

CIVIL

ENGINEERING HANDBOOK

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Third Edition 2015

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The image shows a modern building with a grey tiled roof and a facade of dark grey horizontal slats. The building is surrounded by greenery, including trees and a traditional pavilion with a red-tiled roof in the foreground. The text 'FAKULTI KEJURUTERAAN AWAM' and 'Faculty of Civil Engineering' is displayed on the building's facade.

FAKULTI KEJURUTERAAN AWAM
Faculty of Civil Engineering

FKA has been ranked **Top 100-150** in the world by QS Ranking (By Subject) since 2013 and among the **highest employability (85%)** in Malaysia.

1.0 The University And The Faculty

Universiti Teknologi Malaysia (UTM) is one of Malaysia's premier and renowned universities in engineering and technology. It is strategically located in two major growth areas, Kuala Lumpur and the Iskandar Malaysia (within the Johor- Singapore-Riau development area) (refer Figure 1).

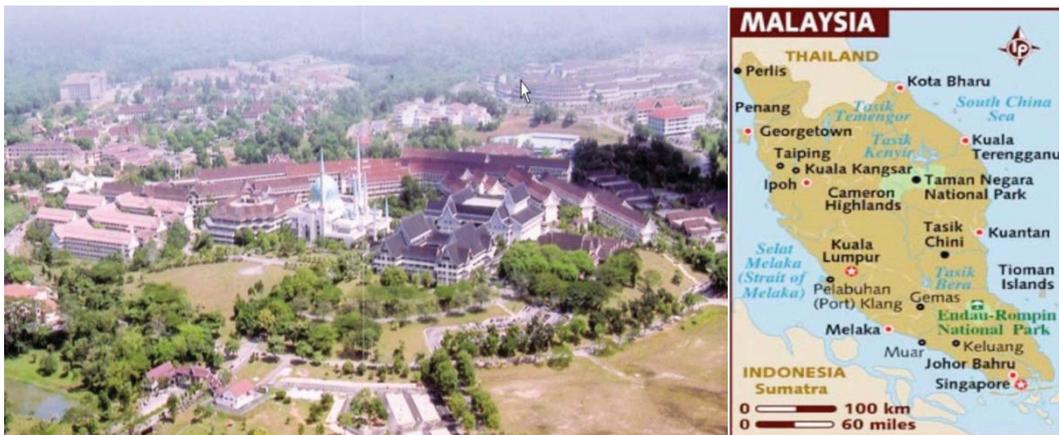


Figure 1: Location and Aerial View of UTM Campus in Skudai

UTM has established a reputation for innovative education and research, with a commitment to educate professionals and technologists towards the development of human capital and advanced technological innovations. This is in line with the aspirations of the country to be a fully developed and knowledge-rich nation by the year 2020.

UTM is currently the top engineering and technology university, with the largest number of engineering-based programmes, supported by non-engineering disciplines; the largest human capital in engineering education, and the largest pool of research workers in engineering fields in the country. UTM currently has the largest research funding in engineering related fields, and is also able to attract high research contracts from the industry. UTM was the first university to have won the Prime Minister Quality award (for IHL Category) in 1999, secured the National Intellectual Property (IP) Award in 2006 and currently the top Malaysian university in terms of IP generation. UTM has very strong linkages with industry and can easily be transformed into a major contributor to the National Innovation System. UTM's Recruiter's Review is the highest among Malaysian universities, and ranks 161 out of top 500 universities in the world. This is indicative of the favourable quality of our graduates, as the products of our quality engineering education.

There are currently 13 faculties and more than 20 specialised research institutes and centres, serving more than 29,000 full-time undergraduate students, 3,000 postgraduate students and 5,000 part-time students in various fields of specialisations. Having produced more than 200,000 engineering and technical graduates of various professional qualifications over the years, UTM has earned its place as Malaysia's Premier University in Engineering and Technology.

The UTM-Faculty of Civil Engineering (FKA) started as a Department of the Faculty of Engineering in 1972, and became a Faculty in 1975. In 1989, the Faculty was moved to Skudai, Johor. During its initial formation, FKA had 3 departments, namely the Structures and Materials Department, the Hydraulics and Hydrology Department and the Geotechnics and Transport Department. The Environmental Engineering Department was set up in 1976. Apart from these departments, 4 Centres of Excellence were established. They are the Coastal and Offshore Engineering Institute (COEI), Construction Research Centre (CRC), Institute of Environmental and Water Resources Management (IPASA) and Centre of Forensic Engineering (FEC). In addition, 3 management units were then formed to provide services and support to the aforementioned departments and centres. The units are the Information Technology Unit (ITUCE), the Surveying Unit and the Civil Engineering Testing Unit (CETU).

2.0 Philosophy, Vision, Mission and Motto of UTM

Philosophy

The divine law of Allah is the foundation for science and technology. Universiti Teknologi Malaysia strives with total and unified effort to develop excellence in science and technology for universal peace and prosperity, in accordance with His Will.

Vision

To be recognized as a world-class centre of academic and technological excellence.

Mission

To be a leader in the development of human capital and innovative technologies that will contribute to the nation's wealth creation.

Motto

In The Name of God for Mankind.

3.0 Vision, Mission And Motto of Faculty of Civil Engineering

Vision

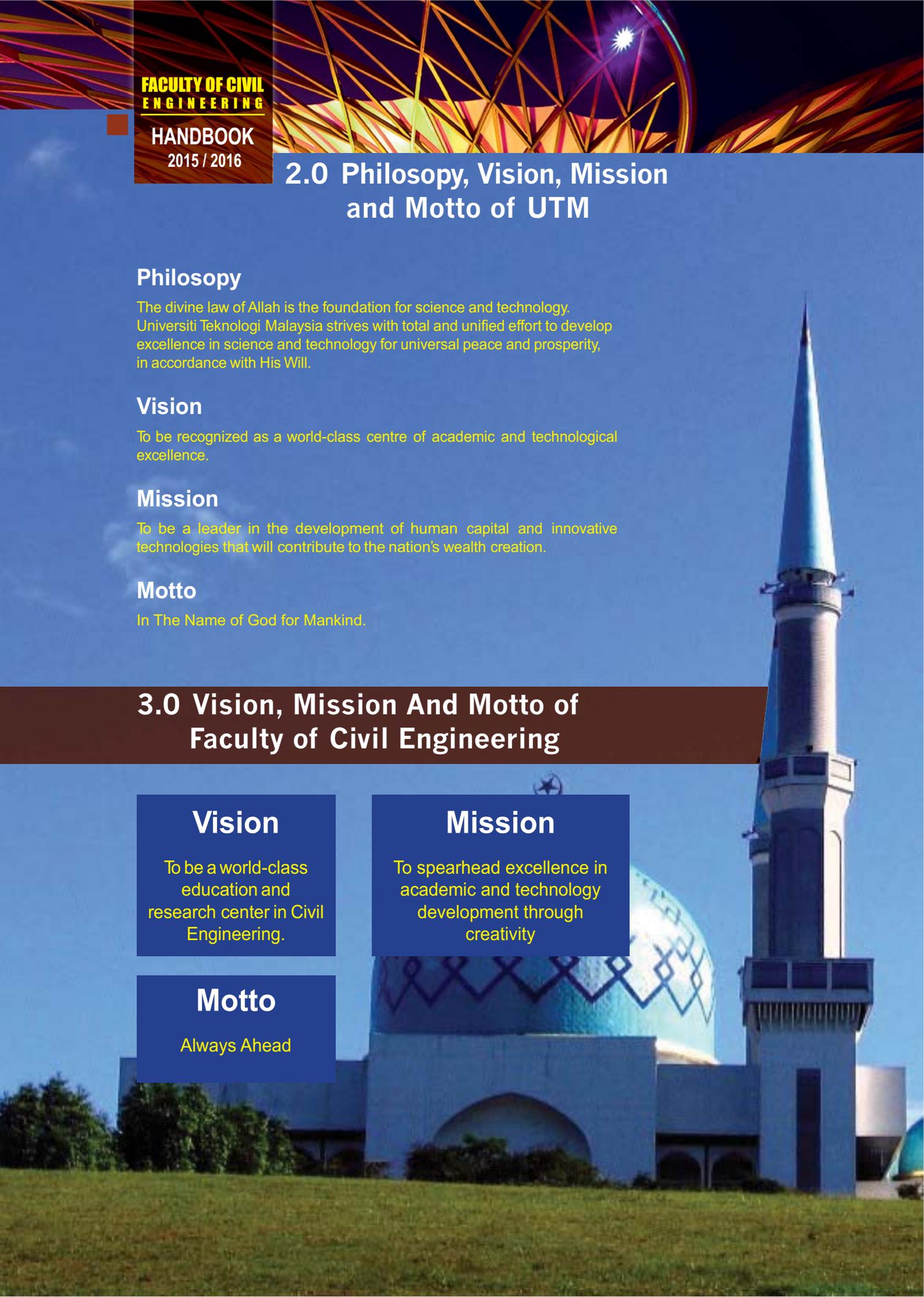
To be a world-class education and research center in Civil Engineering.

Mission

To spearhead excellence in academic and technology development through creativity

Motto

Always Ahead



4.0 FOREWORD BY THE DEAN

Assalamualaikumwrm. andSalam Sejahtera

It gives me great pleasure to present to you our Bachelor of Civil Engineering Handbook. This handbook, published inline with the aspiration of the Ministry of Education, the Engineering Accreditation Councils, Board of Engineers Malaysia and Washington Accord International Partners, provides the framework for our major stakeholders, i.e students and industry players of what and how the Programme Outcomes would be achieved by the students upon graduation.

It includes the 'Programme Specification', a document which specifies what, where and how the outcomes will be delivered and evaluated during the whole course of programme. Individual course outlines which detail out course expectations from students are also presented. As UTM-Faculty of Civil Engineering (UTM-FKA) emphasizes on active learning, this 'cook book recipe' will help students to comprehend and take charge of their own learning and be able to achieve the outcomes expected from them upon graduation.

Being recognized as the top 150 world ranking Faculty in civil engineering, UTM-FKA continues to move forward and implement progressive and measures based on the ISO 9001:2008 – Quality Management System.

Hence, this guideline would provide transparent documentation to our stakeholders on what UTM-FKA is committed to implement and provide avenues for further discussions. We warmly welcome feedbacks and comments to further improve this handbook.

My sincere acknowledgement to the UTM-FKA team that had placed their effort and dedication in preparing this handbook. Lastly, I hope this compilation will be meaningful and useful to all.

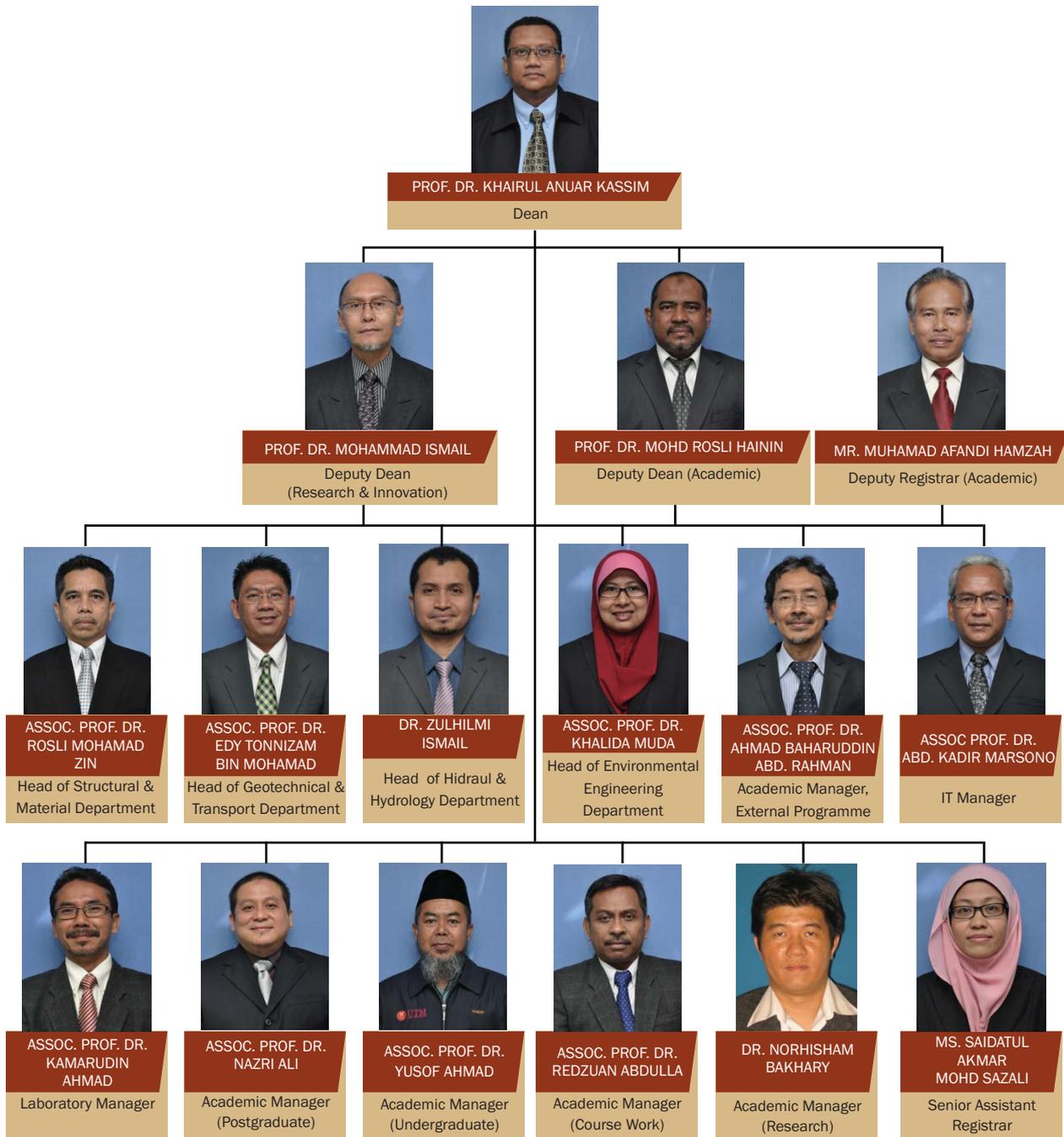
Thank you, Wassalam.



