineering	3
5	BAA4313	Geographical Information System	3
6	BAA4823	Facilities & Asset Management	3
7	BAA4713	Advanced Hydraulic Engineering	3
8	BAE4613	Environmental Management	3
9	BAE4443	Waste Management	3
10	BAE4483	Advanced Water & Waste Treatment	3
11	BAE4813	Advanced Hydrology & Water Resources	3

DIPLOMA OF CIVIL ENGINEERING (DAA)

YEAR	FIRST			SECOND			THIRD
	FIRST	SECOND	FIRST	FIRST	SECOND	FIRST	
CIVIL ENGINEERING CORE COURSES	DAA1113 Engineering Mechanics	DAA1123 Mechanics of Materials	DAA2123 Theory of Structure	DAA2213 Structural Design I (Concrete)	DAA3903 INDUSTRIAL TRAINING REPORT		
	DAA1312 Civil Engineering Materials	DAA1723 Fluids Mechanics	DAA2313 Engineering Surveying	DAA2223 Structural Design II (Steel & Timber)			
	DAA1212 Computer Programming	DAA1032 Engineering Drawing	DAA2322 Engineering Surveying Fieldwork	DAA2523 Geotechnical Engineering			
		DAA1022 Project Management	DAA2413 Traffic & Highway Engineering	DAA2612 Environmental Engineering	DAA3909 INDUSTRIAL TRAINING		
60	7	11	15	15	12		
30	University Required Courses : *English For Academic Skills, English For Occupational Communication , Physic, General Chemistry I, Basic Mathematics, Foundation English, *Islamic and Asian Civilisation I, Calculus, Applied Calculus, *Brigid Siswa (Co-Curriculum I), Ethnic Relations, Soft Skills 1&2, Asas Kebudayaan Keusahawanan.						
90	Total Units For Graduation						

BACHELOR OF CIVIL ENGINEERING (BAA)**BAA1112
ENGINEERING DRAWING****Credit : 2 credit****Pre-requisite : None****Synopsis**

This subject aims to expose the students to the civil engineering drawing. Students should be able to describe, discuss and analyze the information and conventions as presented in the civil engineering drawings. The learning approach of civil engineering drawings is integrated through a series of hands-on tutorial. The students should be able to draw engineering drawings through selected exercises manually and generate engineering drawings using the application of software packages such as AutoCAD and Autodesk Revit

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Sketch isometric, orthographic and sectional drawings
- CO2 Draw detail drawings and write specifications
- CO3 Read structural, geotechnical, infrastructural and architectural drawings
- CO4 Generate civil engineering drawing using Autodesk software

**BAA1113
ENGINEERING MECHANICS****Credit : 3 credit****Pre-requisite : None****Synopsis**

The subject in Engineering Mechanics is the fundamental of all courses in engineering, which requires students to have basic knowledge in both statics and dynamics. The emphasis is on the

development and correct application of the fundamental concepts of rigid body mechanics. Topics covered covered for both statics & dynamics are force system resultant condition of equilibrium, centroid, moment of inertiam force and acceleration, work and energy.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition.
- CO2 Determine the location of centroid and moment of inertia for a body of arbitrary shape.
- CO3 Analyze the kinematics of motion that involves force & acceleration and work & energy principle.
- CO4 Analyze the mechanics of impact by applying the linear impulse and momentum principle.

**BAA1312
CIVIL ENGINEERING MATERIALS****Credit : 2 credit****Pre-requisite : None****Synopsis**

This subject is compulsory and basic subject which will introduce students to the material that been used in construction industry. Students will be exposed to the knowledge on the basic characteristic of each material together with the testing method to determine the material strength. Student who is able to complete this course successfully, would be able understand easily the terms and materials related to construction project.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Illustrate the types of construction materials commonly used in construction industry
- CO2 Explain the properties, differences, advantages, and disadvantages of materials of materials.
- CO3 Explain the production of materials
- CO4 Explain the method to overcome problem in materials

BAA1133**MECHANICS OF MATERIALS**

Credit : 3 credit

Pre-requisite: BAA1113 Engineering Mechanics

Synopsis

The aims of this course are the study of the behavior of engineering or structural elements subjected to loads. It provides an introduction on elastic stress and strain analysis and axial deformations. Thus, properties and behavior of engineering materials including stress-strain relations. This course also deals with the analysis of direct and torsion shear stresses and their deformation; shear force and bending moment of beam also the stresses in beams; transformations of stresses.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify and analyze the state of stresses, strains and deformation response of elastic solids in the external loading and axially load assemblies.

- CO2 Describe and determine the mechanical behavior of materials under load.
- CO3 Illustrate and analyze the shear-moment diagrams accordingly calculate the bending and shear stress in determinate beams.
- CO4 Identify and solve the principal stresses and angles in plane cases using analytical method and Mohr's circle.
- CO5 Identify and calculate the stresses, deformation and twist of angle of a torsional bar

BAA1323**ENGINEERING SURVEYING**

Credit : 2 credit

Pre-requisite : None

Synopsis

This subject will expose to the civil engineering students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, mass transfer diagram & mass transfer measure and the final setting out for construction work.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify and describe some of the engineering roles in civil engineering works.
- CO2 Perform horizontal and vertical control based on related provision
- CO3 Understand the range of calculations that can be made with surveying data.

**BAA1912
ENGINEERING SURVEYING FIELDWORK**

Credit : 2 credit

Pre-requisite : None

Synopsis

This fieldworks encompasses how to handling survey equipments, carry out linear survey, traverse survey, leveling, establishing the temporary bench mark, detailing survey, techniques of gathering the location of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Organize the small survey work project.
- CO2 Practice significant of survey work harnessing engineering survey techniques based on related provision
- CO3 Use various survey instruments at site.
- CO4 Write report affectively

**BAA1331
ENGINEERING SURVEYING CAMP**

Credit : 1 credit

Pre-requisite :

**BAA1323 Engineering Surveying
BAA1912 Engineering Surveying Fieldwork**

Synopsis

This engineering surveying camp encompasses; carry out horizontal and vertical control survey, detailing survey to locate of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Organize the small engineering survey work project
- CO2 Practice significant of survey work harnessing engineering survey techniques based on related provision.
- CO3 Use various survey instruments at site.
- CO4 Communicate affectively in presentation

**BAA1931
ENGINEERING LABORATORY I**

Credit : 1 credit

Pre-requisite : None

SYNOPSIS

This ENGINEERING LAB I covers material testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

COURSE OUTCOMES

At the end of this course, the students should be able to:

- CO1 Observe and detect the failure from destructive and non-destructive testing.
- CO2 Conduct concrete mix design and produce the output from the design.
- CO3 Conduct tensile strength test and discuss the properties of steel from the test

**BAA2113
THEORY OF STRUCTURES**

Credit : 3 credit

Pre-requisite : BAA1133 Mechanics of Materials

Synopsis

This course will be introduced the principal analysis of statically determinate and indeterminate structures. The course covers the fundamental analysis of determinate structure to determine the determinacy and analysis of deflection and internal forces of beams, trusses and arches. Also to determine the influence line of beam and truss. Hence, to analyze the statically indeterminate beams and frames.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify the stability and determinacy of structures, thus analyze the deflection and slope of determinate beam.
- CO2 Analyze an indeterminate beams and frames to obtain the end moments.
- CO3 Analyze internal force and compute deflection of determinate plane trusses.
- CO4 Illustrate the influence lines diagram and calculate the vertical reaction, shear force and moment.
- CO5 Analyze 3-pinned arch to obtain the internal forces

**BAA2713
FLUIDS MECHANICS**

Credit : 3 credit

Pre-requisite : None

Synopsis

To introduce the fundamental principles of fluid mechanics, the basic equations governing fluid statics and fluid flow, and the methods of solving engineering problems related fluid mechanics

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Describe fluid properties and the fundamental of Fluid Mechanics concepts
- CO2 Analyze fluid mechanics system and devices such as capillary tube viscometer, falling ball viscometer, manometers and piezometers.
- CO3 Apply and analyze Fluid Mechanics theories such as Continuity Equation, Bernoulli's Theorem, Darcy-Weisbach equation , Reynold's Number in fluid mechanics system.
- CO4 Analyze pipeline system problems related in civil engineering.

**BAA1322
CONSTRUCTION ENGINEERING**

Credit : 2 credit

Pre-requisite : None

Synopsis

This compulsory and basic subject will introduce the students to the world of construction industry. As an introduction, students are given information on current construction industry developments including on the safety at construction site and also some details regarding parties that usually involved in construction projects. The students will be taught the basic knowledge on the overall construction process and main elements, that would contribute to the development of a strong and stable structure at the end of construction project. Students who are able to complete this course successfully, will be equipped with basic and fundamental knowledge that civil engineers should have.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Explain about construction engineering, the responsibilities of parties involved in construction project and construction work process
- CO2 Explain the types of temporary work structure and equipments , sub-structure and superstructure in building construction
- CO3 Explain the common construction techniques such as retaining wall, IBS and pre-stressed concrete that being practiced in Malaysia.
- CO4 Explain about highway and bridge construction

BAA2941**ENGINEERING LABORATORY II**

Credit : 1 credit

Pre-requisite : None

Synopsis

This ENGINEERING LAB II covers structural laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

Course Outcomes

By the end of semester, students should be able to:

- CO1 Demonstrate the influence lines diagram and calculate the shear force and bending moment using Muller Breslau Method.
- CO2 Conduct and analyze determinate & indeterminate structure to obtain the internal forces and end moment.

- CO3 Conduct and analyze the arches and cables to determine internal forces, and apply the Euler formula to determine critical load buckling column.

BAA2123**STRUCTURAL ANALYSIS**

Credit : 3 credit

Pre-requisite : BAA2113 Theory of Structures

Synopsis

Structure Analysis is the continuity studies of the Theory of Structures course that exposes the advanced analysis in the civil engineering structures and laboratory works. The course focuses on analyzing the column, statically indeterminate trusses, arches and cables and determines the displacement by using the Stiffness Matrix method for trusses, beams and frames. The principles and methods used to meet the objectives are drawn from prerequisite courses in mechanics, physics and mathematics.

COURSE OUTCOMES

At the end of this course, the students should be able to:

- CO1 Apply the Euler formula to determine the magnitude of the critical load of buckling column
- CO2 Analyze the trusses to determine the internal forces and displacement of indeterminate plane trusses by using the Virtual Work Method
- CO3 An ability to analyze the arches and cables to determine the reactions and internal forces in arches and cables
- CO4 An ability to apply the Stiffness Matrix Method to determine the displacement in trusses, beams and Frames

BAA2723**HYDRAULICS****Credit : 3 credit****Pre-requisite : BAA2713 Fluid Mechanics****Synopsis**

This course will be introduced the concept and use of equations for open drainage and analyses flow (uniform & non-uniform flow) in open channels including the various phenomena such as hydraulic jump and backwater, specific energy concept application, design of water distribution system, analyses of hydraulics machinery principles and dimensional analysis & hydraulic similarity concepts

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Define and analyze the uniform and non-uniform flow in open channels.
- CO2 Identify and analyze the Rapidly Varied Flow (RVF) and Gradually Varied Flow (GVF) phenomena in open channels.
- CO3 Apply and design the water distribution systems using Hardy Cross (Loop) and Node (Branching Pipes) methods with Hazen-William & Darcy Weisbach equations.
- CO4 Identify and analyze the hydraulics machinery principales.
- CO5 Identify and analyze the dimensional analysis and hydraulics similarity concepts.

BAA2513**SOIL MECHANICS & GEOLOGY****Credit : 3 credit****Pre-requisite : BAA1133 Mechanics of Materials****Synopsis**

This course provides an elementary introduction and the basic mechanics necessary for

Geotechnical Engineering. This course aims to provide the basic understanding of the engineering geology, the soil origin and formation, basic soil engineering properties, the soil classification, the compaction of the soil, the effect of water in soil in term of permeability and seepage and also the stresses in the soil mass.

COURSE OUTCOMES

By the end of this course , students will have the ability to:

- CO1 Apply soil/mathematical theory to solve problem given.
- CO2 Prepare soil related graphs/curves/diagrams.
- CO3 Outline the problem given and conduct analysis with proper/appropriate calculation.
- CO4 Acknowledge and express the geological process/output

BAA2941**ENGINEERING LABORATORY III****Credit : 1 credit****Pre-requisite : None****SYNOPSIS**

This ENGINEERING LAB III covers Water and Environmental laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

COURSE OUTCOMES

By the end of this course, students should be able to:

- CO1 Demonstrate Fluid Mechanics system and devices ,apply and analyze Bernoulli's Theorem and compute minor losses due to disruption in normal flow

- CO2 Conduct open channel and apply the equation of flow (uniform & non-uniform flow) in open channels, hydraulic machinery principles and rainfall-runoff relationship.
- CO3 Conduct water/wastewater testing and analyze the sample to determine water quality standard such as turbidity, BOD, COD and TSS

BAA3012**LAW OF CONTRACT & ESTIMATION****Credit : 2 credit****Pre-requisite : None****Synopsis**

The course covers topics of tendering, contract, condition of contract, contract administration / management, contract procurement, estimation, taking-off and the importance of information technology in estimation work.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Describe and analyze the type of construction contracts and tender documents
- CO2 Differentiate types of contracts and propose the right type of contracts to suit the nature of construction.
- CO3 Describe and analyze the type of project delivery in construction.
- CO4 Describe and apply the method of estimation to estimate the cost of construction projects.
- CO5 Analyze and interpret the constructions data to estimate the cost involved in construction projects.

BAA3813**HYDROLOGY & WATER RESOURCES****Credit : 3 credit****Pre-requisite : BAA2723 Hydraulics****Synopsis**

This course will be introduced the hydrology theory derived from the natural process of hydrological cycle. Hydrology introduces the application of hydrological theory to solve problem in water resources engineering. The knowledge in hydrology will be used in planning, development, management and design of water resources project. This course also introduces the knowledge of reservoir management, engineering economy and determination of water demand requirement in water resources planning.

COURSE OUTCOMES

By the end of this course, students should be able to:

- CO1 Define and explain the basic concept of hydrology processes.
- CO2 Analyze and solve rainfall, stream flow, flow routing, runoff, hydrograph, groundwater, evapotranspiration and infiltration problems using various methods.
- CO3 Estimate peak discharge and propose urban drainage using MASMA (Urban Stormwater Management Manual for Malaysia) and Probability Distribution)
- CO4 Describe the physical characteristics of reservoir propose the yield, capacity & reliability of reservoir.
- CO5 Explain and analyze the element in water resources planning such as the economic and financial feasibility of engineering projects and computation of water requirement for irrigation.

**BAA2413
HIGHWAY & TRAFFIC ENGINEERING**

Credit : 3 credit

Pre-requisite : None

Synopsis

Introduction to Highway and Traffic Engineering, Road and Highway Network, and Its Function, Category & Administration, Link Capacity Study and Malaysia Highway Capacity Manual, Road Geometric Design, Junction Capacity and Traffic Control System Analysis, Road Pavement Design, and Public Transport and Traffic Safety Initiatives.

Course Outcomes

By the end of this course, students should be able to:

- CO1 Classifying various types of roads and highways and differentiating users characteristics
- CO2 Designing road link based on Malaysia Highway Capacity Manual and explaining speed, flow and density relationship
- CO3 Creating alternative solutions based on geometric alignment study and pavement structure design
- CO4 Evaluating intersection performance based on MHCM
- CO5 Planning traffic management system with traffic safety and or public transportation goals

**BAA2213
REINFORCED CONCRETE DESIGN I**

Credit : 3 credit

Pre-requisite : BAA2113 Theory of Structures

Synopsis

This course covers the introduction of reinforced concrete design, the limit state principles, ultimate strength analysis and flexural design. Shear, bond and torsion, analysis and design of beams and solid slab, staircases and introduction to axial column design. Code requirements and detailing. Group design project for double storey house

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Design reinforced concrete beam in accordance to the relevant codes of practice in building design.
- CO2 Design reinforced concrete slab in accordance to the relevant codes of practice in building design.
- CO3 Design reinforced concrete staircase in accordance to the relevant codes of practice in building design.
- CO4 Design simple reinforced concrete column with axial load only in accordance to the relevant codes of practice in building design.
- CO5 Design the reinforced concrete structures of a double storey house to the relevant code of practice, manuals and software.

**BAA2941
ENGINEERING LABORATORY IV**

Credit : 1 credit

Pre-requisite : None

Synopsis

This ENGINEERING LAB IV covers Highway and Geotechnical laboratory testing. The experiments

are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

Course Outcomes

By the end of this course, students should be able to:

- CO1 Conduct traffic volume survey and analyze the data.
- CO2 Demonstrate flexible pavement design based on JKR Standard
- CO3 Produce soil related graphs/curves/diagrams.

BAA3023
PROJECT MANAGEMENT IN CONSTRUCTION
Credit : 3 credit
Pre-requisite : None

Synopsis

To introduce the concept of project management which will cover the life cycle of the projects, roles of project manager, type of project organization, resource management, techniques of planning and scheduling, monitoring and controlling and types of software for project planning and scheduling that have been practiced in construction industry.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Explain the concept of project management and project life cycle

- CO2 Describe and explain role of project manager as an important person in construction project
- CO3 Explain and differentiate types of project organization practiced in construction industry
- CO4 Differentiate and apply methods and techniques of resource management
- CO5 Apply and illustrate the appropriate techniques of project planning and scheduling
- CO6 Explain activities involved in monitoring and controlling the project
- CO7 Apply the appropriate software in performing the project planning and scheduling tasks

BAA3513
GEOTECHNICAL ENGINEERING
Credit : 3 credit
Pre-requisite : BAA2513 Soil Mechanics & Geology

Synopsis

Geotechnical Engineering provides students with further discussion and explanation related to soil engineering. The course describes: Soil compression, consolidation and settlement, Lateral pressure of soil, Slope stability, Bearing capacity of soil, Soil improvement and environment geotechnics.

Course Outcomes

By the end of this course , students will have the ability to:

- CO1 Describe the principal tests used to determine the compressibility parameters of soil and use them appropriately.
- CO2 Calculate consolidation and time for settlements of a foundation and embankment.

- CO3 Apply earth pressure theory in the analysis and design of earth retaining wall structure.
- CO4 Analyze slope stability using slip surfaces and method of slices and describe the different methods and materials used for stabilizing slopes
- CO5 Calculate the bearing capacity of a shallow foundation
- CO6 Describe the purpose, basic principle of soil improvement and environmental geotechnics in civil engineering.

BAA3613
ENVIRONMENTAL ENGINEERING
Credit : 3 credit
Pre-requisite : None

Synopsis

Introduction to environmental engineering; physical, chemical and biological processes; water and wastewater treatment; air pollution; solid and hazardous waste; sewage treatment and disposal and treatment plant design.

Course Outcomes

- CO1 Identify and calculate the physical, chemical and biological water quality parameters
- CO2 Illustrate water treatment processes
- CO3 Demonstrate wastewater treatment processes
- CO4 Analyze the environmental pollution such as solid waste, water and air pollution

BAA3312
BUILDING SERVICES & MAINTENANCE
Credit : 2 credit
Pre-requisite : None

Synopsis

This course will provide the fundamental knowledge of engineering design and operating principles of the building services and maintenance in buildings

Course Outcomes

By the end of this course, students should be able to:

- CO1 Discuss the fundamental knowledge of the operating principles of the various building services and maintenance system available in buildings
- CO2 Analyse the engineering design of the integrated building services system as presented in engineering drawings
- CO3 Design selected building service system for a specific building project according to and complying with the engineering policies, regulations, guidelines, manuals, standards and specifications
- CO4 Critique the building services design in a specific engineering project

BAA3213

REINFORCED CONCRETE DESIGN II
Credit : 3 credit
Pre-requisite : BAA2213 Reinforced Concrete Design I

Synopsis

This course covers the column design, foundation design, design project, retaining wall design and introduction to prestressed concrete design and

also typical design of a reinforced concrete building.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Analyze and design reinforced concrete columns.
- CO2 Analyze and design foundations.
- CO3 Analyze and design retaining walls.
- CO4 Describe the application of prestressed beams.
- CO5 Design a four storey building project.