**Prof. Dr. Khairul Anuar bin Kassim
Dean, Faculty of Civil Engineering
Universiti Teknologi Malaysia**



5.0 MANAGEMENT COMMITTEE



6.0 ACADEMIC STAFF

6.1 Administration Personnel

The **UTM-Faculty of Civil Engineering** is headed by the Dean and assisted by two Deputy Deans. The Deputy Dean (Academic) manages the academic affairs of the undergraduate and postgraduates programmes, while the Deputy Dean (Development) manages staff developments at the Faculty. At present 153 academic and 111 administrative and technical staff serve the faculty. The strength of the faculty consists of 20 Professors, 44 Associate Professors, 67 Senior Lecturers, 14 Lecturers, 8 Tutors, 109 Ph.D., 40 Master's and 3 B.Eng. Degree holders

1.		Designation : Dean Name : Prof. Dr. Khairul Anuar Kassim Qualification : B.Sc.(Civ. Eng.)(London) : M.Sc.(Geotechnical)(Newcastle Upon Tyne) : Ph.D.(Geotechnical)(Newcastle Upon Tyne) E-mail : kanuar@utm.my Ext. : 31500 Room No. : M46-103
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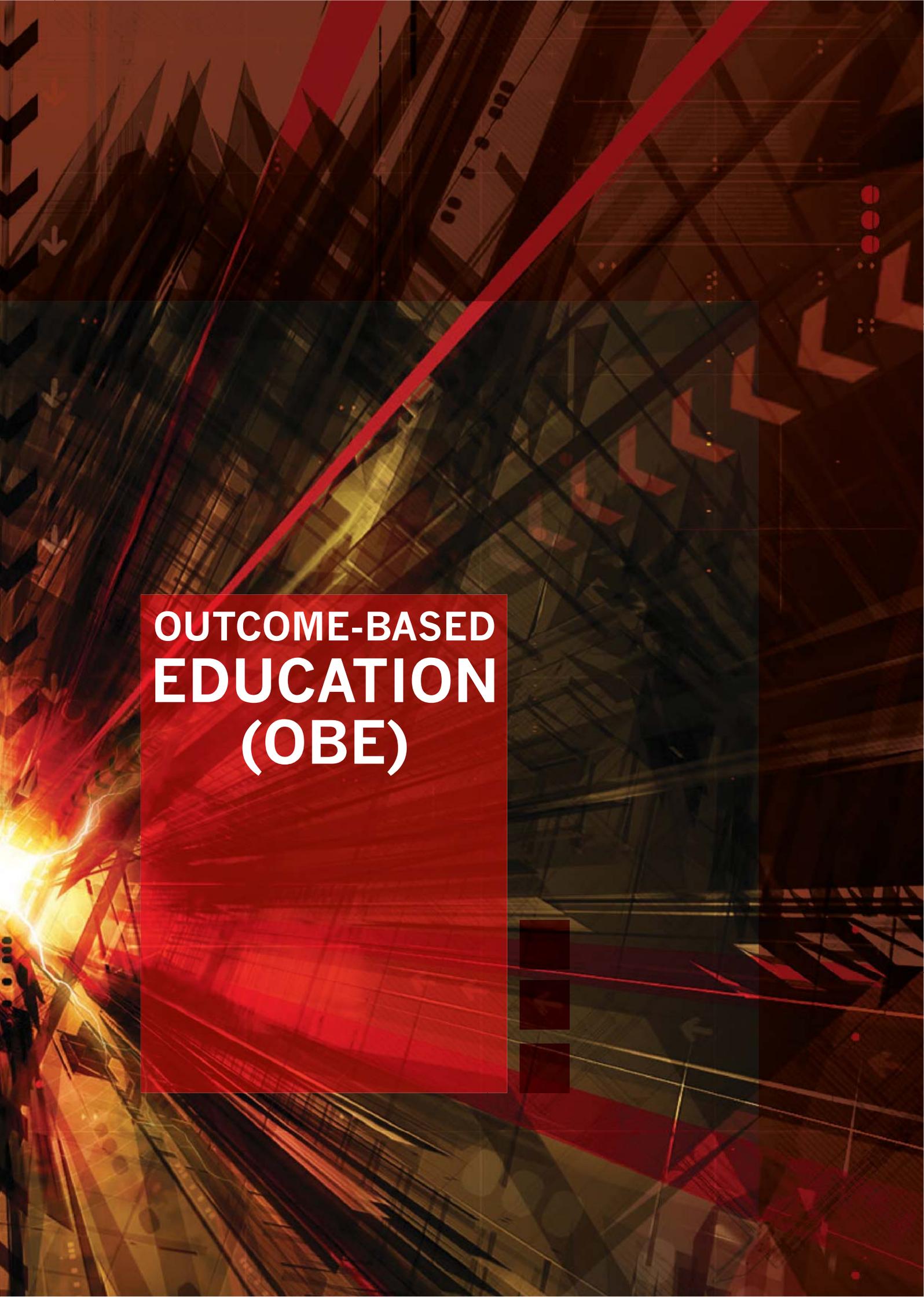
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**OUTCOME-BASED
EDUCATION
(OBE)**

7.0 OUTCOME-BASED EDUCATION (OBE)

WHAT IS OUTCOME-BASED EDUCATION (OBE)?

Outcome-Based Education (OBE) is a shift in focus from curricula, resources and processes towards outcomes and objectives.

OBE focuses on student learning by :

- Using learning outcome statements to make explicit what the student is expected to be able to know, understand or do;
- Providing learning activities which will help the student to reach these outcomes;
- Assessing the extent to which the student meets these outcomes through the use of explicit assessment criteria.

OBE INITIATIVES AT FKA

FKA embarked on outcome-based approach with a conviction that the efforts will benefit both the students and staff in continually improving the programmes. Attempts to improve the competencies of students in many aspects are actually neither new nor rare. Many academic staff had consciously or subconsciously applied various approaches to enhance students' learning in isolation from one another. UTM's serious efforts towards outcome based approach started as early as 2002 when awareness seminars and related activities were conducted.

When a framework for an outcome-based approach was institutionalized in early 2005, efforts for improving undergraduate education became systematic and coherent. A comprehensive methodology of combining technical competencies and generic skills sought by employers, alongside numerous activities associated with it are put together to give the 'big' picture known as the UTM OBE framework. The framework connects the relationship between all the activities, rationalizing why such activities are necessary and how monitoring and assessment can be executed. The framework is divided into three main stages of planning, implementation, assessment and closing the loop, or overall evaluation to improve the setup. While initial training and implementation starts, the process is continuous, and may be simultaneously performed, especially when the first cycle has been completed.

In view of outcome-based education, it is of prime importance that related information and activities be communicated and understood by all academic, supporting staff, as well as students. Hence, there is a need to come up with a policy or guidelines underlying the teaching and learning activities in relation to outcome-based approach. Hence, the Teaching and Learning Policy and Code of Practices were published and made available to academic staff. At the same time, the needs and requirements of stakeholders must be taken into account. Initially, a taskforce was set up in December 2003 and several discussions were held to address issues on students' employability and professional skills. This led to the launching of the UTM Graduate Attributes in April 2004. The blueprint outlines seven graduate attributes that every UTM graduate should master upon graduation.

These requirement, which were feedbacks analyzed from stakeholders and employers of graduates, in turn, form the basis in the development of the Programme Objectives and Programme Outcomes of the civil engineering programme.

These seven (7) attributes, as well as the required technical skills, are then transferred to form part of the Programme Specification. This particular document comprises of the programme objectives, programme outcomes, programme content, course menu and course to programme outcomes mapping matrix, as well as the method of delivery and assessment used in the programme. UTM started the distribution of these programme specifications together with the offer letters to all its new students starting from the June 2005/2006 academic intake.

Programme Specification content depends on the programme designed by the owners at the department or Faculty level. The programme objectives and outcomes were discussed and determined together with the academic staff, taking into account the stakeholders' input. Academic staff representatives are also included in finalizing the course outcomes to ensure proper knowledge and professional skills development for students in each semester. This is crucial to ensure ownership of the programme amongst all members of the department or Faculty.

The course outcomes must be aligned to the programme outcomes, which are in turn mapped to the programme objectives.

Description of Programme Educational Objectives (PEOs)

The Programme Objectives (PEOs) have been formulated based on visions and missions of UTM and FKA. PEOs outline the expected abilities of graduates of the Bachelor of Engineering (Civil) programme four (4) to five (5) years after their graduation. Our PEOs are listed as follows;

- PEO 1:** Graduates are competent, innovative and entrepreneurial in acquiring and applying knowledge towards solving civil Engineering problems.
- PEO 2:** Graduates possess leadership qualities, able to work, manage in diverse teams and serve the society in multi-disciplinary environment.
- PEO 3:** Graduates demonstrate professionalism and uphold ethical values with emphasis on sustainable environment
- PEO 4:** Graduates are able to communicate effectively, possess strong self-confidence and recognize the need for life-long learning.

Programme Outcomes (POs)

The Programme Outcomes (POs) are attributes that are expected to be attained by students upon completion of their Bachelor of Civil Engineering programme. Our POs are listed as follows;

- PO 1: Ability to apply knowledge of science, mathematics, civil, engineering principles and other relevant field of studies to solve complex engineering problems.
- PO 2: Ability to analyse and use appropriate techniques, resources and modern tools to solve complex engineering problems and activities.
- PO 3: Ability to design solutions for complex problems and design components, systems, or processes that comply specific requirement with appropriate consideration of other requirements.
- PO 4: Ability to resolve complex problems based on investigation or research using integration of knowledge and the consequent responsibilities relevant to professional practice.
- PO5: Ability to communicate effectively and with confidence including complex engineering activities.
- PO6: Ability to engineering, management and finance principles in managing project.
- PO7: Ability to function effectively as an individual or in a team to achieve common goals in diverse teams and in multi-disciplinary settings.
- PO8: Ability to perpetually seek and acquire contemporary technological changes.
- PO9: Ability to demonstrate entrepreneurial skills, lead and manage a team effectively in multidisciplinary environment with self- assurance.
- PO10: Ability to understand the impact of engineering decisions and apply professional ethics for sustainable development.

These programme POs are published in most academic-related Faculty documents and distributed to all new students during their enrolment in UTM, as part of their Programme Specification. The POs also appear in other documents, such as Students Academic Handbook, ISO9001:2008 Quality Manual, FKA Homepage, posters, souvenirs and other visuals displayed at strategic locations at the Faculty.

8.0 SOFT-SKILL ELEMENTS

PO 4 [Critical Thinking and Problem Solving Skills]

LEVEL	SKILLS	DETAIL
CTPS1	KIM	Ability to identify and analyse problem in complex situation and making justify judgement.
CTPS2	KIM	Ability to expand and correcting thinking skills like explaining, analysing and evaluate discussion.
CTPS3	KIM	Ability to come out with ideas and alternative solutions.
CTPS4		Ability to think out of the box.
CTPS5		Ability to make decision based on strong evidence.
CTPS6		Ability to sustain and giving full concentration to responsibility given.
CTPS7		Ability to understand and acclimatise to community culture and new working environment.

PO 5 [Communication Skills]

LEVEL	SKILLS	DETAIL
CS1	KIM	Ability to convey the idea clearly, effective and full of confidence verbally and written.
CS2	KIM	Ability to practise active listening skill and able to give feedback.
CS3	KIM	Ability to make presentation clearly with full confidence and suitable with the audience.
CS4		Ability to use technology in presentation.
CS5		Ability to negotiate and coming to an agreement.
CS6		Ability to communicate with other participants from different culture.
CS7		Ability to enhance communication skills individually.
CS8		Ability to use non verbal skills.

PO 6 [Entrepreneurship Skills]

LEVEL	SKILLS	DETAIL
KK1	KIM	Ability to identify business opportunity.
KK2		Ability to draft business planning.
KK3		Ability to develop, explore and grab the business and job opportunity.
KK4		Ability to work on their own.

PO 7 [Teamwork Skills]

LEVEL	SKILLS	DETAIL
TS1	KIM	Ability to develop good relationship, interaction with colleague and work effectively with other people to achieve mutual objective.
TS2	KIM	Ability to understand and play a role sparingly with team leaders and other members.
TS3	KIM	Ability to identify and respect other people's behaviour and believe.
TS4		Ability to contribute in planning and coordinate group effort outcome.
TS5		Responsible with group decision.

PO 8 [Long Life Learning and Information Management Skills]

LEVEL	SKILLS	DETAIL
LL1	KIM	Ability to acquire and manage relevant information from various sources.
LL2	KIM	Ability to accept new ideas and able to learning autonomy.
LL3		Ability to develop want to know mind and knowledge.

PO 9 [Leadership Skills]

LEVEL	SKILLS	DETAIL
LS1	KIM	Knowledge on basic leadership theory.
LS2	KIM	Ability to lead a project.
LS3		Ability to understand and play role sparingly with team leader and other members.
LS4		Ability to monitor team members.

PO 10 [Etiquette and Professionalism Skills]

LEVEL	SKILLS	DETAIL
EM1	KIM	Ability to understand the impact of economy, environment and sosioculture of professional practices.
EM2	KIM	Ability to analyse and making decision in etiquette related problem.
EM3		Ability to practice etiquette values and responsibility towards society.

9.0 SPECIAL PROGRAMMES

9.1 CIVIL ENGINEERING EXIT TEST (CEET)

Introduction

The implementation of Outcome Based Education (OBE) warrants the need to ascertain students obtained the outcomes that are desired for anyone programme. Traditional periodic assessment methods cannot guarantee the outcomes. Feedback from the industry claims that our students are weak in fundamental knowledge.

Therefore, Civil Engineering Exit Test (CEET) is an innovative assessment method to evaluate the students' attainment of cognitive domain in fundamental courses to all final year students at undergraduate level. All final year students are compulsory to sit this test. Student should pass this before graduation.

CEET is a form of summative measurement of students' attainment of learning outcomes in the OBE approach, which is considered as the most realistic measures to ensure that upon graduation, they have acquired competency not only in the subjects learnt in the final semester, but also all basic engineering knowledges they have learnt in the earlier years of the study. CEET is the best answer to the industry's feedback and suggestion to strengthen the basic engineering knowledge of our graduates. It is the only assessment method that will be used to standardise and upgrading the level of basic engineering knowledge of all new engineers in the country.

There are 20 courses covered in CEET. More or less three questions were set from each course; mostly they are very general and some with little calculations. It covers the knowledge that the students should know as an engineer upon graduation. The total number of question is 120 and the duration for the test is 6 hours. All questions are objective with four choices (A, B, C, D). Four programme outcomes (PO) will be addressed in this test i.e. basic knowledge in civil engineering principles, analysis, design, and sustainability. All questions were prepared and checked by competent academic staff to ensure its quality. The relevancy of the questions was vetted by stakeholders represented by practicing professional engineers from industries.

The test was initially conducted in early January 2013 as a preparation for accreditation by Engineering Accreditation Council (EAC). All students should pass all the POs addressed in this test. Hopefully, this test will exhibit a good measurement on student's attainment of fundamental knowledge.

CEET proved to be an innovative approach in determining attainment of fundamental knowledge and the addressed POs which required by EAC. For future planning, the test will be fully conducted using online system. Further refinement could elevate CEET as an exit assessment for IHLs nationwide. Later, this test will be suggested to Institute of Engineers Malaysia (IEM) to become preliminary assessment before the candidates sit the examination for Professional Engineer (P.Eng).

Objectives of CEET

- i. To assess the fundamental knowledge of selected core courses from civil engineering curriculum
- ii. To ensure the effectiveness of our curriculum in developing fundamental knowledge to all students before graduate
- iii. To incorporate the assessment of CEET into student's report card

Why CEET is important?

- i. A new standardized test for graduating students (from various higher educational institutions) intended to give prospective employers a measure of their abilities and knowledge in field of civil engineering.
- ii. The test aims to provide a more objective way to compare the intellectual achievements of graduates in terms of their understanding of fundamental knowledge in civil engineering
- iii. It is another set of information that employers can use to pre-evaluate the applicant
- iv. Students will be able to incorporate the results of the test into their resumes (to show their strength) and have the option of sending copies of the reports to potential employers.

Educational principles

- i. A form of summative measurement of students' attainment of learning outcomes in the OBE approach, which is considered as the most realistic measures to ensure that upon graduation, they have acquired competency not only in the subjects learnt in the final semester, but also all basic engineering knowledges they have learnt in the earlier years of the study.
- ii. It is the best answer to the industry's feed back and suggestion to strenghten the basic engineering knowledge of our graduates.
- iii. It is the only assessment method that will be used to standardise and upgrading the level of basic engineering knowledge of all new engineers in the country.

Who will get benifit from CEET?

- i. Students will gauge their performance in the various fields of civil engineering aspects thus enabling them to be more knowledgeable and well prepared to meet the demands of the engineering world.
- ii. Students will be able to incorporate the results of the test into their resumes (to show their strength) and have the option of sending copies of the reports to potential employers.
- iii. Academicians are able to assess and evaluate the curriculum and syllabus based on the student's performance. This will provide the necessary information for the continuous quality improvement process.
- iv. The CEET results show the level of student's achievement for various programme outcomes. This will facilitate employers to pre-evaluate in the selection of employees with the capabilities that suit their requirements.
- v. Institution of Engineers: This test can be applied to all graduating students. This will provide information on the level of competency of the graduate.

9.2 HOLISTIC STUDENT DEVELOPMENT PROGRAM

Introduction

The student development vision of the university is to produce holistic graduates characterized by obedient to God and well-balance in bio-physical, emotional, spiritual, intellectual and social to fulfill local and global job market. Based on this vision, the faculty has converted the philosophical concept into a realistic practice by implementing the Holistic Student Development Program (Program Pembangunan Mahasiswa Holistik - PPMH).