BAA4936

INDUSTRIAL TRAINING

Credit : 6 credit

Pre-requisite :

BAA2723 Hydraulics

BAA2213 Reinforced Concrete Design I

BAA3023 Project Management in Construction

BAA3513 Geotechnical Engineering

BAA3012 Law of Contract & Estimation

Synopsis

This course also involve placement of students in relevant industry for approximate 10 weeks duration to get real-world working experience. Every student will be assigned an advisor/lecturer from the faculty who will co-operate with the industrial counterpart. At the end of the industrial training, students need to submit report. In addition, the respective industrial counterpart need to evaluate and provide comments on the students performances

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Show concern (A3) of safety standards and be aware (A1) of safety and health measures at job place.
- CO2 Behave according to (A3) organisation's regulation and procedures while conforming (A2) to basic professional skill during the available duration.
- CO3 Practice (S3) and contribute (A2) taught theories to solve real-time problem through involvement in various scopes of works such as planning concept, design, construction & project administration.
- CO4 Adjust (A4) to professional and quality work ethnics in order to become an effective, motivated and responsible engineer

BAA4023

PROJECT FOR PROFESIONAL PRACTICES

Credit : 3 credit

Pre-requisite : Must be a 4th year student

SYNOPSIS

Project for Professional Practice is a group project at the Faculty Civil Engineering & Earth Resources, Universiti Malaysia Pahang. Students are grouped in teams of their choice, preferable based on field similar to their Final Year Project. They may opt to pursue the implementation of one or combination of the Final Year project of the team members or propose a new project or take up the project proposed by the Project Director (the supervising lecturer). Based on the directions but with minimal involvement from/of the Project Director, the group plan and design/undertake the project until the completion of an acceptable project outputs (Plans/Feasibility Study /Detail Feasibility/Project Tender reports) depending on the time and budget constraints. The aims of the course are to develop students professional and ethical responsibilities, communicating effectively with multidisciplinary professions and community at large, functioning effectively as an individual and in a group with the capacity to be a leader,

explaining the impact of technology solution in societal, cultural, global, and environmental context, recognizing the needs and posses the capability in life-long learning and to some extends utilizing techniques, skills, and modern engineering tools necessary for technological practice and adaptable to industrial needs, i.e. attributes of PO6 to PO11. Although it is PBL by nature, lectures and e-learning sessions are conducted as to provide general guidance to the groups.

Course outcomes

At the end of this course, the students are expected to fulfill the following **COURSE OUTCOMES**:

- CO1 Develop professional and ethical responsibilities
- CO2 Communicate effectively in-team and with external parties as to share ideas or get feedbacks from the stakeholders
- CO3 Organised projects activities as a group effort
- CO4 Select sustainable practices in the conduct of the project by providing project's alternatives/options
- CO5 Make appropriate **REFERENCES** to the code of practice and/or guidelines
- CO6 Demonstrate techniques, skills, and modern engineering tools necessary whenever applicable

BAA4513

FOUNDATION ENGINEERING

Credit : 3 credit

Pre-requisite : BAA3513 Geotechnical Engineering

Synopsis

This course will introduce the students to aspect of foundation engineering design and analysis. The

topics cover in the subject includes the review of site investigation report data, settlement of shallow foundation, soil improvement and ground modification method, all aspects of deep foundation including single pile and group piles and also earth retaining structure which involves braced cuts and sheet piles. At the end of this course, student should be able to practiced the knowledge gained and solved problems related to geotechnical engineering field.

Course Outcomes

By the end of this course , students will have the ability to:

- CO1 Interpret soil investigation data.
- CO2 Recognize the problem and proceed with the solution by applying the soil and geotechnical fundamentals.
- CO3 Select and assess solution of a problem.
- CO4 Evaluate the soil condition and defend the judgement made.

BAA4222

ENGINEERING IN SOCIETY

Credit : 1 credit

Pre-requisite : None

Synopsis

Qualified engineers of tomorrow will need to be market conscious, commercially adept, environmentally sensitive and responsive to needs of society. They must also be good communicators, organizers and managers. Therefore, this course is designed to enrich the student and intended to introduce students to the professional practice of civil engineering, with emphasis on the roles of practicing engineers, professional practice organization, engineering ethics, professional registration and communication skill. This course will cover three scopes which is technology in society, organization of engineering society and communication. The course features several guest

speakers and all who are civil engineering practitioners and professional, providing the students an opportunity to interact with professionals in their major field of interest. The course also includes topics which are important parts of the civil engineering discipline.

Course Outcomes

By the end of this course, students should be able to;

- CO1 Adopt and show concern to professional, regulation and ethical responsibilities.
- CO2 Ability to function on multi-disciplinary teams and good communication skills.
- CO3 Adopt and show concern the relationship between technology, engineering and environment issues.
- CO4 Ability to apply the aspects of project management and quality in engineering

BAA3223

STEEL & TIMBER DESIGN

Credit : 3 credit

Pre-requisite : BAA2123 Structural Analysis

Synopsis

This course covers the analysis and design steel structures to EC3 for beams, column, connections, trusses, compression members and tension members. This course is also covered an introduction to Timber design to MS544.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Describe the concept & philosophy of steel design, analyse & design connections according to the relevant codes of practice in building design

- CO2 Analyse & design steel beam in according to the relevant codes of practice in building design
- CO3 Analyse and design steel column according to the relevant codes of practice in building design
- CO4 Analyse and design trusses & portal frame based on the relevant code of practice in building design
- CO5 Describe the concept & philosophy of timber design, analyse and design a typical timber structure according to the relevant codes of practice in building design

BAA3322

ENGINEERING ECONOMICS

Credit : 2 credit

Pre-requisite : None

Synopsis

This subject covers the principles and applications of economic analysis in the field of engineering to make sound decision among alternatives.

Course Outcomes

By the end of this course, students should be able to:

- CO1 Realize the importance and role of economic decision in final decision making process of engineering project.
- CO2 Identify the sources of data, and analyze the cost and benefit (financial matter) of engineering project.
- CO3 Analyze the time value of money problem and apply the principles and techniques of engineering economics for effective decision making among alternatives.

BAA3922
RESEARCH METHODOLOGY & PRE-PROJECT
Credit : 2 credit
Pre-requisite :
BAA2723 Hydraulics
BAA2213 Reinforced Concrete Design I
BAA3023 Project Management in
Construction
BAA3513 Geotechnical Engineering

Synopsis

Students are required to attend a research workshop at the beginning of the course, where they will be taught on how to do research; research methodology, conducting literature review, data sampling, collection, analysis, and interpretation. Students will be guided by their respective supervisors on how to plan for the research, which will be conducted later in PSM 2 course. Students will have to carryout weekly discussion with their supervisors on the research topic, objective, scope, research program, and the extent of the development of the research proposal. A report and a presentation of the research proposal are required at the end of the course.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Select topic, identify the objectives, categorize the scope of works and prepare schedule for the implementation of a civil engineering related projects.
- CO2 Choose, review, discuss and interpret issues and problems related to particular project by conducting adequate literature review.
- CO3 Choose, propose, employ, and develop or formulate the appropriate methodology to carry out the experiment and or data collection as to achieve the objectives of an engineering project.

- CO4 Demonstrate, describe, discuss, illustrate, argue and predict about the selected topic, objectives, project approach, schedule, budget and expected outcomes for an engineering project in an oral presentation.
- CO5 Solve and meet all deadlines and project commitments

BAA4914
FINAL YEAR PROJECT
Credit : 4 credit
Pre-requisite : BAA3922 Research
Methodology & Pre-Project

Synopsis

After successfully completing Research Methodology and Pre-Project (BAA3922 – PSM1), students will continue to proceed with the subsequent tasks of the proposed project program. They have to undertake data collection and conduct experiment or survey, tabulate and analyze the results, and conclude their project findings. They must constantly report and carryout discussion with their supervisors on the extent of the development of their project. At the end of the course, students have to submit the final thesis and present their findings to the examiners.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Compose, develop or formulate, arrange and collect the appropriate required data and information as outlines in the proposed project methodology as to achieve the objectives of an engineering project.
- CO2 Arrange, assess and evaluate the results of the project in accordance to the project objectives and proposed methodology while making reference to the literature review or the prevailing standards and specifications.

- | | | | |
|-----|-------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO3 | Argue or support about the fulfillment of the project objectives and recommend for further works. | | including 3D solid modelling using CAD (PO5) |
| CO4 | Demonstrate, describe, discuss, illustrate, argue and predict about the finding of the project in an oral presentation. | CO3 | Preparing reports, drawing and specifications by composing a 3D visualization skills to draw and communicate design ideas and concepts in any preferred course projects (PO3,PO9) |
| CO5 | Assemble the write up about project in an acceptable and professional format. | CO4 | Contribute on team based projects, solve inter team problems and develop communications skills (PO9) |
| CO6 | Solve and meet all deadlines and project commitments | | |

BACHELOR OF ENGINEERING TECHNOLOGY (BTC)

BET1114 INTRODUCTION TO ENGINEERING DESIGN Credit : 4 credit

Synopsis

This course will expose students to the fundamental elements of a good engineering approach to problem solving with strong reference to basic sciences and math skills as well as testing and evaluation ideas by building prototypes (it could be a product, a technique, a structure, a project, a method, a paperwork or many other things depending on the problem). The learning approach of this subjects is a design driven curriculum with emphasis placed on skills such as team based design, communication skills (graphical, oral and written) and computer aided design tools.

Course Outcomes

At the end of this course, the students should be able to:

- | | |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Identify a well design process in any course projects with the ability to extend the design process to general problem solving, and recognize the value of creativity in the engineering design process (PO3) |
| CO2 | Apply basic skills in mathematic, sciences and engineering drawing |

BET1123 INTRODUCTION TO CIVIL ENGINEERING Credit : 3 credit

Synopsis

The course covers on Historical background; Present status and future challenges of civil engineering profession and its role in society; Ethics and professional responsibility; Concepts of analysis, Design; Problem solving, Computational approaches, Experiments; Interpretation of results and decision making; Sustainability; Career opportunities. Field trips may be required.

Course Outcomes

At the end of this course, the students should be able to:

- | | |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Describe what civil engineering is, what you may do as a civil engineer, and the skills required to be a successful civil engineer |
| CO2 | Explain the importance of professional licensure for civil engineers |
| CO3 | Describe the concept of analysis, design; problem solving, computational approaches, experiments; Interpretation of results and decision making its importance to civil engineering, used in civil engineering projects |

CO4 Provide a framework for evaluating ethical behavior which will apply in your engineering career

horizontal and vertical curve, area and volume of construction work project.

CO5 Show the breadth and excitement of the civil engineering profession

**BET1123
INTRODUCTION TO ENGINEERING
SURVEYING
Credit : 2 credit**

Synopsis

This subject will expose to the civil engineering students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, mass transfer diagram & mass transfer measure and the final setting out for construction work.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify and describe the definition and the principle of engineering survey including the engineering surveying roles in civil engineering works [i.e: determination point location technique, coordinate system, read and understand the information shown in site plan].
- CO2 Describe the procedure to perform horizontal and vertical control based on related provision i.e theodolite and traversing and leveling [angle, horizontal distance and vertical distance measurement and cogo computation.
- CO3 Understand the range of calculations that can be made with surveying data i.e An ability to make a necessary calculation to fix position of forming a

**BET1123
INTRODUCTION TO ENGINEERING PROBLEM
SOLVING
Credit : 3 credit**

Synopsis

The course covers the principles in engineering problem solving including discuss and understand the following area engineering failure, procedure for analysis, propose practical remedial measures, preliminary technical report, critical comments, research and finding, recommendation for the solution

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Discuss engineering failure for different types of engineering problems
- CO2 Apply different principle in analysis of engineering failure. Summarized and compare the differences between them.
- CO3 Apply various analysis techniques to solve variety of engineering failures.
- CO4 Implement different remedial and rehabilitation techniques. Selection process base on technical as well as economic point of view.
- CO5 Produce a preliminary technical report for the proposed solution

BET2344
SPATIAL SCIENCE ENGINEERING
Credit : 4 credit

Synopsis

The goal of this course is to give knowledge and understanding about application of Geographical Information System (GIS) in Civil Engineering. The main content of this course is about an application of GIS in civil engineering. Amongst the main topics discussed are;

- a) Fundamental and development of GIS in civil engineering
- b) Data processing such as data collection, data management, spatial analysis, data manipulation and data output.
- c) Current application of GIS in civil engineering (focus in Malaysia)

Course Outcomes

At the end of this course, the students should be able to:

- | | |
|-----|--------------------------------------------------------------------------------------------|
| CO1 | Student will expose to main component of GIS and advantages of GIS in Civil Engineering |
| CO2 | Student able to explore about the data capture , processing and organization spatial data. |
| CO3 | Student able to analyze and solve the spatial problem |
| CO4 | Student able to use GIS software |

BAA1113
ENGINEERING MECHANICS
Credit : 3 credit

Synopsis

The subject in Engineering Mechanics is the fundamental of all courses in engineering, which requires students to have basic knowledge in both statics and dynamics. The emphasis is on the development and correct application of the

fundamental concepts of rigid body mechanics. Topics covered for both statics & dynamics are force system resultants, condition of equilibrium, centroid & moment of inertia; force & acceleration and work & energy.

Course Outcomes

At the end of this course, the students should be able to:

- | | |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition. (C4,A2) (CTPS,LL) |
| CO2 | Determine the location of centroid and moment of inertia for a body of arbitrary shape. (C4,A2) (CTPS,LL) |
| CO3 | Analyze the kinematics of motion that involves force & acceleration and work & energy principle. (C4,A2) (CTPS,LL) |

BAA1312
CIVIL ENGINEERING MATERIALS
Credit : 2 credit

Synopsis

This subject is compulsory and basic subject which will introduce students to the material that been used in construction industry. Students will be exposed to the knowledge on the basic characteristic of each material together with the testing method to determine the material strength. Student who is able to complete this course successfully, would be able understand easily the terms and materials related to construction project.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Illustrate the types of construction materials commonly used in construction industry
- CO2 Explain the properties, differences, advantages, and disadvantages of materials.
- CO3 Explain the production of materials
- CO4 Explain the method to overcome problem in materials.

BET1213
ENGINEERING PRACTICE 1
Credit : 3 credit

Synopsis

This ENGINEERING PRACTICE 1 covers civil engineering material testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Observe and detect the failure from destructive and non-destructive testing. (C3,P3,A3) (CTPS,EM,LS)
- CO2 Conduct concrete mix design and produce the output from the design. (C3,P3,A3) (CTPS,EM,LS)
- CO3 Conduct tensile strength test and discuss the properties of steel from the test. (C3,P3,A3) (CTPS,EM,LS)

BET2483
PROBLEM SOLVING ANALYSIS
Credit : 3 credit

Synopsis

The course covers on engineering problem solving skills and analysis of infrastructure such as water supply, water distribution system, highway and road engineering, geotechnical engineering, foundation engineering, engineering land surveying

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to analyze, design and assess engineering problem related to geotechnical issue such as slope failure
- CO2 Able to analyze, design and assess engineering problem related to foundation engineering such as settlement
- CO3 Able to analyze, design and assess engineering problem related to highway engineering
- CO4 Able to analyze, design and assess engineering problem related to water supply and water distribution system
- CO5 Able to analyze, design and assess engineering problem related to land surveying

BET1263
GEOLOGY AND GEOMECHANICS
Credit : 3 credit

Synopsis

This ENGINEERING LAB IV covers Highway and Geotechnical laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Conduct traffic volume survey and analyze the data. (C4,A3,P4) (CS,CTPS)
- CO2 Demonstrate flexible pavement design based on JKR Standard. (C4,A3,P4) (CS,CTPS)
- CO3 Produce soil related graphs/curves/diagrams. (C4,A4,P4) (CS,CTPS)

**BET2333
STRUCTURAL AND BUILDING TECHNOLOGY
Credit : 3 credit**

Synopsis

This course deals with the fundamental principles governing the structural performance and practical applications of a range of structural systems. The course seeks to synthesise the diverse design requirements of a modern building structure into a strategy for practical design.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Discuss the fundamental principles governing the structural performance and practical applications of a range of structural systems (PO2, CTPS)
- CO2 Criticise / analyse the structural system within the building technology innovation
- CO3 proposed structural system for a specific building technology project

**BET1472
GREEN TECHNOLOGY
Credit : 2 credit**

Synopsis

Introduction to environmentally friendly engineering and technological advances and new technologies that utilize green principles and green transportation. Course includes topics in new areas of green manufacturing and materials used today and planned for the future, including the operation and manufacture of solar cells and the production of wind, thermal, and hydroelectric power. Topics will vary depending upon new trends in industry. Several experiments related to green technology were exposed in this subject

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Describe the ethics and responsibilities as engineer towards green environment and expose to environmental legislation and regulation practices in Malaysia.
- CO2 Describe the principle of green chemistry, review problems and its solving involving green technology applications
- CO3 Analyze the concept involved in green management, policy, and economics
- CO4 Demonstrate professionalism behavior in conducting laboratory, ethics and good communication skills

**BET2423
ACCOUNTING FOR DECISION MAKING
Credit : 3 credit**

Synopsis

The course covers the fundamental concept for understanding the purpose of accounting and how the system provides information about business activities. This course will assist the student to

understand the language of business and make wise financial choices in business operation

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to understand the language of business and the role of accounting information in business
- CO2 Able to understand how an accounting system is designed
- CO3 Able to understand the role of different accounting informations in the production of different types of decisions
- CO4 Able to analyze the importance of financing, investing, and operating activities to the business
- CO5 Able to analyze the measurement of effectiveness and efficiency in evaluating business decisions and performance

BET2413

ORGANIZATIONAL BEHAVIOUR

Credit : 3 credit

Synopsis

The course covers on wide breadth of theories and applications dealing with such topics as perception, motivation, decision making, team dynamics, negotiation, conflict management, leadership, and organizational culture. Twelve lessons, covering twelve chapters in the textbook, are presented in a logical order to create a sense of progression for the learner. Each lesson builds upon previous lessons by starting at the individual level, then moving on to a team level, and finally adopting an organization-wide level of analysis. The goal of this course is to help students develop a conceptual understanding of OB theories and to provide students with skills to put those ideas and theories into practice. Key techniques and

processes designed to improve organizational efficiency and effectiveness are fully examined from the perspective of management, workers, and society at large."

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to comprehend field of organizational behaviour, individual behaviour, personality, and values
- CO2 Able to understand perception and learning in organizations, workplace emotions, attitudes, and stress
- CO3 Able to comprehend foundations of employee motivation and applied performance practices
- CO4 Able to understand decision making and creativity in team dynamics
- CO5 Able to analyze conflict and negotiation in the workplace and leadership in organizational settings

BET2413

CONSTRUCTION ENGINEERING

Credit : 3 credit

Synopsis

The course covers various construction techniques for infrastructure such as water supply, water distribution system, highway and road engineering, drainage, foundation, slope and bridges.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to identify and demonstrates various construction techniques for highway and roads structures
- CO2 Able to identify and demonstrate various construction techniques for foundations Construction
- CO3 Able to identify and demonstrate various construction techniques for drainages construction
- CO4 Able to identify and demonstrate various construction techniques for water supply and water distribution system
- CO5 Able to identify and demonstrate various construction techniques for bridges

BET3513
HUMAN RESOURCE MANAGEMENT
Credit : 3 credit

Synopsis

This course is designated to expose to students various management skills and good practices in human resources related works. The project work is carried out independently and in a team. Student must be able to carry out assigned tasks.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to demonstrate the knowledge for human resources development
- CO2 Able to organize human resources recruitment
- CO3 Able to demonstrate professionalism behavior and good communication skills in human resources management

BET3513
ENGINEERING PRACTICE 2
Credit : 3 credit

Synopsis

This ENGINEERING PRACTICES 2 covers structural laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Conduct and Illustrate the influence lines diagram and calculate the shear force and bending moment using Muller Breslau Method. (C3,P3,A3) (CTPS,EM,LS)
- CO2 Conduct and analyze determinate & indeterminate structure to obtain the internal forces and end moment. (C3,P3,A3) (CTPS,EM,LS)
- CO3 Conduct and analyze the arches and cables to determine internal forces, and apply the Euler formula to determine critical load buckling column. (C3,P3,A3) (CTPS,EM,LS)

BET3583
ENGINEERING MANAGEMENT
Credit : 3 credit

Synopsis

This course provides the basic requirement and best practices of management in engineering organizations, namely at Government Agencies, Consultancy Firms and Construction Companies. It covers technical knowledge with basic business and management techniques. The practical modules produces engineers that meet management responsibilities, formulate

meaningful business ideas and take into account on the requirement in leadership role as to face challenges in a competitive environment.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify formal structure requirement for engineering operation activities
- CO2 Discuss various management methods available of engineering related agencies and companies
- CO3 Practice the functions of a management team
- CO4 Analyse the way an engineering organization functions

BET3593 **QUALITY PERFORMANCE MANAGEMENT** **Credit : 3 credit**

Synopsis

Techniques of establishing and maintaining quality of product including statistical quality control applications.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Analyze the productivity in an organization by using productivity concept and fundamentals.
- CO2 Select layout design based on layout design procedure location and basic layout design by taking into account the impact of sustainable environment

CO3 Analyze production planning, control and inventory management activities based on given cases.