Holistic can be defined as values embraced by students which not only limited to the attainment of excellence academic achievement, but also include the inter relationship of purity minds in individual, community, environmental, the nation and the Creator. This is the only pedagogical concept that would guarantee the achievement of the 2020 vision, i.e. to become a developed nation whilst upholding high spiritual values.

The program is designed to complement the attainment of program learning outcomes (PO) for generic skills which is focused on ethics and moral and based on the feedback survey from the stakeholders. Various categories of modules have been developed to achieve the purpose, where each module consists of a series of lectures or activities in the form of experiential learning. Each module is mapped to the five basic attributes and is slotted into the weekly academic timetable throughout the semester from the beginning to the end of the study. Facilitators of the modules are invited from those who are expert in their fields such as professors in humanity, medical doctors, motivators, humanitarian activist, project managers and businessmen.

The lecturers in the faculty are also trained to take the responsibility of few series of the modules. To ensure that the students' academic performance is not affected, the total learning hours occupied by the modules is not longer than 224 hrs, which is based on 2 hours per week. The effectiveness of the program in transforming the personal value of students is measured by an indicator called holistic quotient (HQ) index which is designed based on IQ, EQ, SQ index. Feedback from students have indicated that they are very pleased participating in the program. Based on the feedback from the students, they gain new knowledge of different varieties which can benefit them in future.

Significance of the program

- i. The program is designed to enhance the attainment of learning outcomes (PO) for generic skills with focus on ethics and moral values.
- ii. It suit with the university's Student's Development Plan which is not really embraced by any faculty.
- iii. More significantly, it is in line with the ministry's Educational Transformation Plan which is just recently initiated. It complement with the other technical skills learning outcome, producing graduates who are excellence in all aspects of life.
- iv. It is known to be the pioneer in translating philosophical concept into a systematic practical implementation.

Educational principles

- i. It is based on the five elements of educational balance, JERIS (Jasmani (biophysical), Emosi (Emotional), Rohani (Spiritual), Intelek, Sosial).
- ii. The program is designed to complement the attainment of program learning outcomes (PO) set in accordance to EAC requirements by infusing for generic skills i,e, ethics and moral as the major focus, at the end of the study.
- iii. The learning time used for this program is designed such that it does not affect the academic performance of students.
- iv. The topic of the modules delivered in this program is based on the input given by stakeholders.

- v. The achievement and effectiveness of the program is to be measured by an instrument called the Holistic Quotient index.
- vi. The program is conducted in collaboration with the students societies representative committee incorporating Persatuan Kejuruteraan Awam (PEKA), Majlis Perwakilan Mahasisawa (MPM), and Persatuan Mahasiswa Islam (PMI).

Who will benefit and has benefited from the program

- i. Students - the program is mainly for the students' benefit. It give opportunity to open up their minds for a wider dimension of life values outside the classrooms. They will realize that to be a respectful graduate and citizen, academic is only part of it, they should excel in softskill as well as having purity of minds.
- ii. Society - graduates with holistic values contribute to the sustainability of the complex socio-economic-political system, i.e. in maintaining the wealth, prosperity, peaceful and stability.

9.3 OBE BASED STUDENT INFORMATION TOOLS

Introduction

The outcomes based approach subscribes by the Malaysian Qualification Agency (MQA) as part of the accreditation requirements warrants the need to ensure students attain the desired outcomes at the end of their study. Over the years the students tend to have difficulty to stay focus, monitor, acquire and improved these outcomes. This is particularly true for engineering departments that have thousands of engineering students. The faculty management found it difficult to communicate and make the students take charge on their learning. Therefore, 3 easy and innovative information tools are adopted by UTM-Faculty of Civil Engineering to help the students to self-improve and able to them to attain the student outcomes. The tools are CO-PO (course outcomes-programme outcome) mapping, course outline templates and students assessment record. These tools are designed to address the issues on the breadth and depth of the curriculum, instructional approaches and assessment. Complex problems as part of the requirements highlighted in the manual of Engineering Accreditation Council (EAC) are also clearly addressed in the mapping and course outlines. The templates and report have shown to be an effective instrument to help the students to understand the outcome based approach and at the end able to help them to attain the student outcomes set by the institution of higher learning. In the future, these template can be readily made available online.

Significance of the program

The innovation is intended to enhance the teaching and learning amongst the students by providing them tools that able them to understand outcome based education, manage their learning and monitor their own performance. Students can also used these information systematically in their resumes as evidences of what they acquired and attained during their study.

It also help the faculty members to communicate effectively and systematically manage their teaching and learning materials and activities.

As a whole, since the innovation is an on-going process for both the students and the lecturers, it supports the concept of continuous quality improvements in the teaching and learning process.

Educational principles

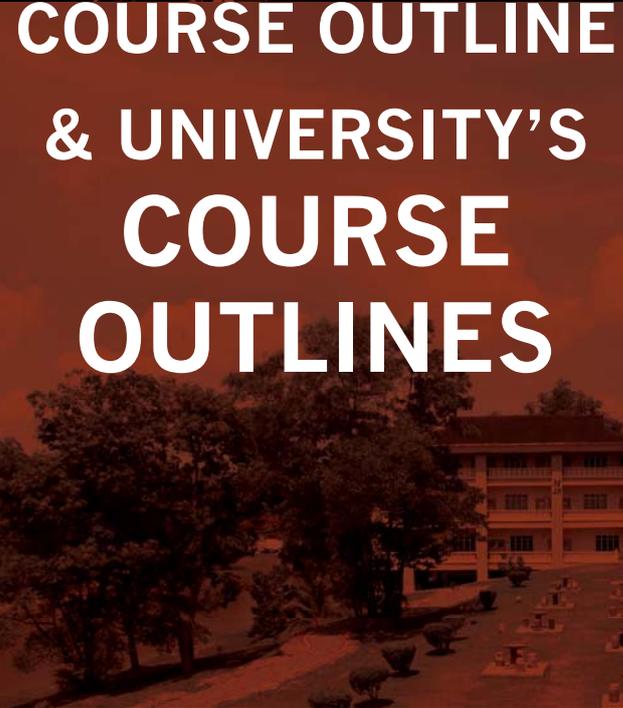
The basis of the innovation is the desire and pleasure to watch them engage and attain the outcomes as required by the stakeholders. The outcome based approach has been the underlying principles used in this innovation.

Who will benefit and has benefited from the program

- i. Students : Students will be able to understand the basis of outcome based education, manage their learning and monitor their own performance and prepared to meet the demands of the industry.
- ii. Academician : Academicians are able to communicate the overall breadth and depth of the outcomes and systematically manage their teaching and learning materials and activities.
- iii. Employers : The tools shows the breadth and depth of what the graduates have gone through and able to show the level of competencies that will facilitate them in the selection of employees. Employers can also see clearly the attainment of student on technical and generic skills.

SUMMARY OF PERFORMANCE CRITERIA

NO.	CRITERIA	LEVEL 1 (0-39%)	LEVEL 2 (40-49%)	LEVEL 3 (50-64%)	LEVEL 4 (65-79%)	LEVEL 5 (80-100%)
PO-1a	Ability to apply the knowledge of civil engineering principles	Unable to apply civil engineering principles in solving basic engineering problem.	Able to apply civil engineering principles in solving basic engineering problem.	Able to apply civil engineering principles in solving complex engineering problem.	Able to apply and analyse civil engineering principles in solving complex engineering problem.	Able to apply and formulate civil engineering principles in solving complex engineering problem.
PO-1b	Ability to apply the knowledge of sciences, mathematics, and other relevant fields	Unable to apply mathematical and other relevant fields of studies in solving basic engineering problem.	Able to apply mathematical and other relevant fields of studies in solving basic engineering problem.	Able to apply mathematical and other relevant fields of studies in solving complex engineering problem.	Able to apply and analyse mathematical and other relevant fields of studies in solving complex engineering problem.	Able to apply and formulate mathematical and other relevant fields of studies in solving complex engineering problem.
PO-2a	Ability to analyse civil engineering problems	Unable to analyse basic engineering problems	Able to analyse basic engineering problems	Able to analyse complex engineering problems	Able to analyse and evaluate complex engineering problems	Able to analyse and formulate complex engineering problems
PO-2b	Ability to use tools in solving civil engineering problems	Unable to use tools in solving basic engineering problems	Able to use tools in solving basic engineering problems	Able to use tools in solving complex engineering problems	Able to use tools in solving and evaluate complex engineering problems	Able to use tools in solving and formulate complex engineering problems
PO-3	Ability to design components, systems, or processes for complex problems	Unable to design basic engineering problems	Able to design basic engineering problems	Able to design complex engineering problems	Able to design and evaluate complex engineering problems	Able to design and formulate complex engineering problems
PO-4	Ability to resolve complex problems based on investigation or research	Unable to resolve basic engineering problems based on investigation or research	Able to resolve basic engineering problems based on investigation or research	Able to resolve complex engineering problems based on investigation or research	Able to resolve and evaluate complex engineering problems based on investigation or research	Able to resolve and formulate complex engineering problems based on investigation or research
PO-5	Ability to communicate effectively with confidence	Unable to communicate in simple situation	Able to communicate in simple situation	Able to communicate with confidence in simple situation	Able to communicate effectively with confidence in simple situation	Able to communicate effectively with confidence in complex situation
PO-6	Ability to manage projects	Unable to manage projects in simple situation	Able to manage simple projects in simple situation	Able to manage simple projects in complex situation	Able to manage complex projects in complex situation	Able to manage complex projects in complex situation with efficient
PO-7	Ability to work in a diverse team and multi-disciplinary	Unable to work in a team	Able to work in a team	Able to work in a diverse team	Able to work effectively in a diverse team	Able to work effectively in a diverse team and multi-disciplinary
PO-8	Ability to perpetually seek and acquire contemporary technological changes	Unable to seek and acquire technological changes	Able to seek and acquire technological changes	Able to perpetually seek and acquire technological changes	Able to perpetually seek and acquire contemporary technological changes	Able to perpetually seek and acquire contemporary technological changes with constant
PO-9a	Ability to demonstrate entrepreneurial skill	Unable to demonstrate entrepreneurial skill	Able to demonstrate entrepreneurial skill	Able to demonstrate entrepreneurial skill to utilize minimum resources	Able to demonstrate entrepreneurial skill to utilize minimum resources and maximize the benefit	Able to demonstrate entrepreneurial skill to utilize minimum resources and maximize the benefit efficiently
PO-9b	Ability to lead and manage a team effectively in multidisciplinary environment with self-assurance	Unable to lead and manage a team	Able to lead and manage a team	Able to lead and manage a team effectively	Able to lead and manage a team effectively in multidisciplinary	Able to lead and manage a team effectively in multidisciplinary with self-assurance
PO-10a	Ability to understand the impact of engineering to the society and environment	Unable to understand the impact of engineering to the society	Able to understand the engineering decisions	Able to understand the impact of engineering decisions	Able to understand the impact of engineering decisions to the society	Able to understand the impact of engineering decisions to the society and environment
PO-10b	Ability to integrate economic and environment for sustainability development	Unable to demonstrate sustainability development	Able to demonstrate the economic and environment	Able to demonstrate sustainability development	Able to demonstrate the economic and environment for sustainability development	Able to integrate the economic and environment for sustainability development
PO-10c	Ability to apply professional ethics	Unable to apply professional ethics	Able to apply professional ethics	Able to apply professional ethics in some aspects	Able to apply professional ethics in all aspects	Able to apply and show professional ethics in all aspects



FACULTY'S COURSE OUTLINE & UNIVERSITY'S COURSE OUTLINES

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: B
	Date of issue	: 15 th July 2010
	Last Amendment	: 25 th April 2011
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA1012
CIVIL ENGINEERING FUNDAMENTALS: SKAA1012 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course is only offered in the 1st Semester every year to all new students who have just registered in the Faculty of Civil Engineering. The course includes a general introduction to the field of civil engineering and the engineer's responsibilities to society. Main subfields in the discipline such as Structural Engineering, Transportation and Geotechnical Engineering, Hydraulics and Hydrology and Environmental Engineering will be highlighted. Problem solving exercises apply fundamental concepts from these subfields to integrate the steps of analysis, synthesis and evaluation through individual homework assignments and group projects through competition in selected civil engineering fields that require attention to a broad range of issues. The course also exposes the students to issues related to engineering practice such as working in teams, scheduling, evaluating risk and making ethical decisions. Prior to regular weekly lectures and project exercises, a special welcoming lecture will be given by the Dean of the Faculty.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Express a basic understanding of the civil engineering profession in its various disciplines.	PO1			KP7	C2	A
CO2	Interpret and solve civil engineering problems through competition related to civil engineering fields.	PO1, PO2	CP2	CA2		C3	Pr
CO3	Think creatively and to apply basic research skills.	PO2				C3, P3	A, Pr
CO4	Demonstrate their organizational and presentation skills with a professional attitude.	PO5				P3, C1, C2, C3	P
CO5	Have the opportunity to interact with their peers and work in a team .	PO7 PO10				A3, TS1, TS3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	20
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	8
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	18
	b. Revision	10
	c. Assessment Preparations	16
3.	Formal Assessment	
	a. Continuous Assessment	8
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

Lectures

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1 – 2	<ul style="list-style-type: none"> ▪ Welcoming speech by the Dean or Deputy Dean. ▪ An Introduction to Civil Engineering and the role of civil engineers. ▪ The close ties between the Faculty and civil engineering firms, government agencies and professional organization such as IEM, BEM and any other international bodies. ▪ What Faculty (FKA) can offer and the facilities and expertise available.
2	3 – 4	Department of Structures & Materials <ul style="list-style-type: none"> ▪ Structural engineering includes the design and construction of steel structures, including buildings, bridges, tunnels and offshore structures such as oil rigs. ▪ Construction materials like steel, concrete, timber and their applications. ▪ Role of structural engineer.
3	5 – 6	Department of Geotechnics & Transportation <ul style="list-style-type: none"> ▪ Transportation – concerned with developing transportation systems, including highways, airports and runways and rail systems. ▪ Geotechnical – includes the design and construction of rock and soil based structures, including foundations and retaining walls. ▪ Role of Geotechnical & Highway Engineer.
4	7 – 8	Department of Hydraulics & Hydrology <ul style="list-style-type: none"> ▪ Water Resources – includes construction of dams, canals and water pipeline systems as well as conservation and resource management. ▪ Aspects of hydrology including basic hydrological cycle and processes. ▪ Introduction to basic coastal engineering topics such as wave movements, shoreline and tsunami protection methods. ▪ Role of Hydraulic & Irrigation Engineer.
5	9 – 10	Department of Environmental Engineering <ul style="list-style-type: none"> ▪ Environmental engineering involves wastewater treatment, air pollution management and the handling and processing of hazardous wastes. ▪ Role of Environmental Engineer.
6	11 – 12	<ul style="list-style-type: none"> ▪ Fundamental survey measurements. ▪ The role of surveyors in civil engineering firms ▪ Introduction of IT in construction. ▪ Research Methodology & Pre-Project ▪ Final Year Project ▪ Project on Professional Practice ▪ Civil Engineering Seminar ▪ Industrial Training ▪ Laboratory
7	13 – 14	<ul style="list-style-type: none"> ▪ Briefing on grouping, assignment topic and competition / presentation from subject coordinator.