CO4 Evaluate solutions for a given cases based on total quality management systems, quality control concept ISO 17001.

BET3593 **OCCUPATIONAL SAFETY & HEALTH** **ADMINISTRATION (OSHA)** **Credit : 2 credit**

Synopsis

Occupational Safety and Health Administration (OSHA) safety guidelines including electrical, chemical, and hazardous material safety. Ergonomic considerations to include repetitive motion, plant layout, and infrastructures management. Industrial safety awareness, accident cost and prevention, and workman's compensation issues.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Explain safety practices and procedures
- CO2 Describe commonly used tools, instruments and equipment in infrastructure management
- CO3 Evaluate industrial environments for workplace hazards
- CO4 Produce a safety hazard analysis
- CO5 Describe issues related to employee safety

BET3523
JOB ORGANIZATION
Credit : 3 credit

Synopsis

The course outlines the principles of modern civil engineering construction management, and develops skills in the taking off of quantities, the preparation of engineering estimates and the preparation of construction programmes. Aspects of contract supervision are examined, particularly the use of the Australian Standard General Conditions of Contract. The on-site supervision of civil construction work is covered, including the aspects of job safety and industrial relations.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to describe and use current practices in job planning and scheduling, contract administration and job control used in civil engineering construction;
- CO2 Able to take off quantities from construction plans, prepare estimates, and programme construction works using techniques to balance resources, labour and cash flow;
- CO3 Able to manage a simple engineering contract which has as its basis a nationally recognised standard General Conditions of Contract;
- CO4 Able to 4. organise a simple construction job effectively in regard to the site management of materials, plant, labour, safety and costs;
- CO5 Able to analyze conflict and negotiation in the workplace and leadership in organizational settings

BET3583
RESEARCH METHODOLOGY
Credit : 3 credit

Synopsis

The course provides students with the ability to evaluate research literatures in order to determine the current state of knowledge. In addition, the course will instruct students in the principles of research to enable them to conduct research and prepare an original project in their professional area of interest.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to propose and justify an appropriate research plan for particular research problem
- CO2 Able to choose and apply appropriate methodology for particular research problem
- CO3 Able to choose and apply appropriate methodology for particular research problem
- CO4 Able to apply techniques for writing clear and well expressed technical papers and reports
- CO5 Able to judge the logical consistency of written material

BET2573
CONSTRUCTION METHODS
Credit : 3 credit

Synopsis

The course covers various construction techniques for infrastructure such as water supply, water distribution system, highway and road engineering, drainage, foundation, slope and bridges.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Able to identify and demonstrates various construction techniques for highway and roads structures
- CO2 Able to identify and demonstrate various construction techniques for foundations Construction
- CO3 Able to identify and demonstrate various construction techniques for drainages construction
- CO4 Able to identify and demonstrate various construction techniques for water supply and water distribution system
- CO5 Able to identify and demonstrate various construction techniques for bridges

BET3683**FINAL YEAR PROJECT 1**

Credit : 3 credit

Synopsis

This course is designed to expose the students to a senior design project. They have to apply all the knowledge that they have learned in the programme to complete the senior design project. Each student will be supervised by at least one lecturer or two lecturers (main supervisor and co-supervisor). During the senior design project I, the students will be able to do a literature survey and prepare a draft which contains objective of the project, problem statement, literature survey, solving techniques, methodology, expected result, treatment of results and list of reference publications. At the end of this subject, the students are required to present the draft in a short seminar which will be evaluated by a faculty's panel.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Propose background study, problem statement, objective and scopes of the research
- CO2 Present the research proposal and cited latest publications on the subject

BET3634**STRUCTURAL DESIGN**

Credit :4 credit

Synopsis

This course examines the role of structural engineers and the structural knowledge that project managers require to effectively manage and supervise projects and to be able to interact with and manage structural engineers as part of the design team. This includes the development of an understanding of structural principles by introducing students to the loads acting on simple and complex structures and demonstrating how these loads are supported by structural members and transmitted to footings. Students are provided with an appreciation of the structural behaviour of common structural systems and temporary structures through the calculation of internal structural forces and moments. Students also develop an understanding of typical structural design documentation with a focus on structural drawing and specification details.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Recognise the main structural principles that project managers need to know to effectively manage and supervise construction projects
- CO2 Interpret and utilise structural design documentation

CO3 Calculate loads on simple structures

CO4 Analyse reactions, shear forces, bending moments in basic structural components and deflections in simply supported and continuous beams

BET3643

INFRASTRUCTURAL MANAGEMENT

Credit :3 credit

Synopsis

This subject is a compulsory and basic subject for students to understand the basic principles and techniques of infrastructure management. The course focuses on basic principles across the breadth of the infrastructure management body of knowledge, and covers the key concepts in managing a infrastructure project from its initiation to final closeout.

The course reviews infrastructure management processes in an organized framework, with an emphasis on tools that enable the concepts to be applied directly into the working environment.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Define Infrastructure management concept and Objective the learning of Infrastructure Management subject.

CO2 Apply the collection data for proposal of infrastructure design such as survey data, geotechnical data etc

CO3 Demonstrate the services requirement for infrastructure development such as TNB, Telekom, JPS, pavement, IWK etc. Apply the basic requirement in preparation of design proposal referring Akta Parit, Jalan dan Saliran dan Akta Undang-undang kecil Bangunan

CO4 Apply infrastructure software to demonstrate or illustration the final finding of infrastructure construction. Experiencing the construction stage of infrastructure form Site Possesion until Project Closeup.

CO5 Apply the project management in handling infrastructure project and estimating the project cost. Implementation the realise the infrastructure project planning for any construction.

BET3633

INTRODUCTION TO LAW

Credit :3 credit

Synopsis

The course covers on The course covers law of contract documentation, law on tendering procedure, contract law administration, traditional contract law procurement, design and build contract law, turnkey contract law, management contract law.

Course Outcomes

At the end of this course, the students should be able to:

CO1 Able to interpret and estimate construction law involves in construction projects

CO2 Able to handle any works related law of contract in constructionApply the collection data for proposal of infrastructure design such as survey data, geotechnical data etc

CO3 Able to prepare the construction law contract and law tender documents

CO4 Able to differentiate traditional contractual law and design & built contract law

- CO5 Able to understand law related to construction dispute and litigation procedures

BET1613
ENGINEERING PRACTICE 3
Credit :3 credit

Synopsis

This ENGINEERING PRACTICE 3 covers Highway and Geotechnical laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Conduct traffic volume survey and analyze the data. (C3,P3,A3) (CTPS,EM,LS)
- CO2 Demonstrate flexible pavement design based on JKR Standard. (C3,P3,A3) (CTPS,EM,LS)
- CO3 Produce soil related graphs/curves/diagrams. (C3,P3,A3) (CTPS,EM,LS)

BET4783
FINAL YEAR PROJECT 2
Credit :3 credit

Synopsis

This subject is the continuation of the subject Engineering Technology Senior Design Project I. In this course, the students are required to conduct the research, collect and analyze data, discuss the findings and form the conclusions. At the end of the semester, the students are required to produce a design project report and present it to faculty's evaluation panel.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Analyze data, discuss and conclude the finding
- CO2 Manage the research work
- CO3 Practice positive attitude in research activities
- CO4 Present the research report and cited latest publications on the subject

BET4774
TECHNOLOGY DESIGN PROJECT
Credit :4 credit

Synopsis

In this course, the widest implications of a service, product or process are considered at the project design stage, including not only the technical interactions of the various sub-systems, but also the financial ethical, political, sociological, and socio-economic implications. This course leads the students the understanding of the philosophy and methodology of the design process in the context of the system which embraced political, sociological, economic, technical and ergonomic aspects. The technology design project is the capstone project course in the four year bachelor of engineering technology (infrastructure management).

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Conceptualize problems and develop strategic solutions from open-ended scenarios;
- CO2 Identify, review, and evaluate multi-disciplinary design projects that require the system design approach;

- CO3 Rationalize, plan, develop, optimize, and communicate a system design in the wider engineering environment of statutes, ecology, common law, ergonomics, social acceptability, marketing, and economics, etc;
- CO4 Transfer and apply appropriate use of computer technology to the design project;
- CO5 Cooperate as effective members of teams working and communicate the multi-disciplinary project results in a professional manner with formal report structure, an executive summary and a formal conveyance letter.

BET4899
INDUSTRIAL TRAINING ATTACHMENT
Credit :9 credit

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo six months of industrial training during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives.

BET4893
INDUSTRIAL TRAINING REPORT
Credit :9 credit

Synopsis

In industrial training the students should gain insight into the industrial practice, in order to visualize the tasks and possibilities of their later occupation work. All students are required to undergo six months of industrial training during the last semester of the academic year. The performance of each student during the periods of his/her Industrial Training is evaluated jointly by the faculty staff, and the representatives from employer organizations. The student is required to maintain proper records and submit reports on the training received by him/her. The industrial training report should cover all periods of approved employment. The report document is expected to demonstrate development of practical and professional skills in Engineering through technical experience and application of theoretical knowledge. Development of skills in dealing with people, and communication skills are part of the subject objectives.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Work independently in actual working environment with minimal supervision
- CO2 develop communication skill with different levels of staff in the organization
- CO3 construct technical documents and give oral presentations related to the work completed.
- CO4 develop positive attitude during the training programmed such as team working, lifelong learning and able to use the latest technology in industries
- CO5 develop an entrepreneurship attitude and management skill during a training

ELECTIVE COURSES**BAA4223****PRE-STRESSED CONCRETE DESIGN****Credit : 3 credit****Pre-requisite : BAA3213 Reinforced Concrete Design II****Synopsis**

This course is being taught as an elective course to provide the understanding about the analytical method and the design procedures involving pre-stressed concrete. The main purpose of this course is to deliver knowledge and understanding of principles of pre-stressed concrete, pertaining to both its analysis and design aspects. This course deals with the analysis and design of elements of structure. This course includes an assignment and mini project that involves the design of pedestrian footbridge.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Define and explain the principle of prestressed concrete
- CO2 Differentiate method of prestressing and their practical applications
- CO2 Explain the types of loss of prestress in pretensioned and post-tensioned members
- CO4 Analyze and design flexural members under service and ultimate loads
- CO5 Design structural elements for shear, anchorage and end block

BAA4243**ADVANCED CONCRETE MATERIALS****Credit : 3 credit****Pre-requisite : None****Synopsis**

This course will introduce the students to the concepts, characterization, and application and advantages the recent concrete technology in construction as well as concrete durability in detail. Initially, the course will cover on durability aspect of concrete in terms causes of deterioration, mechanism of attack as well as method to overcome the problem. The course will also touch on the utilization of blended cement in concrete technology before introducing the student to the modern concrete namely lightweight concrete, high strength concrete, high performance Portland cement concrete, fiber-reinforced concrete, high workability concrete, and shrinkage-compensating concrete. Others topics will also be included that quality control for durability of concrete and repairs of concrete structures.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Explain the properties and applications of special concretes; Lightweight concrete, high performance concrete, high strength Portland cement high workability, polymer concrete, and shrinkage compensating concrete.
- CO2 Identify the properties of recent concrete technology with their application and characteristic
- CO3 Identify several cement replacement materials and to describe the properties of blended cement concrete.
- CO4 Ability to access and evaluate damages on concrete buildings.

- CO5 Ability to decide the method of assessment and repair of the concrete
- CO6 Ability to produce and present an engineering report on condition surveys, proposal of repair /rehabilitation plan.

BAA4813**ARCHITECTURAL DESIGN & ENGINEERING****Credit : 3 credit****Pre-requisite : None****Synopsis**

As graduating semester for the Bachelor of Civil Engineering at UMP, the focus of this elective course is a project that will utilise student's engineering skills and competency to make independent design decisions with creativity and innovativeness. The nature and complexity of the project shall be in the form of medium rise of three (3) to five (5) stories, such as museum, shopping centres, sport centres and healthcare clinics involving up to 500 people (at one occupancy). The project will incorporate engineering, architectural design, technical and regulatory requirement as part of the design process and submission.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Design THREE (3) to FIVE (5) stories building that incorporates engineering and architectural design
- CO2 Design engineering solutions such as structural design, geotechnical design, infrastructural design related to the project
- CO3 Integrated the engineering innovation and creativity with architectural design considerations

- CO4 Analyse building economic principles such as life cycle cost, operational cost and maintenance cost of the facilities proposed for the project
- CO5 Proposed sustainable design to the related project

BAA4313**GEOGRAPHICAL INFORMATION SYSTEM****Credit : 3 credit****Pre-requisite : None****Synopsis**

The goal of this course is to give knowledge and understanding about application of Geographical Information System (GIS) in Civil Engineering. The main content of this course is about an application of GIS in environmental and civil engineering.

Amongst the main topics discussed are;

- Fundamental and development of GIS in civil engineering
- Data processing such as data collection, data management, spatial analysis, data manipulation and data output.
- Current application of GIS in civil engineering (focus in Malaysia)

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Identify and describe to main component of GIS and advantages of GIS in Civil Engineering
- CO2 Explore about the data observation, processing, organization and spatial data management.
- CO3 Process and solve the spatial problem
- CO4 Use GIS software

BAA4823
FACILITIES & ASSET MANAGEMENT
Credit : 3 credit
Pre-requisite : None

Synopsis

The course provides the requisite knowledge for understanding facilities management as a profession with reference to how people, spaces, organisations, services, indoor and natural environment interact within the property and construction industry in an environmentally sustainable fashion. Apart facilities the module also integrate with the nature and concepts of contemporary asset management. Asset management topic aspects as asset management systems, asset management plan, asset knowledge, the use of geographical information systems, delivery (plan, design, risk & value management, procure, construct), audit and review.

Course Outcomes

By the end of semester, students should be able to:

- CO1 Understanding what facility management means and how it relates to the core business of organisations.
- CO2 Understanding of the strategic value of facilities management, and their potential contribution to organisational effectiveness.
- CO3 To outline the potential enhancements to systems and techniques used manage facilities and asset management in a variety of contexts
- CO4 To outline and apply skills in the context of facilities management and asset management

BAA4713
ADVANCED HYDRAULICS ENGINEERING
Credit : 3 credit
Pre-requisite : None

Synopsis

This course enhances and broadens the scope of hydraulics by including the characteristics and influence of groundwater, sediment and sea waves to the hydraulic process itself. The function of hydraulic structures i.e. dam, spillways and coastal structures are also introduced to demonstrate the above influences.

COURSE OUTCOMES

By the end of semester, students should be able to:

- CO1 Differentiate uniform flow in open channel and closed conduit
- CO2 Describe the hydraulic flow processes on groundwater emphasizing on aquifer hydraulics
- CO3 Describe the types and analyze the functions of dams, spillways and coastal structures.
- CO4 Analyse the influence of groundwater, sediment and sea waves to the hydraulic process itself
- CO5 Ability to work effectively in a team and demonstrate cooperative effort to carry out a given group project

BAA4223
FINITE ELEMENT
Credit : 3 credit
Pre-requisite : None

Synopsis

This course will enable students to understand the fundamental principles of finite element analysis in civil engineering structures. The finite element analysis use numerical method in solving structural engineering problems involving complicated geometries, loadings and material properties. The finite element formulation of the problem results in a system of simultaneous algebraic equations for solution. Basic concept of structural modelling finite element discretization, interpretations, review of the direct stiffness method are combined for obtain the solution in the framework of structure mechanics. This course also will introduce some of the computational modelling and analysis techniques for comprehensive evaluation and checking when interpreting results. It covers basic theory, modelling, meshing and analysis component models for stresses, deflections, treatment of boundary conditions and restrains, with example of good practice for safe and effective application in use.

Course Outcomes

At the end of this course, the students should be able to:

- CO1 Analyse by using the FEM of 2D and 3D truss line elements
- CO2 Analyse by using the FEM of 2D plane stress/strain elements
- CO3 Analyse by using the FEM of 3D plane stress/strain elements
- CO4 Apply a finite element software by using LUSAS to Interpret the solutions obtained from the structural finite element analyses

BAA4253
BRIDGE ENGINEERING
Credit : 3 credit
Pre-requisite : None

Synopsis

This course covers prestressed concrete bridge design, prestressing system, loss of prestress, analysis and design of section for flexural, shear and also principles and design of prestressed concrete members for prestressed concrete bridge. Deflection analysis and anchorage zone design are also taught in this course. In addition, this course also covers prestressed concrete one-way slab and two-ways slab design for prestressed concrete bridge.

Course Outcomes

At the end of this course, students should be able to:

- CO1 Able to design minimum number of tendons in types of bridge girders in accordance to different loading condition
- CO2 Able to calculate loss of prestress in pretensioned and post-tensioned members for a typical prestressed concrete bridge
- CO3 Able to calculate and design for flexural capabilities under ultimate limit states for prestressed concrete bridge elements.
- CO4 Able to calculate and design for shear requirement, deflection and anchorage zone under ultimate limit states for prestressed concrete bridge elements
- CO5 Able to design one-way and two-ways slabs for prestressed concrete bridge

**BAA4263
INDUSTRIALIZED BUILDING SYSTEM (IBS)**

Credit : 3 credit

Pre-requisite : None

Synopsis

The course introduces the concept of Industrialized Building System (IBS) as a sustainable construction in Malaysia. A comparative study of conventional and IBS building process and construction shall be introduced. Various materials, technologies and economic aspects will also be discussed in the course. Aspects of Modular Coordination, Modular Design Rules and Structural Design Concept using components will be introduced and verified using IBS Score Manual.

Course Outcomes

At the end of this course, students should be able to:

- CO1 Differentiate between IBS and conventional building process
- CO2 Categorize structural forms and types of IBS
- CO3 Interpret of IBS and Modular Coordination design concepts and rules in building construction
- CO4: Calculate the IBS Score

**BAE4483
ADVANCED WATER & WASTEWATER TREATMENT**

Credit : 3 credit

Pre-requisite : None

Synopsis

Theory, principal and design of biological and physico-chemical unit processes for advanced water and wastewater treatment. The course will address the anaerobic and aerobic processes such as biological removal through attached and suspended growth processes, fluidized bed

reactors and control of nitrogen and phosphorous for nutrient removal. Advanced design process development for clarifier, filtration, adsorption, disinfection, ion exchange, membrane processes are also discussed.

Course Outcomes

By the end of this course, students should be able to:

- CO1 Define and analyze physical, chemical and biological properties for water & wastewater treatment
- CO2 Define and analyze physical, chemical and biological processes for water & wastewater treatment
- CO3 Apply and design water treatment process
- CO4 Apply and design wastewater treatment process

**BAE4613
ENVIRONMENTAL MANAGEMENT**

Credit : 3 credit

Pre-requisite : None

Synopsis

Environmental management of civil engineering is of increasing importance throughout the world, so demand is growing for qualified and trained environmental managers. This course is aimed at undergraduates who want to enhance knowledge in environmental management. This subject covers various topic from water, air, noise and solid waste which contribute to pollution during constructions works. Rule and regulation from Department of Environment also will be addressed together with environment impact assessment (EIA) before the construction works and environmental management planning (EMP) during constructions works. International standards and GIS application also will be highlighted with latest development, technology and applications.