8		MID SEMESTER BREAK
9	15 – 16	▪ Introduction to sustainable development principles.
10	17 – 18	▪ Engineering sustainability.
11	19 – 20	▪ Engineer Professional Ethic and responsibility to society.
12	21 – 22	▪ Competition preparation.
13	23 – 24	▪ Competition continue.
14	25 – 26	▪ Competition continue.
15	27 – 28	▪ Competition assessment.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

None

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Essay or report writing	5	10	50	
2.	Presentation (individual)	1	10	10	
3.	Group competition and teamwork	1	40	40	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Prof. Dr. Shahrin Mohammad	shahrin@utm.my	M46-103	31500
2.	Prof. Dr. Mohd. RazmanSalim	mohdrazman@utm.my	M46-155	31506
3.	Prof. Dr. AminatonMarto	aminaton@utm.my	M46-311	31703
4.	Prof. Dr. Ahmad KhairiAbd. Wahab	akhairi@utm.my		03-2615 ext : 4370
5.	Assoc. Prof. Dr. Abd. LatifSaleh	alatif@utm.my	M46-106	31503
6.	Dr. Roslli Noor Mohamed (P)	roslli@utm.my	M46-218	32456
7.	Dr. RozanaZakaria	rozana@utm.my	M47-115	32441
Competition				
1.	Assoc. Prof. Ir. Dr. AzmanKassim	azmankassim@utm.my	C09-221	31685
2.	Assoc. Prof. Dr. Kamarudin Ahmad	kamarudin@utm.my	M47-118	32515
3.	Dr. KhalidaMuda	khalida@utm.my	C07-316	31522
4.	Dr. Norhazilan Md. Noor	norhazilan@utm.my	C09-329	31626
5.	Dr. Tan Cher Siang	tcsiang@utm.my	D04 217	31539
6.	Mr. Muhd. Nur AsmawishamAlel	alel@utm.my	M46-312	32140
7.	Ms. NormalaHashim	normala@utm.my	C07-315	31516
8.	Ms. Zainab Mohamed Yusof	zainabyusof@utm.my	C09-319	31716
9.	Ms. NuryazmeenFarhanHaron	nuryazmeen@utm.my	C09-228	31637

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: A
	Date of issue	: 21 st February 2011
	Last Amendment	: 21 st July 2011
	Edition	: 1
	Procedure No.	: FKA/PG/RK/SKAA 1023
ENGINEERING SURVEYING SKAA 1023 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 3 hours / week		

SYNOPSIS

This course provides the basic theory and practice of surveying to civil engineering students. Methods of establishing horizontal & vertical control for construction and design are explained, compared and practiced via fieldworks. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to analyse errors so that standard accuracies are met. Detailing for producing site plans, area and volume estimations, road curves geometric design are also discussed. The concept of field survey automation and the usage of software are explained. At the end of the course, students are expected to be able to plan, execute, compute and analyse surveying works involved in establishing horizontal & vertical controls and producing plans for civil engineering applications. Students should also be able to geometrically design horizontal and vertical curves according to standards, perform area calculations and volume estimation for earthwork activities in civil engineering.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Identify and compare surveying methods that are applicable to civil engineering.	PO1				C1, C2	T, F
CO2	Apply knowledge of surveying in providing controls, engineering plans and conducting setting out via measurements obtained during fieldworks.	PO3	CP1	CA1		C3, P4	FW
CO3	Utilise softwares and relevant tools in solving and analyzing surveying problems.	PO2			KP6	C4, P4	FW
CO4	Acquire current surveying techniques and instrumentation being used in civil engineering design and construction.	PO8				C6	A,FW

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial (Fieldwork)	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	36
	b. Revision	15
	c. Assessment Preparations	18
3.	Formal Assessment	
	a. Continuous Assessment	6
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lectures
2. Fieldwork

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction, branches of surveying, basic principles, survey methods & errors
	2	Introduction to vertical control, principles, objective and application
	3	Leveling – concept, terminologies and principles of leveling instruments
2	4	Types of levels – salient features & leveling staff
	5	Temporary and permanent adjustments of levels, two-peg test
	6	Leveling procedures and booking techniques & fieldwork
3	7	Booking examples – rise & fall and HPC
	8	Leveling comps, corrections and checks (I)
	9	Leveling comps, corrections and checks (II)
4	10	Inverted staff – applications and examples
	11	Leveling accuracy and error analysis
	12	Introduction and principles of horizontal control, traverse and its applications
5	13	Types and class of traverse, coordinate systems
	14	Theodolites / edm / total stations – types, usage and adjustments
	15	Traverse procedures and checks & fieldwork
6	16	Bearing & distance observations and booking techniques
	17	Travers comps, bearing & distance corrections (I)
	18	Traverse comps, bearing & distance corrections (II)
7	19	Error analysis and solution
	20	Introduction to detail survey, basic principles, methods, radiation method using total station
	21	Booking and comps, accuracy, sources of errors and applications
8		MID SEMESTER BREAK
9	22	Introduction to road curves, purpose of road curves, geometric design of circular curves
	23	Computations of setting out data for circular curves
	24	Introduction to transition curves and their applications, combined curves & fieldwork
10	25	Super elevation, computations of setting out data for transition and combined curves
	26	Computation examples and checks (I)
	27	Computation examples and checks (II)
11	28	Introduction to vertical curves, assumptions and equations
	29	Computation examples and setting-out data (I)
	30	Computation examples and setting-out data (II)

Week	Lecture	Topic / Content
12	31 32 33	Introduction to area calculations, methods for straight line boundaries Methods of calculating areas with irregular boundaries, planimeter, examples Areas from cross-sections, types of cross sections and related equation
13	34 35 36	Examples of area calculation from cross-sections, introduction to volume estimations Methods of volume estimations, volume from cross sections and computation examples Volume from spot heights and contours, computation examples
14	37 38 39	Introduction to mass-haul diagrams, functions and terminologies Calculation of haulage costs using mass-haul diagrams Worked example on haulage costs
15	40 41 42	Introduction to field survey automation (field to finish) Surveying Engineering Software familiarization I (data reduction & adjustments) Surveying Engineering Software familiarization II (design & output) & fieldwork
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- Bannister, A., Raymond, S. & Baker, R. (1998). SURVEYING. Longman.
- Uren, J. & Price, W.F. (1994). SURVEYING FOR ENGINEERS. Palgrave Macmillan.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	2	5	10	Week 5, 10
2.	Projects and problem solving ability	4	5	20	
3.	Quizzes				
4.	Presentation				
5.	Tests	2	15	30	Week 9, 15
6.	Final Exam	1	40	40	Week 17 – 19
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of lecture hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Dr. Mushairry Mustaffar	mushairry@utm.my	M50 02-27-01	38680 32447(Lab)
2.	Assoc. Prof. Dr. Mohd. Zulkifli Mohd. Yunus	mzul@utm.my	M46-231	31679
3.	Mr. Radzuan Sa'ari	radzuan@utm.my	M50 02-32-01	38650 32447(Lab)

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: A
	Date of issue	: 21 st February 2011
	Last Amendment	: 21 st July 2011
	Edition	: 1
	Procedure No.	: FKA/PG/RK/SKAA 1031
SURVEY CAMP SAB1031 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : Practical		

SYNOPSIS

After successfully completing course SKAA 1023, students are well exposed to the theory and practice of surveying. Nevertheless, surveying projects that were undertaken so far are 'stand alone' projects with emphasis on the understanding of the concepts involved. Therefore, this subject provides training of the surveying work involved in a typical civil engineering project. In other words, this subject gives a holistic view of the surveying activities needed prior to and during the construction stage of a civil engineering project. The course will furthermore, train students in planning and executing survey works on a larger scale. The surveying works involved depend on the type of project undertaken, but normally include establishing horizontal and vertical controls, detailing, earthwork calculations and setting out. Students are assessed based on their oral presentation and written reports submitted at the end of the course. This subject introduces the basics and concepts of surveying in general with emphasis towards engineering surveying. Basic surveying needs commonly required in civil engineering are explained. Methods of establishing horizontal & vertical controls, detailing for producing site plans, area and volume estimations, road curves geometric design and setting out are discussed. Students are introduced to the typical field tasks as required in civil engineering. Common methods of field procedures, bookings and reduction of observations are adopted. Students are expected to be able to establish horizontal and vertical controls, setting out and detailing. The importance of surveying field activities prior to the design and during the construction stages in civil engineering work is highlighted. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to conduct survey works that meet standard accuracies.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Apply theory into practice.	PO1				C3	Pr
CO2	Identify and solve surveying problems in civil engineering.	PO3	CP1			C3, P4	Pr
CO3	Communicate effectively when presenting results and ideas.	PO5				P3, CS1, CS3	Pr, P
CO4	Justify methods and equipment to suit purpose of survey.	PO2		CA1	KP6	C3	Pr
CO5	Function effectively in a team and play role sparingly with other members to achieve a common goal.	PO7				A3, TS3	Pr
CO6	Lead and manage a team effectively with confidence.	PO9				A3, LS3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	20
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial / Field	8
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	18
	b. Revision	10
	c. Assessment Preparations	16
3.	Formal Assessment	
	a. Continuous Assessment	8
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

Lectures

1. Fieldworks.

WEEKLYSCHEDULE

Days	Topic / Content (Survey Camp Activities)
1	Students Registration. Preparation of the surveying equipments needed. Mobilization to survey camp location.
2	Project Briefing. Reconnaissance of the project area. Equipment calibration.
3	Traversing project to establish horizontal control at project area. Finalize traversing results and plan preparation.
4	Leveling project to establish vertical control at project area. Examine and finalize leveling results. Prepare project report and presentation materials and plan preparation.
5	Topographic survey at project area. Details and contour plan preparation. Project report and preparation of presentation materials.
6	Link traverse to locate boundary marker at project area. Project report and preparation of presentation materials. Project presentations.
7	Setting out and as-built survey. Details and contour plan preparation. Project report and preparation of presentation materials Project presentations.
8	Earthwork Project – Volume Estimation. Project report and preparation of presentation materials. Project presentations.

Days	Topic / Content (Survey Camp Activities)
9	Setting up instrument test. Finalize all survey data and plotting for submission. Survey data submission.
10	Mobilization to campus. Returning all equipments to the survey lab.

REFERENCES

1. Bannister, A., Raymond, S. & Baker, R. (1998). SURVEYING. Longman.
2. Uren, J. & Price, W.F. (1994). SURVEYING FOR ENGINEERS. Palgrave Macmillan.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments				
2.	Project and team working	5	15	75	1 – 10
3.	Quizzes				
4.	Presentation	1	20	20	6 - 8
5.	Setting-up Equipment Test	1	5	5	9
6.	Peer Evaluation				
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Dr. Mushairry Mustaffar	mushairry@utm.my	M50 02-27-01	38680 32447(Lab)
2.	Assoc. Prof. Dr. Mohd. Zulkifli Mohd. Yunus	mzul@utm.my	M46-231	31679
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 <b style="font-size: 2em; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : A Date of issue : 21st February 2011 Last Amendment : 21st July 2011 Edition : 1 Procedure No. : FKA/PG/RK/SKAA 1213
ENGINEERING MECHANICS SKAA1213 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 3 hours / week	

SYNOPSIS

The course is designed to expose the students to the basic principles of statics and dynamics. The subject is divided into two parts: Mechanics of Statics and Mechanics of Dynamics. The content of the lecture will be emphasized on the application of the basic mechanics principle in civil engineering. Mechanics of Statics deals with equilibrium of bodies, i.e. bodies at rest and bodies moving with a constant velocity. It includes resultant and resolution of forces, equilibrium of a particle, force system resultant, equilibrium of rigid bodies, center of gravity and centroid, and moment of inertia of an area. Mechanics of Dynamics deals with the accelerated motion of bodies. It includes kinematics and kinetics of a particle and of a rigid body. Kinematics discusses the relationship between displacement, velocity and acceleration against time. Kinetics covers the concepts of force and acceleration (Newton’s second law of motion), energy and work, impulse and momentum, and vibration. At the end the course, students should be able to incorporate and utilise principles of applied mechanics in civil and structural engineering problems.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom’s Taxonomy	Assessm. Methods
CO1	Define and apply the concept of forces and moment about a point or an axis.	PO1			KP1	C3, P2, A2	Q, T, A, F
CO2	Define and formulate the state of equilibrium of particles and rigid bodies and calculate reaction of particles and rigid bodies.	PO1			KP1	C3, P3, A2	T, A, F
CO3	Define, describe and calculate the centre of gravity, centroid of a body or any arbitrary shape and moment of inertia of an area.	PO1	CP2		KP1	C3, P4, A2	Q, T, A, F
CO4	Describe the relationships between displacement, velocity and acceleration against time and solve problems involving kinematic motions of a particle.	PO1	CP2		KP2	C3, A2	T, A, F
CO5	Describe the relationships between force and acceleration, principle of work and energy, conservation of energy, and solve problems involving the kinetics of a particle.	PO1			KP2	C3, A2	Q, T, A, F
CO6	Describe the principle of impulse, momentum and vibration and solve problems involving momentum of particles.	PO1			KP2	C3, P1, A2	A, F
CO7	Solve problems in engineering mechanics using the principles of statics, kinematics and kinetics, by working in groups.	PO7		CA3	KP1, KP2	C3, P1, A1, TW1,2,3	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	28
	b. Revision	18
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. In the lectures, students are exposed to the concepts in applied mechanics and given as many examples as possible on the application of such principles to solve related problems.
2. In the tutorial classes, students are required to go through the tutorial sets and encouraged to expose themselves to applied mechanics problems from various other sources.
3. The performance of students are assessed through quizzes, tests and the final exam.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	
	2	
2	3	RESULTANT AND RESOLUTION OF FORCES Introduction.
	4	Addition and subtraction of concurrent forces. Resolution of forces in two-dimensional space. Resultant of concurrent coplanar force system.
3	5	Resultant of forces using graphical method. Resolution of a force in three-dimensional space.
	6	Resultant of a three-dimensional concurrent force system. ASSIGNMENT / QUIZ 1
4	7	MOMENT AND COUPLE Moment of a force and couple.
	8	Principle of moment and Varignon's Theorem. Moment of a system of coplanar forces and couples.

Week	Lecture	Topic / Content
5	9	Moment of a three-dimensional force system.
	10	EQUILIBRIUM OF A PARTICLE Equilibrium of a particle in two-dimensional space
6	11	Equilibrium of a particle in three-dimensional space.
	12	TEST 1
7	13	EQUILIBRIUM OF RIGID BODIES Principle of equilibrium. Free body diagram.
	14	Equilibrium of a rigid body in two-dimensional space. Equilibrium of a rigid body in three-dimensional space.
8		MID SEMESTER BREAK
9	15	FRICTION Introduction
	16	Equilibrium of forces on a horizontal plane Equilibrium of forces on an inclined plane
10	17	CENTERS OF GRAVITY AND CENTROIDS Introduction. Centroid of line, area and volume Center of gravity for load.
	18	MOMENT OF INERTIA OF AN AREA Introduction. Parallel Axis Theorem. Polar moment of inertia. Radius of gyration of an area. ASSIGNMENT / QUIZ 2
11	19	KINEMATIC OF PARTICLES Rectilinear motion Particle motion described by equation of position, velocity and acceleration. Motion of a particle with constant acceleration Motion of a particle with varying acceleration
	20	Curvilinear motion :Normal and tangential velocity and acceleration. Circular Motion, angular velocity and acceleration. Projectile motion.
12	21	FORCE AND ACCELERATION Newton's Laws of Motion, $F = ma$. Rectilinear Motion of a particle.
	22	Particles moving on inclined plane, under gravity and through resisting medium. Motion of connected bodies. Curvilinear Motion, normal and tangential components. Circular Motion. centripetal force and acceleration.
13	23	WORK AND ENERGY Principle of work and Energy. Conservation of energy.
	24	TEST 2
14	25	IMPULSE AND MOMENTUM Central Impact For Elastic Body.
	26	Oblique Impact between Two Spheres.
15	27	VIBRATION Undamped Free Vibration Energy Methods
	28	Undamped Forced Vibration Viscous Damped Free Vibration Viscous Damped Forced Vibration

Week	Lecture	Topic / Content
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Yusof Ahmad. Mekanik : Statik. Penerbit UTM. 1996
2. Hibbeler, R.C. Engineering Mechanics: Statics. Singapore: Prentice Hall. 2010
3. Yusof Ahmad, Mekanik: Dinamik, Penerbit UTM, 1998
4. Hibbeler, R.C., Engineering Mechanics: Dynamics: Singapore: Prentice Hall. 2010
5. Meriam J,L, and Kraig, L.G, Engineering Mechanics : Dynamics, John Willey, 2008
6. Keith M.Walker, Applied Mechanics for Engineering Technology, Prentice Hall, 2008
7. Bedford,A, Fowler,W, Engineering Mechanics : Statics, Prentice Hall,2005
8. Bedford,A, Fowler,W, Engineering Mechanics : Dynamics, Prentice Hall, 2005