Course Outcomes

At the end of this course the student should be able to:

- CO1 Understand the important terminology, facts, concepts, principles and theories used in the environmental management field.
- CO2 Be able to make sound management decisions based on environmental and scientific data.
- CO3 Apply environmental management systems in organizational environmental improvement.
- CO4 Recognize economic, environmental, and social issues relevant to the management of organizations and justify the need for environmental strategies in organizations;

**BAE4813
HYDROLOGY & WATER RESOURCES
MANAGEMENT
Credit : 3 credit
Pre-requisite : None**

Synopsis

This course is to provide students with the knowledge in advanced hydrological methods towards water resources problems. It equips the students with the skills on techniques of hydrological and water resources data analysis, modeling and prediction. This course begins with advanced methods in runoff model and hydrograph analysis. Other topics will be covered are a detail flood routing analysis, erosion and sedimentation, reservoir design and water resources planning including integrated river basin management, policy and regulation, and economics analysis of water resources system. This course will also familiarize students with various integrated and multi objectives analysis of water resources system.

Course Outcomes

By the end of this course, students should be able to:

- CO1 Predict the temporal distribution of runoff using various runoff models, including estimate the time of concentration, peak runoff and entire run off hydrograph from rainfall excess.
- CO2 Perform the flood routing analysis and determine the soil loss, bed load, sediment yield and water quality estimation using various method.
- CO3 Describe the Integrated River Basin Management (IRBM) and water resources management issues, law, policy, and regulation.
- CO4 Analyze the economic and financial feasibility of water resources system and compute reservoir yield by analyzing supply and demand curve.
- CO5 Conceptualize and apply an integrated/multi objectives analysis for evaluating various management alternatives of water resources system

DIPLOMA OF CIVIL ENGINEERING (DAA)**DAA1312****CIVIL ENGINEERING MATERIAL****PRE-REQUISITE****SYNOPSIS**

This subject is compulsory and basic subject which will introduce students to the material that been used in construction industry. Students will be exposed to the knowledge on the basic characteristic of each material together with the testing method to determine the material strength. Student who is able to complete this course successfully, would be able understand easily the terms and materials related to construction project.

COURSE OUTCOMES

- CO1 Identify and explain the types of construction materials commonly used in construction industry. (C2)
- CO2 Explain the properties, differences, advantages disadvantages of the materials. (C2,P3,A1, CTPS, TS)
- CO3 Explain the production of the materials. (A1, C1, TS)
- CO4 Illustrate the types of construction materials commonly used in construction industry
- CO5 Explain the differences, advantages, disadvantages and the production of engineering materials
- CO6 Apply the knowledge obtained from this subject when involved in Engineering related work.

DAA1032**ENGINEERING DRAWING****PRE-REQUISITE****SYNOPSIS**

This subject aims to expose the students to the civil engineering drawing and to prepare this knowledge for their future profession. Students should be able to describe, discuss and analyse the information and conventions as presented in the civil engineering drawings. The learning approach of civil engineering drawings is integrated through series of hands-on tutorial. The students should be able to generate engineering drawings through selected exercises manually and using the application of software packages

COURSE OUTCOMES

- CO1 Describe the basic characteristics and features of civil engineering drawings. [C2, P3, CTPS3]
- CO2 Understand the civil engineering drawings and interpret to the actual construction. [C4, P3, A3, TS3]
- CO3 Employ computer-aided software to produce civil engineering drawings. [C5, P3, A3, CTPS3, TS3]

DAA1212**COMPUTER PROGRAMMING****SYNOPSIS**

The subject focuses on development of programming skills using computer programming language that is suitable for the current computer operating system.

COURSE OUTCOMES

- CO1 Describe basic computer programming and its functionalities (C2)
- CO2 Construct and adopt a pseudo code and flow chart for solving a computing problem (C5),(P3),(A4),(CTPS)

- CO3 Analyze a simple computing-based project (C4),(P4),(A3),(CPTS)
- CO4 Design and develop computer program using basic language programming (P7),(A4)

DAA1113 ENGINEERING MECHANICS

PRE-REQUISITE

SYNOPSIS

The subject in Engineering Mechanics is the fundamental of all courses in engineering, which requires students to have basic knowledge in both statics and dynamics. The emphasis is on the development and correct application of the fundamental concepts of rigid body mechanics. Topics covered for both statics & dynamics are force system resultants, condition of equilibrium, centroid & moment of inertia; force & acceleration and work & energy.

COURSE OUTCOMES

- CO1 Analyze the concept of static mechanics system in two and three dimensions problems and solve it by applying the equilibrium condition (C4) (CPTS)
- CO 2 Determine the location of centroid and moment of inertia for a body of arbitrary shape. (C4) (CPTS)
- CO 3 Analyze the kinematics of motion that involves force & acceleration and work & energy principle. (C4,P2,A2) (CPTS,TS).

DAA1022 PROJECT MANAGEMENT

SYNOPSIS

This subject is a compulsory and basic subject which will provide the students with the knowledge of managing of construction project. As an introduction, students will be given general information on basic elements involved in management and phases in construction project. Then they will be given exposure to the methods

to properly plan and schedule the project. Students who is able to complete these course successfully, would be able to understand on the management aspect in construction project

COURSE OUTCOMES

- CO1 Understand the overall construction project management process and the function of each party involved in construction (C2) (CPTS) (TS)
- CO2 Identify and explain an appropriate construction methods used in project management (C2) (CPTS)
- CO3 Apply the right method of procuremnet (C3) (CPTS)
- CO4 Carry out the Bill of Quantity and develop Critical Path Method (C5) (CPTS)

DAA2313 ENGINEERING SURVEYING

PRE-REQUISITE

SYNOPSIS

This subject will expose to the civil engineering students the role of survey engineering in their field. The subject topics encompasses introduction to the engineering surveying, surveying equipment, measurement unit, bearing/angle and distance measurement for horizontal control, coordinate system, area & volume calculation, mass transfer diagram & mass transfer measure and the final setting out for construction work

COURSE OUTCOMES

- CO1 Identify and describe some of the engineering surveying roles in civil engineering works. (C2,A2) (CPTS)
- CO2 Perform horizontal and vertical control based on related provision.(C3,P3,A2) (CPTS,TS)

- CO3 Understand the range of calculations that can be made with surveying data.(C3,P3,A2) (CTPS,TS)

DAA2322

ENGINEERING SURVEYING FIELDWORK

SYNOPSIS

This fieldworks encompasses how to handling survey equipments, carry out linear survey, traverse survey, leveling, establishing the temporary bench mark, detailing survey, techniques of gathering the location of man-made and natural features, preparation of site plan, related computation and setting-out simple construction work.

COURSE OUTCOMES

- CO1 Organize a small survey work for project (CTPS3,TS2)
- CO2 Practice the significant of survey work using engineering survey techniques based on related provision.(C1,CTPS3,TS2)
- CO3 Use various survey instruments at site (CTPS3,TS2)
- CO4 Write report affectively (C1,TS2)

DAA1123

MECHANICS OF MATERIALS

PRE-REQUISITE

DAA1113
ENGINEERING MECHANICS

SYNOPSIS

Mechanics of materials studies the relationship between external forces on a deformable body and the intensity forces acting within the body. The course focuses on several types of components, bars subjected to axial load, beams in bending and shaft in torsion. The principles and methods used to meet the objectives are drawn from prerequisite courses in mechanics, physics and mathematics

COURSE OUTCOMES

- CO1 Determine the internal forces, stresses & strains, deformation of axially loaded members and analyze the stress-strains relationships to obtain material properties
- CO2 Analyze the determinate beams to construct shear force & bending moment diagram and determine the bending and shearing stresses
- CO3 Analyze the stress transformation at particular coordinate system to other having different orientations by using equations method & Mohr's circle
- CO4 Analyze the circular shaft to obtain the torsion

DAA1951

ENGINEERING LABORATORY I (WATER & ENVIROMENT)

SYNOPSIS

This ENGINEERING LAB I covers Water and Environmental laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry.

COURSE OUTCOMES

- CO1 Demonstrate Fluid Mechanics system and devices ,apply and analyze Bernoulli's Theorem and compute minor losses due to disruption in normal flow(C3,A3,P3) (CS,CTPS)
- CO2 Conduct open channel and apply the equation of flow (uniform & non-uniform flow) in open channels, hydraulic machinery principles and rainfall-runoff relationship. (C3,A3,P4) (CS,CTPS)
- CO3 Conduct water/wastewater testing and analyze the sample to determine water

quality standard such as turbidity, BOD, COD and TSS.(C4,A4,P4) (CS,CTPS)

DAA1723

FLUID MECHANICS

PRE-REQUISITE

SYNOPSIS

To introduce the fundamental principles of fluid mechanics, the basic equations governing fluid statics and fluid flow, and the methods of solving engineering problems related fluid mechanics

COURSE OUTCOMES

- CO1 Fluid Properties and the fundamentals of Fluid Mechanics concept.(C1) (CS)
- CO2 Explain Fluid Mechanics system and devices such as capillary tube viscometer, falling ball viscometer, manometers, and piezometer.(C2)(CTPS)
- CO3 Apply Fluid Mechanics theories such as Bernoulli's Theorem , Continuity Equation, Darcy-Weisbach Equation and Reynold's Number in Fluid Mechanics system.(C3)(CTPS)
- CO4 Demonstrate the pipeline systems as related to engineering.(C3)(CTPS)

DAA2931

ENGINEERING LABORATORY II (MATERIALS & STRUCTURAL)

SYNOPSIS

This ENGINEERING LAB II covers material testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

COURSE OUTCOMES

- CO1 Observe and detect the failure from destructive and non-destructive testing. (C3,A3,P3) (CS,CTPS)
- CO2 Conduct concrete mix design and produce the output from the design. (C3,A3,P3) (CS,CTPS)
- CO3 Conduct tensile strength test and discuss the properties of steel from the test. (C3,A3,P3) (CS,CTPS)

DAA2123

THEORY OF STRUCTURES

PRE-REQUISITE

DAA1123
MECHANICS OF MATERIALS

SYNOPSIS

In this course students will be introduced to the analysis of statically determinate and indeterminate structures. The course covers the fundamental concepts of determining the structural stability and determinacy, analysis of statically determinate beams and frames, trusses and arches. Also to determine the deflection and influence lines of beam and truss, and the analysis of indeterminate beams and frames

COURSE OUTCOMES

- CO1 Analyze the deflection and slope of determinate beams (C4,P4,CTPS3)
- CO2 Analyze an indeterminate beams and frames to obtain the end moments (C4,P4,CTPS3)
- CO3 Analyze internal forces and compute deflection of determinate plane trusses (C4,P4,A3,CTPS3,TS3)
- CO4 Construct the influence lines diagram and determine the vertical reaction, shear force and moment(C3,P3,CTPS3)

- CO5 Analyze 3-pinned arch to obtain the internal forces (C4,P4,CTPS3)

DAA2413 TRAFFIC & HIGHWAY ENGINEERING

PRE-REQUISITE SYNOPSIS

This course is designed to introduce students on the basic understanding of highway and traffic engineering with an emphasis on the design standards that being used in Malaysia. Topic covers are construction developments and highways planning in Malaysia, highway geometric design, pavement design and construction, pavement maintenance and rehabilitation, traffic engineering studies including traffic volume and capacity studies, and intersection and interchanges design principles.

COURSE OUTCOMES

- CO1 Explain the characteristics of road network system based on road design standard in Malaysia and their administration.
- CO2 Explain the fundamentals of traffic engineering elements such as road, driver and vehicles characteristics and the traffic control devices.(C4)
- CO3 Analyze the fundamental traffic studies data of speed, volume and capacity and outline the intersection design principal based on local standard.(CTPS,TS),(C4),(P4),(A3)
- CO4 Analyze the fundamentals of highway geometric and carry out the mix design and flexible pavement designs based on JKR Standard.(CTPS,CS),(C4),(P4),(A3)

DAA2513 SOIL MECHANICS & GEOLOGY

PRE-REQUISITE

SYNOPSIS

This course provides an elementary introduction and the basic mechanics necessary for Geotechnical Engineering. This course aims to provide the basic understanding of the engineering geology, the soil origin and formation, basic soil engineering properties, the soil classification, the compaction of the soil, the effect of water in soil in term of permeability and seepage and also the stresses in the soil mass.

COURSE OUTCOMES

- CO1 Acknowledge and explain the geological background and the soil formation. (C3,A1) (CTPS)
- CO2 Describe the fundamental of weight-volume relationship in soil and able to produce the compaction curve from soil compaction. (C3,A1) (CTPS)
- CO3 Identify the soil classification based on AASHTO and USCS system and determine the soil behavior as an engineering material.(C3,P2,A1) (CTPS,TS)
- CO4 Identify the soil's permeability, calculate the of water flowing by producing the flow net diagram.(C3,P2,A1) (CTPS)
- CO5 Acknowledge the principle of effective stress and able to analyze the soil stresses in various cases.(C3,P2,A1) (CTPS,TS)

**DAA2523
GEOTECHNICAL ENGINEERING**

PRE-REQUISITE

DAA2513
SOIL MECHANICS & GEOLOGY

SYNOPSIS

This subject provides further discussion and explanation related to soil engineering. The topics cover in the subjects includes the shear strength of soil, lateral earth pressure, slope stability, site investigation, shallow foundation, compressibility of soil and environmental geotechnics. at the end of this course, student should be able to have ample knowledge regarding the soil engineering and behaviour and also able to practice the knowledge outside.

COURSE OUTCOMES

- CO1 Define the Mohr Coulomb criterion and describe the laboratory tests to obtain the shear strength parameters and also explain the soil behaviour that relate to soil shear strength. (C3) (CTPS)
- CO2 Solve the lateral earth pressure based on various cases and method of analysis and Compute the stability of the slope in term of factor of safety using various approach of analysis. (C3) (CTPS)
- CO3 Describe the important things in site investigation process that need to be consider before a construction can take place (C2) (CTPS)
- CO4 Illustrate the types of shallow foundation and its function, able to describe bearing capacity and also apply the soil bearing capacity under various conditions. (C3) (CTPS)
- CO5 Define the concept of soil compressibility, describe the laboratory test to obtain various consolidation parameters and able to predict future settlement and Use the modern

technology to manage the landfill by using the geosynthetics materials. (C1) (CS) / (C3) (CTPS)

**DAA2723
HYDRAULICS & HYDROLOGY**

PRE-REQUISITE

DAA1723
FLUIDS MECHANICS

SYNOPSIS

Hydraulics introduces the basic concepts of fluid flow in open channel including uniform flow, non uniform flow and hydraulic jump. Water distribution through pipeline and hydraulic machinery, especially pumps are covered in this course. Whilst hydrology includes the hydrological cycle, precipitation, measurement and analysis of rainfall, hydrological losses, streamflow, runoff, hydrograph and groundwater.

COURSE OUTCOMES

- CO1 Define the type of channel flow, and evaluate the uniform flow, non-uniform flow in open channel.(C5) (CTPS) (TS)
- CO2: Analyse pipe network using head distribution and identify the types of pumps, their selection criteria and performance evaluation.(C4)(CTPS) (TS) (LS)
- CO3 Define and explain the basic concept of hydrology processes.(C2)(CTPS)
- CO4 Analyze and solve rainfall, hydrological losses, stream flow, runoff, hydrograph and groundwater problems using various methods.(C4)(CTPS)

**DAA2213
STRUCTURAL DESIGN I (CONCRETE)**

PRE-REQUISITE
DAA2123
THEORY OF STRUCTURES

SYNOPSIS

This course covers the introduction of concrete design, the limit states principles, ultimate strength analysis and flexural design, shear, bond and torsion, analysis and design of beams, slabs and columns, and code requirements and detailing

COURSE OUTCOMES

- CO1 Explain the purposes and basic concepts of reinforced concrete design [C2]
- CO2 Identify and analyze loads involve in structural design [C4]
- CO3 Interpret the architect drawing to engineering drawing according to their application thus construct structural drawing. (P7, A3, TS3,CTPS3]
- CO4 Design of structural reinforced concrete beams,slabs, columns and foundation by using relevant standard code of practice and carry out the concrete structures detail [C4, P3, CTPS3]

**DAA2233
STRUCTURAL DESIGN II (STEEL& TIMBER)**

PRE-REQUISITE
DAA2123
THEORY OF STRUCTURES

SYNOPSIS

This course covers introduction to the design code for designing beams, trusses, portal frame, connections, tension members, compression members and column. Timber design for simple structural use will also be covered.

COURSE OUTCOMES

- CO1 Describe the concept & philosophy of steel & timber design based on the relevant code of practice & differentiate the classes of cross section for steel member structure.[C3]
- CO2 Analyze & design a typical bending & compression steel structural member, trusses & portal frame according to the relevant codes of practice in building design [C5,P4,CTPS]
- CO3 Analyze & design steel connection according to the relevant codes of practice in building design with producing work project of complete steel building [C4,P4,A2,CTPS,TS]
- CO4 Analyze and design a typical timber structural according to the relevant codes of practice in building design. [C4,P4,CTPS]

**DAA2612
ENVIRONMENTAL ENGINEERING**

PRE-REQUISITE

SYNOPSIS

Introduction to environmental engineering; physical, chemical and biological processes; water and wastewater treatment; air pollution; solid and hazardous waste; sewage treatment and disposal and treatment plant design.

COURSE OUTCOMES

- CO1 Identify and calculate the physical, chemical and biological water quality parameters
- CO2 Illustrate water treatment processes
- CO3 Demonstrate wastewater treatment processes

- CO4 Analyze the environmental pollution such as solid waste, water and air pollution

**DAA2951
ENGINEERING LABORATORY III
(GEOTECHNICAL & HIGHWAY)**

SYNOPSIS

This ENGINEERING LAB III covers Highway and Geotechnical laboratory testing. The experiments are complimentary to the theory that students have learned in the classroom and also to expose them to the practice work at the construction industry

COURSE OUTCOMES

- CO1 Conduct traffic volume survey and analyze the data.(C4,A3,P4) (CS,CTPS)
- CO2 Demonstrate flexible pavement design based on JKR Standard. (C4,A3,P4) (CS,CTPS)
- CO3 Produce soil related graphs/curves/diagrams.(C4,A4,P4) (CS,CTPS)

**DAA3909
INDUSTRIAL TRAINING**

PRE-REQUISITE

All Subjects Up To 4th Semester

SYNOPSIS

Students are exposed to the industrial practice as associate to engineers thorough attchement at public and private sectors. They need to be attached at the workplace for six months or at least through out the final semester as set by the faculty. Achievement of every student will be assessed by visiting supervisor (tutors and lecturers) and host supervisor (the representative of the industry where the student is attached).

COURSE OUTCOMES

Students should be able to:

- CO1 Experience actual working environment at the workplace
- CO2 Practice relevant theory in carrying duties at workplace
- CO3 Use logbook as diary for technical personal
- CO4 Learn new skills at workplace
- CO5 Communicate and work as team member with all levels of work force

**DAA3903
INDUSTRIAL TRAINING REPORT**

PRE-REQUISITE

Industrial Training Attachment

SYNOPSIS

Students are required to write report of all recorded activities in the log book in a standard format, present it and submit a copy of the report to the industrial training coordinator for evaluation.

COURSE OUTCOMES

At the end of this course, the students should be able to:

- CO1 Use information and data collected in the logbook as prime source for writing a technical report.
- CO2 Arrange, assess and discuss the results of the data while making reference to the literature review or the prevailing standards and specifications.
- CO3 Argue or support about the fulfilment of the project objectives and recommend for further works.

- CO4 Demonstrate, describe, discuss, illustrate, argue and predict about the finding of the project in an oral presentation.
- CO5 Assemble the write up about project in an acceptable and professional format