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Quizzes / Assignments	2	10	10	
2.	Test 1	1	20	20	
3.	Test 2	1	20	20	
4.	Final Exam		50	50	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

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3.	Mr. Hazlan Abd.Hamid	hazlan@utm.my	M46-220	32157
4.	Assoc. Prof. Ir. Dr. Mohd. Hanim Osman	hanim@utm.my	M46-322	32147
5.	Mr. Ahmadon Bakri	ahmadon@utm.my	C09-212	31609
6.	Dr. Ahmad Kueh Beng Hong	kbahmad@utm.my	C09-229	32307
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision : A
	Date of issue : 21 st February 2011
	Last Amendment : 21 st July 2011
	Edition : 1
	Procedure No. : FKA/PG/RK/SKAA1422
CIVIL ENGINEERING DRAWING SKAA 1422	
PRE-REQUISITE :	
EQUIVALENCE :	
LECTURE HOURS : 4hours / week	

SYNOPSIS

This course is designed to expose the students to the basic understanding of technical and engineering drawings. It will cover the aspect of understanding and interpretation of the element of drawings. The concept of orthographic and isometric projection will be discussed and applied in the hands-on session with Computer Aided Drawing (CAD). Students will also be exposed to the civil works drawings, i.e. the earthworks, reinforced concrete detailing and structural steel detailing drawings. Several exercises are performed with the use of CAD to get the students acquaintance of the software. During this session, students will be asked to draw and submit group projects that are given to them. After completing this course students should be able to produce civil engineering drawings using CAD.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Apply the principles of technical and civil engineering drawings.	PO1			KP4	L2	A, T
CO2	Utilise CAD software to produce civil engineering drawing.	PO2	CP3	CA1		L3	A, Pr
CO3	Practice professional ethics and values in groupwork.	PO10				L3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	14
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	28
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	18
	b. Revision	10
	c. Assessment Preparations	6
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lecture
2. Practical (Hands on)
3. Assignment and discussion in class
4. Project and presentation

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Graphic communication for engineers The role of engineer on a design team
	2	AutoCAD - Setting drawing, Coordinates Line command and Point Entry methods
2	3	Circles, Arc, Rectangle, Polygon and Donut Commands
	4	Copy, Move, Mirror and Erase commands Object Selection and Object Snap
3	5	Zoom commands
	6	Offset, Trim, Extend and Fillet commands Array and Point Commands
4	7	Layer, linetype, colour and line weight controls
	8	Orthographic Projection
5	9	Text command
	10	Dimensioning type: linear, aligned, radius and angular Hatch command
6	11	Sectional Views
	12	Blocks and Insert Commands Plotting
7	13	Polyline and Spline commands
	14	Isometric projection
8		MID SEMESTER BREAK
9	15	Discussion
	16	Test 1
10	17 18	Civil Engineering Drawing - Earthwork
11	19 20	Civil Engineering Drawing - Earthwork
12	21 22	Civil Engineering Drawing - Reinforced Concrete Detailing
13	23 24	Civil Engineering Drawing - Reinforced Concrete Detailing
14	25 26	Civil Engineering Drawing - Structural Steel Detailing
15	27 28	Presentation / Q & A
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Gary R. Bertoline (2007). Fundamentals of Graphics Communication, 5e. McGraw-Hill, New York.
2. A. Yarwood (2002). An Introduction to AutoCAD 2002. Pearson Education, Edinburgh.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignment & Exercises	2	5	10	Week 1 – 7
2.	Project	2	15	30	Week 10 – 15
3.	Test	2	30	60	Week 9 & 14
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Mr. Rosli Anang	roslianang@utm.my	M46-314	31632
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FLUID MECHANICS SKAA 1513 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course is designed to introduce and apply the concepts of Fluid Mechanics (fluid statics and kinematics, forces and flow in closed conduits, with/and centrifugal pumps) and to solve problems related to Civil Engineering. It encompasses topics such as fluid statics and fluid dynamics. The pressures and forces in these static and dynamic fluids are introduced, discussed and analyzed through equations. It also covers upon the analyses of flows in closed conduits to include minor and major head losses. The performance characteristics, functions and applications of centrifugal pumps in pipeline systems are also demonstrated and analyzed in this course.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Ability to develop fundamental understanding of various theoretical concepts of civil engineering fluid mechanics.	PO1, P04			KP1	L2	CS, F
CO2	Ability to apply and integrate the fundamental theoretical concepts to solve and compute civil engineering fluid mechanics related problems through critical and innovative solutions.	PO1, P04	CP4		KP3	L3	CS, T1, F
CO3	Ability to develop calculating skills and design in civil engineering fluid mechanics related practical problems.	PO1, P04		CA 2	KP5	L4	CS, T2, F
CO5	Have the opportunity to interact with their peers and work in a team .	PO7				A3, TS1, TS3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation;
 CS: Case Study

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	14
	b. Revision	21
	c. Assessment Preparations	21
3.	Formal Assessment	
	a. Continuous Assessment	5.5
	b. Final Exam	2.5
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

- Lectures shall emphasize on theories, followed by worked examples and further applications to problems of interest in Civil Engineering Fluid Mechanics.
- Tutorials shall be conducted to provide opportunities for students to be in smaller groups and work together to appreciate the theories given in lectures. Students shall discuss amongst themselves and solve given tutorial problems in class in the related field through analyses, with the aid of standards, whenever necessary.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1-3	Chapter 1: Fluid properties 1.1 Introduction to Fluid Mechanics 1.2 Definition of fluids 1.3 Types of fluids: absolute fluid, real fluids 1.4 Fluid properties: Density, specific weight, dynamic viscosity, kinematic viscosity, surface tension Chapter 2: Fluid Statics 2.1 Pressure-density-head relationships 2.2 Pressure distribution
2	4-6	2.3 Relationship between absolute pressure and gauge pressure measurement: Mercuric Barometer, aneroid, Bourdon gauge, piezometer and manometer 2.4 Computation of pressure using simple manometer, U-tube manometer and inverse U-tube manometer
3	7-9	2.5 Hydrostatic force on submerged plane vertical and inclined surfaces. Determination of the centre of pressure on the surfaces 2.6 Hydrostatic force on submerged curved surfaces, and determination of the centre of pressure
4	10-12	Chapter 3: Fluid Kinematics 3.1 Introduction to flow lines, volumetric flow rate, mass flow rate and control volume 3.2 The continuity equation on control volume 3.3 The Bernoulli's Theorem and its relationship to the static head, kinetic head, potential head and head loss
5	13-15	3.4 Derivation of Hydraulic Grade Line and Total Energy Line 3.5 Applications of Bernoulli's Theorem: Pipeline with Pumps and turbines, Venturi meter, various weirs and orifices

Week	Lecture	Topic / Content
6	16-18	Test I Chapter 4: Momentum Equation and Its Application 4.1 Derivation of the momentum equation 4.2 The force of impacts on: (i) stationary plates, (ii) stationary curved vanes,
7	19-21	(iii) Pipe bends and closed conduits, nozzles Chapter 5: Analysis of Pipe Flow 5.1 Flow classifications: turbulent, laminar, transition 5.2 Introduction to energy loss in pipe flows
8	22-24	5.3 Energy loss in pipes flows and application of Darcy -Weisbach and Hazen-Wil- liams equations 5.4 Various equations for friction factor and Reynolds number for laminar and turbulent flows
9		MID SEMESTER BREAK / CASE STUDY HANDOUTS
10	25-27	5.6 The use of Moody chart to obtain the relationship between friction factor, Reyn- olds number and relative roughness 5.7 Design of pipeline diameter and flow rate
11	28-30	Chapter 6: Steady Flow in Pipelines 6.1 Minor losses due to disruptions in normal flows, eg: sudden enlargement and constriction of diameters, pipe inlet and outlet, bends and connections 6.2 Flow through a pipeline: pipeline in series, parallel and combination 6.3 Sketching of Total Energy Line and Hydraulic Grade Line
12	31-33	TEST II Chapter 7: Pump in Pipelines 7.1 Introduction to pumps 7.2 Classification of pumps: positive displacement and rotor dynamic
13	34-36	7.3 Description of a centrifugal pump. Theoretical relationship between head, flow rate, power and efficiency
14	37-39	7.4 Pump characteristics; single, in series and in parallel
15	40-42	7.5 Iso-efficiency curves and pump similarity laws 7.6 Use of pumps in water supply lines; single, in series and in parallel SUBMISSION OF CASE STUDY
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Fatimah MN, Faridah JS, Goh GK (1995) *Mekanik Bendalir untuk Kejuruteraan Awam*, UTM.
2. Mott, Robert L. (2006) *Applied fluid mechanics*, 6th edition in SI Units, Singapore: Prentice Hall.
3. Evett, Jack B., Liu, C. (1989) *2500 Solved problems in fluid mechanics & hydraulics*, Schaum's solved problem series, USA: McGraw-Hill.
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5. Olson, Reuben M., Wright, Steven J. (1990) *Essentials of engineering fluid mechanics*, 5th edition, New York: Harper & Row.
6. Finnemore, E. John, Franzini, Joseph B. (2002) *Fluid mechanics with engineering applications*, 10th edition, Boston : McGraw-Hill.
7. The Malaysian Water Association (MWA), (2000) *MWA design guidelines for water supply systems*, Kuala Lumpur: Percetakan Nasional Malaysia Berhad.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Case Study	1	10	10	7 - 14
2.	Test I & II (1 hour each)	2	20	40	6 & 13
3.	Final Exam	1	50	50	16 - 18
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation: - Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

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SOIL MECHANICS SKAA 1713 PRE-REQUISITE : EQUIVALENCE : SAB 1713 (Soil Mechanics) LECTURE HOURS : 3 Hours Lecture 1 Hours Tutorial	

SYNOPSIS

This subject is compulsory subject for civil engineering students. The content of this subject will give a student basic understanding and exposure towards practical in Geotechnical Engineering. It will cover on basic soil properties which, consists of soil composition, soil classification and soil compaction. Besides that, it will also discuss on water in soil and soil shear strength. The topic that will cover is important to civil engineers where most of problems occur at site will involve with geotechnical and soil mechanics. At the end of this subject, students will able to apply the knowledge on basic soil properties, water in soil and shear strength parameters in the planning, analysis, design and supervision of related geotechnical works.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe composition and solve volume-mass relationship equations for soils.				KP1	C3	Q, T1, A, F
CO2	Classify types of soils and analyse soil compaction works.	PO1				C3	A, T1 / F
CO3	Determine vertical stresses and permeability and solve for flux and flow behaviour in soils.	PO1	CP1	CA1	KP1	C4, A3	A, T2, F
CO4	Explain theory of shear strength and analyse for parameters of shear strength for direct shear, triaxial, and vane shear tests.	PO1		CA1	KP2	C4, P3, A3	A, F
CO5	Prepare and share information for group project work using technical knowledge and teamworking conditions.	PO5		CA1	KP1	A3, CS1, CS3	P

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
a.	Lecturer-Centered Learning	
i.	Lecture	42
b.	Student-Centered Learning (SCL)	
i.	Laboratory/Tutorial	14
ii.	Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	28
	b. Revision	10
	c. Assessment Preparations	20
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	2
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lecture and Discussion
2. Co-operative Learning
3. Independent Study
4. Tutorial

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	INTRODUCTION Introduction to subject matter and testing conducted in laboratory
	2	PHYSICAL SOIL PROPERTIES Introduction on soil composition and volume mass relationship
	3	Derivation of equation base three phase soil models
2	4	Determination/Application of physical/index properties based on three-phase diagram
	5	Soil classification
	6	Introduction of sieve analyses, hydrometer test and particle size distribution.
3	7	Atterberg limits
	8	USCS and/or BSCS
	9	and AASHTO soil classification
4	10	Soil compaction. Introduction, definition, compaction theory, soil densification method and compaction effort
	11	Comparison between Standard Proctor and Modified Proctor
	12	Effect of compressibility on clay structure
		Test 1 (10%)
5	13	Relationship between dry density and moisture content, air void and degree of saturation for compacted fines soil.
	14	Dry density versus moisture content for clay and effect on different type soils.
	15	Introduction on compaction on site and effect on different type of soils.
6	16	Introduction on compaction on site and effect of different type of soils (con't).
	17	Relative Density.
	18	Relative Density (cont'd).
7	19	WATER IN SOIL Introduction of water in soil
	20	Total stress, pore pressure and effective stress
	21	Total stress, pore pressure and effective stress- hydrostatic, artes pressure and quick sand
8		MID SEM BREAK
9	22	Coefficient of permeability
	23	Capillary, pore pressure in capillary zone
	24	Capillary, pore pressure in capillary zone (cont'd)
10	25	Soil permeability coefficient
	26	Concrete dam and sheet pile seepage analysis (isotropic)
	27	Concrete dam and sheet pile seepage analysis (isotropic) –con't

Week	Lecture	Topic / Content
11	28 29 30	Introduction on flow net, boiling and piping Earth dam seepage analysis Filtered and Unfiltered dam seepage analysis Test 2 (15%)
12	31 32 33	SHEAR STRENGTH Introduction of Shear strength Mohr Circle Methods to determine shear strength
13	34 35 36	Direct shear to determine shear strength Direct shear to determine shear strength- cont'd
14	37 38 39	Triaxial test to determine shear strength (UU, CU, CD) Triaxial test to determine shear strength (UU, CU, CD) – con't Unconsolidated Unconfined and Vane Shear
15	40 41 42	Unconfined Compression Test to determine shear strength Revision Water in Soil Revision on Shear Strength
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

Murthy, V. K. S. (2010), Textbook for Soil Mechanics and Foundation Engineering, CMS Publisher, New Delhi, India, 1040 pp.

Other References

1. B.M Das, Principles of Geotechnical Engineering , 5th Edition,2004, Brooks and Cole
2. Roy Whitlow, Basic Soil Mechanics, 3rd Edition, 1999, Prentice Hall
3. GN Smith, UNSUR MEKANIK TANAH, Edisi Pertama, Terjemahan oleh Abdul Rahman
4. Mohamood, 1990, Dewan Bahasa dan Pustaka.
5. Nor Zurairahetty dan Siti Norafida , Short Notes SAB 1713

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignment/Quizzes	2/1or 2	5,5	10	
2.	Test (1 & 2)	2	15,15	30	
3.	Term Paper/Report	1	10	10	
4.	Final Exam	1	50	50	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation: - Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Ms. Fauziah Kasim	fauziahkasim@utm.my	CETU-D04 / C07-319	32155 / 31586
2.	Dr. Rajeev Kumar Prasannan Pillai	prkumar@utm.my	C09-326	31721

 <b style="font-size: 24pt;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 25 th February 2011 Edition : 5 Procedure No. : FKA/PG/RK/SKAA 2012
CIVIL ENGINEERING LABORATORY 1 SKAA 2012 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 4 hours / week	

SYNOPSIS

Civil engineering is a practical field and the laboratory work is essential to be performed by students in this field. The laboratory work, which consists of workshops and experiments are designed to expose students essential problem solving and experimental techniques. Most of the generic attributes that the students must develop at the University are acquired through the laboratory experiments and researches. Laboratory sessions are able to strengthen the students to relate the fundamental theories with laboratory experiments in the field of concrete, transportation, hydraulics, and structural engineering. Each student will experiences data collections and performs data analysis and result interpretations. Application of the experimental results to the real civil engineering problem will be highlighted. Upon completion of the course, students are expected to be able to perform laboratory experimental work and investigation in concrete, transportation, hydraulics and structural engineering, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to develop generic attributes and enhance their ability to participate effectively in a laboratory environment and be able to work as a part of a team.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Perform laboratory experiments in the field of concrete, geotechnic, fluid mechanics, and structural engineering.	PO2	CP5		KP1	C2	Report
CO2	Analyze, interpret and relate experimental data with the fundamental theories.	PO2	CP3		KP5	C4, A3	Report
CO3	Produce laboratory report.	PO2			KP3	C3	Report
CO4	Work in team during laboratory works.	PO7	CP3	CA5		TS1, TS2, TS3	OLW
CO1	Perform laboratory experiments in the field of concrete, geotechnic, fluid mechanics, and structural engineering.	PO2	CP5		KP1	C2	Report

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	10
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	26
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	7
	b. Revision	-
	c. Assessment Preparations	-
3.	Formal Assessment	
	a. Continuous Assessment	37
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Basic theory, its application in practice and the use of apparatus will be demonstrated.
2. Students are required to carry out laboratory tests and produce test reports in group

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
2	1	Briefing
	2	
3	3	Concrete: Fresh and Hardened Concrete Test (C1)
	4	Concrete: Non Destructive Testing (C2)
4	5	Structure: Portal Frame (S1)
	6	Structure: Influence Lines (S2)
5	7	Structure: Stiffness Factor (S3)
	8	Structure: Two-Hinged Arch (S4)
6	9	Hydraulics: Pipe Friction (H1)
	10	Hydraulics: Hydraulic Jump (H2)
7	11	Hydraulics: Computation of Manning's n (H3) & Gradually Varied Flow (H4)
	12	Hydraulics: Centrifugal Pump Characteristics (H5)
8		MID SEMESTER BREAK
9	13 14	Transportation: California Bearing Ratio Test (T1) -2 JAM
		Transportation: Penetration Test (T2)
		Transportation: Softening Point Test (T3)
		Transportation: Extraction of Bitumen from Bituminous Mixture (T4)
		Transportation: Sieve Analysis of Extracted Aggregate (T5)
10	15	Transportation: Capacity of Unsignalised Intersection (T6)
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Laboratory Manual for Laboratory I (SAB 2012)
2. Text Books and Journal in Concrete, Hydraulics, Transportation Engineering and Structures.

DISTRIBUTION OF MARKS

INFORMATION	TEST															MARK	
	CONC.		STRUCTURES				HYDROLOGY					HIGHWAY					
	C1	C2	S1	S2	S3	S4	H1	H2	H3	H4	H5	T1	T2	T3	T4	T5	
Cognitive	C1: Knowledge																
	C2: Comprehensive																
	C3: Application																
	C4: Analysis																
	C5: Synthesis																
Psychomotor	C6: Evaluation																
	P2: Set																
	P3: Guided Response																
	P7: Origination																
Affective	A3: Valuing																
	A4: Organizing Values																
	A5: Internalizing Values																
Teamwork	TS1-TS3																

Team work skills are assessed separately (C2, S2, H2 & T2) and not included in grading.

ATTENDANCE

Student must attend all experiments.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Academic Staffs of Faculty of Civil Engineering			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: B
	Date of issue	: 15 th July 2010
	Last Amendment	: 25 th April 2011
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA1012
MECHANICAL AND ELECTRICAL SYSTEM SKAA 2032 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course is a service course from the Faculty of Mechanical Engineering & The Faculty of Electrical Engineering. The course will expose civil engineering students to the fundamentals of Mechanical & Electrical building services. The topics to be covered in the Mechanical Portions are design of Domestic Water Supply System, Fire Prevention System, Ventilation and Air-Conditioning System and Lift and Escalators System. Students will be exposed more on design using professional charts and codes and catalogues from manufacturers. The electrical portion of the course covers single phase and three phase system followed by an insight to transformer and induction motor operation. The electrical section will also cover the commercial practice of electrical wiring and substation design. At the end of the course, students should be able to demonstrate the understanding of electrical system and machines operation and ability to design domestic wiring system..

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe and explain the basics requirements of Domestic Water Supply System, Fire Prevention System, Ventilation & Air conditioning System and Lifts & Escalators System	PO1				C2	A, F
CO2	Analyse and design basics Domestic Water Supply System, Fire Prevention System, Ventilation & AirConditioning System and Lift & Escalator System.	PO2				C5	A, F
CO3	Analyse, design and prepare an appropriate document as practiced by consultant.	PO2				C5, A4	A, F
CO4	Organize a project in a team and producing design report within a stipulated time frame. Submit individual essay on selected topics within a stipulated time.	PO7				C2, A4, TS3	A
CO5	Explain the relationship between voltage, current and power.	PO1				C2	A, F
CO6	Recognize and distinguish star and delta circuit in 3-phase system.	PO2				C4	A, F
CO7	Identify types of transformers and induction motors and describe their operation and application.	PO1				C2	A, F
CO8	Recognize and describe various types of wiring and protection system.	PO1				C2	A, F
CO9	Plan and design domestic wiring and substation.	PO7				C2, TS3	A, T

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	40
2.	Self-Directed Learning	34
3.	Formal Assessment	6
Total Student Learning Time* (SLT)		80

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1		<ul style="list-style-type: none"> ▪ Domestic Water Supply System ▪ Introduction to potable water, Direct and indirect System, Fittings and loadings, Estimation of flow rate .
2		<ul style="list-style-type: none"> ▪ Estimations of resistance to flow. Estimation of pumping power ▪ Drainage of waste water ▪ Prepare students for group/individual assignment ▪ Brief revision
3		<ul style="list-style-type: none"> ▪ Fire Prevention System ▪ Introduction, Philosophy of fire, Active and Passive Fire prevention, Types of fires and media used to put out fires. ▪ Estimation of water flow rate, resistance and pumping power ▪ Estimation of CO₂ requirement for electrical fire prevention ▪ Prepare student for group/individual assignment
4		<ul style="list-style-type: none"> ▪ Ventilation & Air Conditioning ▪ Introduction, Indoor Air Quality Acts, Natural and forced ventilation. Estimation of fans power. ▪ Introduction to air conditioning
5		<ul style="list-style-type: none"> ▪ Humidity and Psychrometric chart, heat loads, estimation of air conditioning power. Types of air conditioning units/system. ▪ Prepare student for group/individual assignment ▪ Brief revision
6		<ul style="list-style-type: none"> ▪ Lifts and Escalators ▪ Introduction to lift and escalator, Building Bylaws, Components of lifts system. Lift installation & safety. Power estimation.
7		<ul style="list-style-type: none"> ▪ Escalators installation and safety ▪ Prepare student for group/ individual assignment. ▪ Short revision of all topics covered.
8		MID SEMESTER BREAK
9		<ul style="list-style-type: none"> ▪ Electrical supply (AC and DC) ▪ Current, voltage Power and their relationship ▪ Direct Current, Alternating Current, Sinusoidal and Phasor
10		<ul style="list-style-type: none"> ▪ Three-phase system (star and delta), line and phase voltage / current ▪ Generation, transmission and distribution
11		<ul style="list-style-type: none"> ▪ Electrical Machines, Transformer design, operation, types and application ▪ Transformer rating, losses and efficiency
12		<ul style="list-style-type: none"> ▪ Induction motor operation principle, synchronous speed, rotor speed and slip ▪ Starting circuit (DOL, Y-δ, autotransformer)
13		<ul style="list-style-type: none"> ▪ Electrical Distribution and Wiring ▪ Wiring system, cable types, sizes and rating ▪ Isolation, over-current protection and grounding
14		<ul style="list-style-type: none"> ▪ Switchboard, distribution board and domestic wiring ▪ Electrical load estimation for commercial and residential building

Week	Lecture	Topic / Content
15		<ul style="list-style-type: none"> ▪ Substation design, 415kV single and double chamber ▪ Symbol and single line diagram
16 – 18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Design Guidelines for Water supply Systems, The Malaysian Water Association, 1994
2. Guide to Fire Protection in Malaysia, Jointly published by Fire and Rescue Dept,PAM,IEM, ACEM, IFE, MFPA
3. Construction Technology and Building Services EBVC3103, Universiti Terbuka Malaysia,2004
4. Notes on Lift as supplied by Otis Malaysia Sdn Bhd and other manufacturer
5. Notes on escalator as supplied by manufacturers
6. Notes on Ventilation, air Conditioning as supplied by manufacturers of Fans and Air Condition units.
7. Uniform Building By-Laws 1984, International Law Book Services.
8. Electrical system lecture notes

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments (group)	2	15	30	
2.	Assignment (individual HW)	2	10	20	
3.	Test	0	0	0	
4.	Final Exam	1	50	50	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: G
	Date of issue	: 1 st June 2003
	Last Amendment	: 5 th February 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 2112
CIVIL ENGINEERING MATERIALS SKAA 2112 PRE-REQUISITE : EQUIVALENCE : SAM 3123, SAB2112 LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course is designed for students to understand the different types of construction materials in civil engineering. It will emphasize on types and function of cement, the function of aggregates in concrete, water, admixtures, properties of fresh and hardened concrete, concrete mix design, manufacturing concrete on site, properties and application of timber, types and characteristics of brick and block, ferrous and non-ferrous metal, and other latest materials in construction industry. At the end of the course students should be able to describe, identify and discuss the properties and behaviour of different types of civil engineering materials together with the applications of the materials in practice.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Explain in writing the properties and behavior of different type of civil engineering materials.	PO1				C2, A2	T
CO2	Express and illustrate how the concrete tests are carried out in accordance to relevant standards.	PO1				C2, P2	T
CO3	Select the right type of materials to be used for different application in practice.	PO3			KP1	C4, A3, P1	F
CO4	Find up-to-date information relating to the subject.	PO8				LL1, LL3	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	20
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	22
	b. Revision	15
	c. Assessment Preparations	10

No.	Teaching and Learning Activities	SLT* (hours)
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

Lectures

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction, cement manufacturing process
	2	Types of cement, chemical composition
2	3	Hydration of cement, testing of cement
	4	Types of aggregates, physical and mechanical characteristics of aggregates
3	5	Size distribution and testing of aggregates
	6	Water in concrete, Types of chemical admixtures
4	7	Types of pozzolanic admixtures
	8	Water-cement ratio and its effect in concrete
5	9	Workability, test of fresh concrete
	10	Segregation and bleeding in concrete
6	11	Concrete on site- methods of production
	12	Concrete strength and grade TEST 1
7	13	Concrete proportions-standard, nominal, mix design
	14	Hardened concrete tests- destructive and nondestructive
8		MID SEMESTER BREAK
9	15	Timber- classification, its structure and moisture content
	16	Types of strength, factors affecting the strength of timber
10	17	Defects in timber and its causes, seasoning and wood preservative,
	18	Timber products and their use Types of bricks, blocks and their use
11	19	Manufacturing and types of clay bricks
	20	Characteristics and testing of bricks
12	21	Mortar for brickwork
	22	Ferrous metal – iron and steel
13	23	Types and application of steel in construction
	24	TEST 2
14	25	Non-ferrous metal- types, characteristics
	26	Use of non-ferrous metal in construction
15	27	Latest construction materials- polymer, glass Composite material, Cement based products
	28	
16-19		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

Text Book

- Abdel Kader Ismail, M., Mohd.Sam, A.R., RadinSumadi, S., Hussin, M.W., and Haron, Z., Introduction to Civil Engineering Materials, Second Edition, McGraw Hill, 2008

Other Books

1. Somayaji, S., Civil Engineering Materials, Second Edition, Prentice Hall, 2001
2. Jackson N., Civil Engineering Materials, Macmillan Press Ltd., 1995
3. Neville A. M., and Brooks J. J., Concrete Technology, Longman, 1990
4. Herubbin C. A., and Marotta T. W., Basic Construction Materials, Prentice Hall, 1987
5. Derucher, K. N.; Korfiatis, G. P.; and Ezeldin, A. S., Materials for Civil & Highway Engineers, Fourth Edition, Prentice Hall, 1998

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	2	10	20	Week 10
3.	Test 1	1	15	15	Week 6
3.	Test 2	1	15	15	Week 13
4.	Final Exam	1	50	50	Week 17-19
				100%	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Dr. Abdul RahmanMohd. Sam	abdrahman@utm.my	M46-353	31601
2.	Prof. Ir. Dr. Mohd. WaridHussin	warid@utm.my	M46-356	31607
3.	Assoc. Prof. Dr. Mohammad Ismail	mohammad@utm.my	C09-313	31688
4.	Assoc. Prof. Dr. A.S.M Abdul Awal	abduawal@utm.my	C09-209	31701
5.	Dr. Abdullah Zawawi Awang	abdullahzawawi@utm.my	M50-02-31-01	38692
6.	Assoc. Prof. Dr. Muhammad Amir Rafique	muhammadamir@utm.my	C09-323	31736

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	30
	b. Revision	14
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	5
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic concept of each topic will be demonstrated.
2. Students are required to go through the given tutorials
3. Students will require to solve group assignments

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 2,3	INTRODUCTION STRESS AND STRAIN Introduction Types of forces Stress and strain Linear elasticity and Hooke's law Normal stress and normal strain relationship
		Poisson's ratio Shear stress and shear strain relationship Deflection of axially loaded member Composite bar Thermal stress
2	4,5,6	INTRODUCTION SHEAR FORCE AND BENDING MOMENT Types of beams and supports Shear force and bending moment
		Shear-force diagrams and Bending-moment diagrams Types of statically determinate frames Shear force and bending moment diagrams for frames
3	7,8,9	STRESSES IN BEAMS Euler-Bernoulli beam equation Bending stresses in beam Bending stress distribution
		Shear stresses in beam Shear stress distribution
		TEST 1
4	10,11,12	STRESS TRANSFORMATION Introduction General equations for plane stress Stresses for inclined surface Principal stresses and Maximum shear stresses Mohr's circle for plane stress
5		MID SEMESTER BREAK

Week	Lecture	Topic / Content
9	22,23 24	DEFLECTIONS OF BEAMS Introduction Calculation of slope and deflection using: Double Integration method Macaulay's functions
10	25 26,27	Macaulay's functions (Continued) Virtual work method or Unit Load method
11	22 23 24	STATICALLY DETERMINATE PLANE TRUSSES Introduction Methods to determine member forces: - Method of Joint - Method of Sections Zero force member Virtual Work Method to determine displacements
12	25 26 27	STATICALLY DETERMINATE SPACE TRUSSES Introduction Analysis of space trusses Analysis of space trusses (Continued) DEFLECTIONS OF BEAMS Introduction Calculation of slope and deflection using: Double Integration method
13	34 35,36	TEST 2 COLUMN Introduction Euler's theory and Critical Load
14	37 38, 39	Euler's theory and Critical Load (Continued) Ideal column with pin support Columns having various types of supports
15	40,41,42	TORSION Introduction Torsion's theory
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- Hibbeler, R.C., Mechanics Of Materials, 7th Edition in SI units, Prentice Hall, 2008.
- Gere dan Timoshenko, Mechanics of Materials, 3rd Edition, Chapman & Hall.
- Yusof Ahmad, 'Mekanik Bahan dan Struktur' Penerbit UTM 2001

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test 1	1	15	15	
2.	Test 2	1	15	15	
3.	Tutorial / Quizes	10	1	10	
4.	Project and Critical Thinking	2	5	10	
5.	Final Exam	1	50	50	
				100	

ATTENDANCE

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ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Roslida Abdul Samad	roslida@utm.my	M50-02-50	38660
2.	Dr. Roslli bin Mohamed Noor	roslli@utm.my	M50-2-16	38683
3.	Dr. IzniSyahrizalIbrahimi	iznisyahrizal@utm.my	M50 03-01-05	38703

 <b style="font-size: 24px; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 25 th February 2011 Edition : 5 Procedure No. : FKA/PG/RK/SAB 2513
HYDRAULICS SKAA 2513 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 3 hours / week	

SYNOPSIS

Hydraulics is one of the major discipline of civil engineering. This course introduces the concepts of open channel fluid flow and their applications in hydraulics engineering problems. It covers various aspects of open channel hydraulics including types of open channel flow, design of channel section dimensions, uniform and non-uniform steady flows. Flow distribution in pipe network system and dimensional analysis are also included. At the end of the course, students should be able to apply the knowledge in solving civil engineering hydraulics problems.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Identify the properties of open channel flow and apply uniform flow equation for channel design.	PO1	CP2	CA2	KP3		CS, T, F
CO2	Calculate and estimate flow characteristics around control structures such as weirs, flumes and sluice gates.	PO4	CP2	CA2	KP5		T, F
CO3	Analyse flow profiles for gradually varied flow in prismatic channels.	PO4	CP2	CA2	KP3		T, F
CO4	Apply the appropriate analytical concept for various types of flow conditions in open channels.	PO1	CP2	CA2	KP5		T, F
CO5	Discuss and apply the concept of dimensional analysis for hydraulic model studies.	PO1	CP2	CA2	KP3		T, F
CO6	Analyse and calculate steady flow in pipe networks using quantity balance and head balance methods.	PO4	CP2	CA2	KP5		F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	10
	ii. Student-centered learning activities – Active Learning, Project Based Learning	10

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	28
	b. Revision	15
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Fundamental theory will be delivered during lecture session with emphasis on working examples and real problems.
2. Students will be provided opportunities to solve problems in class, tutorial and out of class.
3. Students will be given a case study which required knowledge of bulk of the topics and to be submitted in group

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 - 3	Introduction to Open Channel Flow
		1.1 Channel types
		1.2 Flow types
		1.3 Geometrical properties of open channels
2	4 - 6	Uniform Flow in Open Channels
		1.1 Resistance formulae in open channel
3	7 - 9	2.2 Calculation of normal depth using various methods – graphical, chart and trial and error
4	10 - 12	1.2 Channel section design using the best hydraulic cross section Compound Channel
5	13 - 15	Non-uniform Flow in Open Channels
6	16 - 18	1.1 Specific energy – critical depth and alternate depths
		1.2 Calculation of critical depth, critical slope and critical velocity
7	19 - 21	1.3 Control sections and critical flow Flow through hydraulic structures – broad crested weir, venturi flume and sluice gate
8		MID SEMESTER BREAK
9	22 - 24	Hydraulic Jump
		1.1 Type and uses of hydraulic jumps
		1.2 Momentum principle for jump in horizontal rectangular channels
		1.3 Basic characteristics of the jump
10	25 - 27	Gradually Varied Flow
		5.1 Introduction to gradually varied flow
11	28 - 30	1.1 Derivation of the equations for gradually varied flow
		1.2 Methods of computation: Numerical Integration and Standard Step Classification of flow profiles
12	31 - 33	Dimensional Analysis and Hydraulic Similarity
13	34 - 36	6.1 Introduction to dimensional analysis
		6.2 Buckingham's Theorem, Repeating variables method The concept of physical similarities
14	37 - 39	Steady Flow in Pipe Network
		7.1 Analysis of flow in pipe network using head balance method
15	40 - 42	7.2 Analysis of flow in pipe network using flow balance method
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. CHOW, V.T. (1959), Open Channel Hydraulics, McGraw Hill, Tokyo.
2. AMAT SAIRIN DEMUN (1997), Hidraulik Saluran Terbuka Dengan Penggunaan Komputer, Penerbit Universiti Teknologi Malaysia, Skudai Johor.
3. AMAT SAIRIN DEMUN (2008), Hydraulic, Lecture Note.
4. FATIMAH MOHD. NOOR (1996), Hidraulik Kejuruteraan Awam, Teori, Masalah dan Penyelesaian, Penerbit Universiti Teknologi Malaysia, Skudai Johor. (*Translation of Featherstone, R.E. dan Nalluri,*
5. C., *Civil Engineering Hydraulics – Essential Theory With Worked Examples*).
VENNARD, J.K. and R. L. STREET (1982), Elementary Fluid Mechanics, Sixth Edition, John Wiley & Sons, New York

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Case Study	1	20%	20	
2.	Test 1	1	15%	15	
3.	Test 2	1	15%	15	
4.	Final Exam	1	50%	50	
				100%	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation: Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Zulhilmi Ismail	zulhilmi@utm.my	M50-42-02	31587
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3.	Mr. Abu Bakar Fadzil	abakar@utm.my	C07-322	31750
4.	Prof. Dr. Ahmad Khairi Abd. Wahab	dr_khairi@citycampus.utm.my	M46-213	31733 / 31587
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6.	Dr. Mohd Hidayat Jamal	mhidayat@utm.my	M47-126	32444
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 25 th February 2011
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SAB 2712
GEOLOGY AND ROCK MECHANICS SAB 2712 PRE-REQUISITE : SAB 1713: Soil Mechanics EQUIVALENCE : SAM 3722 LECTURE HOURS : 2 hours / week 1 hours tutorial		

SYNOPSIS

This course is designed to enable students to evaluate, to apply and to analyse the relevant geological and rock mechanics principles in designing safe and economical rock engineering structures. In geology, the related topics on rock types/classifications, geological structures and geological processes are taught. Having acquired this knowledge, the principles of rock mechanics are then introduced mainly to highlight the relevancy of engineering properties of geological materials in designing rock engineering projects. These principles include engineering properties of rock material, rock discontinuities and rock stabilisation systems. At the end of the course, students should acquire the related knowledge and principles in geology and rock mechanics, and should be able to apply these knowledge and principles in designing safe and economic engineering structures in rock masses.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assesmm. Methods
CO1	Identify the types & classifications of geological materials & structures, and to recognise the relevant principles of geology and rock mechanics that are related to civil engineering activities (knowledge & understanding).	PO1	C1				Q, T, A, F
CO2	Use and apply the relevant principles of geology and rock mechanics in civil engineering construction (application).	PO2	C3				T, A, F
CO3	Apply and analyse important geological & rock mechanics principles in designing civil engineering structure in rock masses (analysis).	PO2, PO3	C4, A3				T, A, F
CO4	Recognise and evaluate a safe and economical design of civil engineering structures in rock mass (Evaluation).	PO2, PO3, PO4	C6, A3, CTPS2				T, A, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	12
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	14
	b. Revision	10
	c. Assessment Preparations	6
3.	Formal Assessment	
	a. Continuous Assessment	6
	b. Final Exam	4
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

- Lectures shall emphasize on theories, followed by worked examples and further applications to problems related to Geology & Rock Mechanics that are of interest in Civil Engineering Construction.
- Tutorials shall be conducted to provide opportunities for students to be in smaller groups and work together to appreciate the theories given in lectures. Students shall discuss amongst themselves and solve given tutorial problems in class in the related field through analyses, with the aid of standard design procedures, whenever necessary.
- Group assignment (4 to 5 group members) is given after 75% of the lecture content has been delivered. This assignment helps to develop positive aspects like team-working, interactive learning and learning through problem solving. The assignment covers basic aspects in designing rock engineering structures and their related problems in construction and normally with systematic guide in tackling the related issues. It also contains elements where students learn about effects and repercussions of any decision and solution adopted, towards the environment and costs. By doing such an exercise, it is anticipated that the students would be aware of their professional & social responsibilities.
- Geology field; 3-days 2-nights trip after exam weeks (optional). This camping trip creates an opportunity for the student to understand the subject matter under actual field conditions and to apply relevant principles of subject matters

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 - 2	Course introduction. Anatomy of earth. The process related to the formation of earth surface and structures: volcanic, tectonic & gradation processes (sedimentation and erosion).
2	3 - 4	Elements, minerals and composition of rocks. Mode of formation and classification of igneous rocks, and basic rock & mineral identification (Tutorial/lab).
3	5 - 6	Mode of formation and classification of sedimentary rocks, and basic rock & mineral identification (Tutorial/lab). Mode of formation and classification of metamorphic rocks, and basic rock & mineral identification (Tutorial/lab).
4	7 - 8	Brief introduction on basic engineering properties of rock. Relation between engineering properties of rock and construction and design of civil engineering structures. QUIZ (15 minutes)
5	9 - 10	Rock cycle and related processes. Geologic time scale and stratigraphy in construction activities. Geomorphology/geological structures: fold, bedding, joints and faults.
6	11 - 12	Effect of geological structures/discontinuities on construction in rock masses. Geometrical measurement on important components of geological structures; stereo-net projection method.
7	13 - 14	Weathering and Erosion: related processes, agent and their geological environment, process on formation of soil from weathering of rock. Assessment on weathering zone/grade (ISRM method) and its effect on rock properties (grade, strength and permeability). Factors affecting engineering properties of rock mass. TEST 1

Week	Lecture	Topic / Content
8		MID SEMESTER BREAK
9	15 - 16	Introduction to Rock Mechanics. Structures constructed & excavated in rock masses. Scale effect between rock discontinuities and structures being constructed.
10	17 - 18	Rock classification for engineering purposes, elements for classification, elements for the classification. Classification approach: RQD, RMR and Q-system.
11	19 - 20	Common methods for the assessment of rock material and rock mass properties in the laboratory and field. Geological processes and structures associated with <i>in situ</i> stresses in rock. GROUP ASSIGNMENT
12	21 - 22	Loading and deformation of rock masses in the formation geological structures. Loading on rock masses due to civil engineering structures: rock slope, excavation in rock and structure foundation.
13	23 - 24	Basic parameters for the design of rock slope and underground excavation: the use of stereonet projection. Reinforcement and support system for unstable rock masses; principles and methods.
14	25 - 26	Common reinforcement and support methods for structures in rock mass. Specific rock stabilization methods: rock bolt, dowel, grouting/shotcrete, wire-mesh, drainage systems.
15	27 - 28	Criteria for selecting suitable stabilisation methods. Selection based on mode of instability, discontinuities, rock types and state of weathering.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. A. C. McLean and C.D. Gribble (1980), *Geology for Civil Engineers* ISBN 0046240024.
2. F.G. Bells (1993), *Fundamentals of Engineering Geology*, ISBN 0408011606.
3. B.H.G. Brady and E.T. Brown (1985), *Rock Mechanics for Underground Mining*, ISBN 0046220046.
4. J.A. Hudson (1989), *Rock Mechanics Principles in Engineering Practice*, ISBN 040803081-X.
5. ISRM, (1981) *Rock characterisation testing and monitoring, ISRM Suggested method*.
6. H. R. Perry (1996) *Engineering Geology an Environmental Approach*, 2nd. Edition, Prentice Hall, ISBN 0-13-177403-4.
7. C.M. Christopher (1981) *Engineering Geology*, Bells & Howell Co. ISBN 0-675-08032-0.
8. Note (power-points) on geology & rock mechanics.

DISTRIBUTION OF MARK

No.	Assessment	Number	% each	% total	Weeks
1.	Quiz	1		5	Week 4
2.	Test	1		20	Week 6 or 7
3.	Assignment	1		25	Week 10 or 11
4.	Final Exam	1		50	16 - 18
Overall Total					100

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Edy Tonnizam Mohamad	edy@utm.my	D03-223	31767
2.	Assoc. Prof. Mohd For Mohd Amin	mohdfor@utm.com	C09-332	31726
3.	Assoc. Prof. Ir. Azman Kassim	azmankassim@utm.my	C09-232	31725

2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	10
	b. Revision	10
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lectures
2. Tests
3. Examinations

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	INTRODUCTION – schedule and overview of SAB 2722 (Geotechnics I) and review of SAB 1713 (Soil Mechanics) e.g. vertical stress, Terzaghi's principle of effective stress, soil properties and shear strength.
	2	STRESSES IN SOILS – Vertical stresses due to applied load: Simple method (2:1 method); Boussinesq Method - Point load, Line load, Uniform surcharge load.
2	3	Fadum Chart
	4	Pressure Bulb Chart.
3	5	Lateral earth pressure at –rest, active and passive conditions.
	6	Rankine Method and Coulomb Method.
4	7	Lateral pressure diagram and location of resultant force against sheet pile & gravity retaining wall.
	8	Soil pressures against & force in tie-back rod for anchored tie-back sheet piles.
5	9	COMPRESSIBILITY AND CONSOLIDATION – Introduction, Definition of 'consolidation' and 'settlement'.
	10	Curve of dial gauge reading versus time, and void ratio versus log effective stress curve (consolidation or oedometer test).
6	11	Compressibility parameters of soils; Terzaghi's Consolidation Theory – One-dimensional consolidation.
	12	Test 1 – Stresses in Soils & Earth Retaining Walls
7	13	Pre-consolidation pressure and definition of 'normally consolidated soil', 'overconsolidated soil', and underconsolidated soil'.
	14	Components of total settlement= immediate (elastic) settlement + consolidation settlement + secondary settlement (creep).
8		MID SEMESTER BREAK
9	15	Calculation of ultimate or consolidation settlement
	16	Degree of consolidation (U) – relationship between U and settlement (DH), U and void ratio (e), and U and excess pore-water pressure (u_e).
10	17	Average consolidation vs. Time Factor (T_v) Chart; and Isochrone (y/H_{dp} , U_v , T_v) Chart.
	18	Problem solving exercises.
11	19	Test 2 – Compressibility & Consolidation
	20	SLOPE STABILITY – Infinite & Finite Slopes, Stability of infinite slope: dry slope, saturated slope and partially-submerged slope (water table or seepage parallel to surface).

Week	Lecture	Topic / Content
12	21 22	$\phi_u=0$ analysis and Taylor's Chart Methods of Slices: Fellenius and Simplified Bishop
13	23 24	Stability of natural slope, embankment, and excavation
14	25 26	Methods of slope stabilization Problem-solving assignment for slope stability
15	27 28	Revision
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Nurly Gofar and Khairul Anuar Kassim, INTRODUCTION TO GEOTECHNICAL ENGINEERING PART I, Pearson Education, 2005.
2. Liu C. and J. Evett SOILS AND FOUNDATIONS SI ed. by Nurly Gofar, Pearson Education, 2004.
3. Craig, R.F CRAIG'S SOIL MECHANICS 7th ed. FN. Spons London, 2004.
4. Holtz, R. D. and Kovacs, W., INTRODUCTION TO GEOTECHNICAL ENGINEERING, Prentice Hall, 1981.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test	2	20	40	Week 6 and 11
2.	Assignment	1	10	10	Week 14
3.	Final Exam	1	50	50	Week 16
				100	

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ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Nazri Ali	nazriali@utm.my	M47-123	0137592970
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 <b style="font-size: 24px; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small style="font-size: 10px; margin-left: 20px;">Faculty of Civil Engineering</small>	Revision : B Date of issue : 15th July 2010 Last Amendment : 20 June 2013 Edition : 2 Procedure No. : FKA/PG/RK/SKAA 2832
HIGHWAY ENGINEERING SKAA 2832 PRE-REQUISITE : SKAA 1713 (Soil Mechanics), SKAA 1023 EQUIVALENCE : SAB 2832 (Highway Engineering) LECTURE HOURS : 2 hours Lecture 1 Hour Tutorial	

SYNOPSIS

This is one of the compulsory courses which will expose students to the fundamental theory of highway engineering. Topics covered are highway materials and evaluations, premix plants, construction techniques and plants, mix designs, quality controls and testing, pavement structural thickness design, highway drainage, pavement visual assessment, maintenance and rehabilitation.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Identify materials, type of tests, construction methods and plants in highway construction and able to carry out and evaluate/solve on-site construction and materials quality control requirements.	P02	CP1			C3, P3, A3,	T, A, Q, F
CO2	Identify and differentiate types of HMA gradation, mix design methods, and design/evaluate HMA mix using Marshall method.	P02	CP2, CP5		KP5	C4, P3, A3	T, A, Q, F
CO3	Analyze and design pavement structures and maintenance program.	P02	CP2		KP5	C5, A3	T, A, Q, F
CO4	Perpetually seek and acquire contemporary technological changes in highway engineering.	P08				LL1, LL2	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	10
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	20
	b. Revision	10
	c. Assessment Preparations	8
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Formal Lecture
2. Group and individual assignments
3. In class discussion
4. Laboratory and/or field visits
5. Tutorials

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 & 2	Explanation of syllabus and course outline, introduction to highway engineering Topic 1: Highway Materials Introduction, type of pavements, Malaysian road system, pavement layers and materials
2	3 & 4	Pavement layers and materials (cont.) Compaction and California Bearing Ratio tests In class exercises
3	5 & 6	Highway materials – aggregate Origin, production, physical properties, tests Assignment # 1
4	7 & 8	Highway materials - bitumen Origin, physical properties, grading system, tests Discussion of topic 1 and exercises
5	9 & 10	Topic 2: Hot Mix Asphalt Design Introduction, HMA Gradations, Aggregate blending, and Volumetric properties
6	11 & 12	HMA mix designs, Marshall Mix design, HMA mixing plants Discussion of topic 2 and exercises Assignment #2
7	13 & 14	Topic 3: Highway Construction Site clearing, earthworks and drainage works In-situ quality tests TEST #1
8		MID SEMESTER BREAK
9	15 & 16	Pavement works – sub-base, road base, and surfacing Quality control and tests Discussion of Test #1
10	17 & 18	Finishing works Highway plants Discussion of topic 3 and exercises Assignment # 3
11	19 & 20	Topic 4: Pavement Structure Thickness Design Fundamental theory – factors considered in design Methods of design for new pavement, design process Design methods - ATJ 5/85

Week	Lecture	Topic / Content
12	21 & 22	Design methods - Road Note 31 & JKR 2006
13	23 & 24	Discussion of topic 4 and exercises Topic 5: Highway Drainage & Maintenance Highway drainage system Assignment # 4
14	25 & 26	Highway maintenance Highway rehabilitation TEST # 2
15	27 & 28	Pavement evaluation Discussion of topic 5, exercises and Test #2 Review
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Atkins, H.A., HIGHWAY MATERIALS, SOILS, AND CONCRETES, Prentice Hall, 2003.
2. Garber, N.J., Hoel, L.A., TRAFFIC AND HIGHWAY ENGINEERING, West Publishing Co., 1999.
3. Oglesby, C.H., Hicks, R.G., HIGHWAY ENGINEERING, John Wiley & Sons, 1982.
4. Roberts et. al., HOT MIX ASPHALT MATERIALS, MIXTURE DESIGN AND CONSTRUCTION, NAPA, 1991.
5. Wignall, A., Kendrick, P.S., Ancill, R., ROADWORK : Theory and Practice, Newnes, 1991.
6. Wright, P.H., HIGHWAY ENGINEERING, John Wiley & Sons, 1996.
7. Jabatan Kerja Raya Malaysia, SPESIFIKASI PEMBINAAN JALAN RAYA, JKR/SPJ/1988, 2008
8. Jabatan Kerja Raya Malaysia, ARAHAN TEKNIK JALAN 5/85.
9. Transport Research Laboratory, OVERSEAS ROAD NOTE 31, 1993.
10. Jabatan Kerja Raya Malaysia, DESIGN OF FLEXIBLE PAVEMENT STRUCTURES, 2006
11. Standards - BS, MS, ASTM, AASHTO.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments & quizzes	6	5	30	Continuous
2.	Test	2	15	30	Week 7 & 14
3.	Final Exam	1	40	40	Week 16-18
				100	

ATTENDANCE

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Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

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3.	Dr. Haryati Yaacob	yaacob.h@gmail.com	M47-124	32446
4.	Dr. Norhidayah Abdul Hassan	norhidayah_utm@yahoo.com	D02-124	31678
5.	Mr. Mohd Izzudin Md. Ithnan	mizuddin@utm.my	Study leave	
6.	Mr. Mohd Khairul Idham bin Mohd Satar	khairulidham@utm.my	Study leave	
7.	Ms. Dorina anak Astana	dorina@utm.my	Study leave	

TEACHING METHODOLOGY

1. Lecture and Discussion
2. Informal Co-operative Learning
3. Independent Study
4. Presentation

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1 2	Introduction to Water Treatment Engineering Water quality – physical
2	3 4	Water quality – chemical, measurement unit Water quality – chemical, measurement unit
3	5 6	Water quality – microbiological Water quality – microbiological
4	7 8	Drinking water quality standards Water sources - quantities and demand Quiz 1
5	9 10	Water intake, Screening and Aeration system Design of Aeration system
6	11 12	Test 1 Coagulation – colloidal suspensions, function and mechanism
7	13 14	Coagulation – jar test and coagulant aid Flocculation – function and theory
8		MID SEMESTER BREAK
9	15 16	Flocculation – mechanical type and hydraulic type Design of Flocculation tank Quiz 2
10	17 18	Sedimentation – criteria, settling analysis Design of Sedimentation tank
11	19 20	Design of sedimentation tank, types of sedimentation process Filtration – function, mechanism
12	21 22	Filtration – types of filtration Disinfections – theory, function and methods
13	23 24	Disinfections – break point chlorination Introduction to advanced treatment Presentation on Water Treatment Process
14	25 26	Test 2 Water distribution system
15	27 28	Water storage (mass curve), types of water supply Layout of water distribution system
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G (1985) Environmental Engineering, McGraw-Hill.
2. Tebbutt, T.H.Y (1992) Principles of Water Quality Control. 4th Ed. Pergamon.
3. Sawyer, C.N and McCarty, P.L. (1985) Chemistry for Environmental Engineering. McGraw Hill.
4. Montgomery, J.M. (1985) Water Treatment Principles and Design. Wiley.
5. Hammer, M.J. (2005) Water and Wastewater Technology, 5th Ed. Pearson Education South Asia Ltd.
6. Metcalf & Eddy (2003) Wastewater Engineering: Treatment and Reuse, 4th Ed. McGraw Hill.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	1	5	5	
2.	Project				
3.	Quizzes	2	2.5	5	
4.	Presentation				
5.	Test	2	20	40	
6.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
 Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Mr. Mohd. Nor Othman	mnor@utm.my	M46-355	31621
2.	Dr. Aznah Nor Anuar	aznah@utm.my	C07-320	31738
3.	Ms. Normala Hashim	normala@fka.utm.my	C07-315	31516
4.	PM Dr. Mohd Fadhil Md Din	mfadhil@utm.my	C07-308	31530
5.	Mr. Azri Rasyidi Abdul Razak	azrirasyidi@utm.my	C07-313	31518

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 25 th February 2011
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 2922
WASTEWATER ENGINEERING SKAA 2922 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course is designed to expose the students to wastewater treatment technology. Topics discussed include basic environmental microbiology, characteristics of wastewater, wastewater analysis (Biological Oxygen Demand, Chemical Oxygen Demand and Suspended Solids), design of conventional wastewater treatment systems, sludge treatment and design of septic tank. For design of wastewater treatment systems, it will cover the design of sedimentation tank, Waste Stabilization Pond, Conventional Activated Sludge, Extended Aeration, Aerated Lagoon and Trickling Filters. At the end of the course, the student should be able to apply the knowledge to design a simple unit operation of wastewater treatment systems and also to modify existing unit operation.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe the basic concept of microbiology, wastewater characteristics, sewer system and explain the concept of wastewater treatment and sludge treatment system	PO1			KP1	C2	T, F
CO2	Solve some of wastewater parameters, i.e. solids, BOD and COD and the wastewater quantity	PO3				C3	A, T, F
CO3	Apply the knowledge to design of each unit processes in sewage treatment plant, differentiate between the processes	PO3	CP2		KP5	C5	A, T, F
CO4	Produce report or presentation related to current environmental issues	PO8		CA1		LL1	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	4

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	12
	b. Revision	10
	c. Assessment Preparations	8
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Principle, concept and design of unit processes of wastewater treatment will be delivered during lecture session with emphasis on working examples.
2. Students will be provided opportunities to solve problems in class, tutorial and out of class.
3. Students will be given an assignment which requires knowledge of bulk of the topics and to be submitted in group.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to Wastewater Engineering
	2	Environmental Microbiology – types and classes
2	3	Environmental Microbiology - metabolism and biological growth in wastewater treatment
	4	Wastewater Characteristics and Analysis - SS
3	5	Wastewater Characteristics and Analysis– BOD
	6	Wastewater Characteristic and Analysis – COD
4	7	Discharge Standards & Sewerage Act
	8	Wastewater Quantity
5	9	Sewer System
	10	Sewage Treatment System
6	11	Preliminary Treatment – screen, grit removal, balancing tank, flow measurement
	12	Test I
7	13	Primary Treatment – primary sedimentation tank design
	14	Secondary Treatment – biological treatment, secondary sedimentation, chlorination
8		MID SEMESTER BREAK
9	15	Activated Sludge – Principles and Concept
	16	Conventional Activated Sludge – Design
10	17	Extended Aeration – Design
	18	Sequential Batch Reactor – Principles and Concept
11	19	Trickling Filters – Principles and Concept
	20	Trickling Filters – Biological Tower Design
12	21	Waste Stabilization Pond – Principles and Concept
	22	Waste Stabilization Pond - Design
13	23	Aerated Lagoon – Principles, Concept and Design
	24	Site Visit to Sewage Treatment Plant
14	25	Septic Tank – Design
	26	Test 2
15	27	Sludge – Sources and Quantity
	28	Sludge Treatment and Disposal
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Warren Viessman, Jr., Mark J. Hammer, Elizabeth M. Perez, and Paul A. Chadik, (2009) Water Supply and Pollution Control, 8th Ed. Pearson Education
2. Metcalf & Eddy (2003) Wastewater Engineering: Treatment and Reuse, 4th Ed. McGraw Hill
3. Hammer, M.J. (2005) Water and Wastewater Technology, 5th Ed. Pearson Education South Asia Ltd
4. Code of Practice for Design and Installation of Sewerage System (MS 1228), 1991

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Generic Skill	1	5	5	
2.	Assignment	4	2.5	10	
3.	Test	2	20	40	
4.	Final Exam	1	45	45	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Ms. Normala Hashim	normala@utm.my	M50-219	38713
2.	Assoc. Prof. Dr. Azmi Aris	azmi.aris@utm.my	M50-326	38697
3.	Mr. Mohd Hafiz Puteh	mhafizputeh@utm.my	C09-228	31637

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 25 th April 2011
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 3012
CIVIL ENGINEERING LABORATORY II SKAA 3012 PRE-REQUISITE : SAM 4051 EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

Civil engineering is a practical field and the laboratory work is essential to be performed by students in this field. The laboratory work, which consists of workshops and experiments are designed to expose students essential problem solving and experimental techniques. Most of the generic attributes that the students must develop at the University are acquired through the laboratory experiments and researches. Laboratory sessions are able to strengthen the students to relate the fundamental theories with laboratory experiments in the field of concrete, transportation, hydraulics, and structural engineering. Each student will experiences data collections and performs data analysis and result interpretations. Application of the experimental results to the real civil engineering problem will be highlighted. Upon completion of the course, students are expected to be able to perform laboratory experimental work and investigation in concrete, transportation, hydraulics and structural engineering, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to develop generic attributes and enhance their ability to participate effectively in a laboratory environment and be able to work as a part of a team.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Perform laboratory experiments in the field of concrete, geotechnical, environmental, and hydrological engineering.	PO2	CP3		KP1	C2	Report
CO2	Analyze,interpret and relate experimental data with the fundamental theories.	PO2	CP3		P5	C4, A3	Report
CO3	Produce laboratory report.	PO2			KP3	C3	Report
CO4	Work in a team during lab work	PO7				TS1, TS2, TS3	OLW

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	3
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	20
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	5
	b. Revision	-
	c. Assessment Preparations	-
3.	Formal Assessment	
	a. Continuous Assessment	12
	b. Final Exam	-
Total Student Learning Time* (SLT)		40

TEACHING METHODOLOGY

1. Basic theory, its application in practice and the use of apparatus will be demonstrated.
2. Students are required to carry out laboratory tests and produce test reports in group.
3. Students are required to carry out one open ended project and produce project reports in group.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
2	1	Project Concrete: Concrete Mixed Design (C1)
3	2	Project Concrete: Concrete Mixed Design (C1)
4	3	Environment: Alkalinity Test (E1)
5	4	Environment: Biochemical Oxygen Demand (BOD)(E2) Environment: Total Suspended Solids (TSS)(E3)
6	5	Environment: Jar Test (E4) Environment: Turbidity Test (E5)
7	6	Geotechnic: Oedometer Consolidation Test (G1)
8		MID SEMESTER BREAK
9	7	Geotechnic: Vane Shear Test (G2)
10	8	Geotechnic: Undrained Triaxial Shear Strength Test (G3)
11	9	Geotechnic: Permeability Test (G4)
12	10	Geotechnic: Direct Shear Test (G5)
13	11	Hydrology: Flow Over Broad Crested Weir (H1)
14	12	Hydrology: Rainfall-Runoff Relationship (H2)
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Laboratory Manual for Laboratory III (SAB3011)
2. Text Books and Journal in Concrete, Hydraulics, Transportation Engineering and Structures

DISTRIBUTION OF MARKS

INFORMATION	TEST														MARK	DATE
	C1	HYDRO		ENVIRON					GEOTECHNICS							
		H1	H2	E1	E2	E3	E4	E5	G1	G2	G3	G4	G5			
Cognitive	C1: Knowledge															
	C2: Comprehensive		X	X	X	X	X	X	X	X	X	X	X	X	X	
	C3: Application		X	X	X	X	X	X	X	X	X	X	X	X	X	
	C4: Analysis		X	X	X	X	X	X	X	X	X	X	X	X	X	
	C5: Synthesis		X	X	X	X	X	X	X	X	X	X	X	X	X	
Psychomotor	P2: Set															
	P4: Mechanism		X													
Affective	A3: Valuing		X	X	X	X	X	X	X	X	X	X	X	X	X	
	A4: Organizing Values															
PO7	TS1		X													
	TS2		X													
	TS3		X													
P04	CTPS1		X													

ATTENDANCE

Student must attend all experiment.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Academic Staffs of Faculty of Civil Engineering			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision Date of issue Last Amendment Edition Procedure No.	: A : 15 th July 2010 : 15 th July 2010 : 1 : FKA/PG/RK/SAF 3021
INTEGRATED DESIGN PROJECT 1SKAA 3021 PRE-REQUISITE: EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

Integrated Design Project 1 is tailored to encourage students to explore the inception and conceptual planning stage of a civil engineering development project. The subject focuses on site and utility planning of a development project given to students, working in groups. Such exercise may include developing a survey plan for the specific proposed site, developing a general drainage and sewerage plan including evaluation of and connection to existing infrastructure and possible need for sewage lift station, proposing location and type of soil investigation to be carried out, producing preliminary road and utility cross sections and recommending any improvements to ease traffic congestion, developing an environmental mitigation plan including sittings of detention ponds and wetlands, to consider alternatives for sustainable design, evaluate the impact of relocating existing utility services and producing a preliminary project design schedule showing milestones and critical path. The scope and brief of the proposed development will be as reflective of a real life development project. Students are required to integrate their knowledge of civil engineering disciplines such as (but not limited to) geotechnical engineering, highway and transportation, waste water engineering, and sustainable development considerations into their overall project work. At the end of this course, the students will be able to comprehend the importance of proposing a viable and workable development project and appreciate the importance of integration and synthesis of various discipline of civil engineering knowledge.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Comprehend the general concept of planning in civil engineering	PO1		CA1		C2	PRE
CO2	Demonstrate problem-solving skills and integrate knowledge gained from all relevant core subjects to propose a generally workable engineering solution.	PO4	CP1	CA2	KP4	C3, C4 P6 A4	PRE
CO3	Produce a technical conceptual report incorporating preliminary design calculations and supporting drawings/sketches/bills etc. in a team.	PO3	CP8	CA5	KP5, KP6	C5 P7 A5	Pr, INT
CO4	Apply critical reasoning and make informed judgement orally in defending selected engineering proposals.	PO7				C5 P5 A4	Pr, INT

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation
PRE: Preliminary; INT: Interview

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	6
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	20
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	10
	b. Revision	-
	c. Assessment Preparations	2
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	-
Total Student Learning Time* (SLT)		40

TEACHING METHODOLOGY

1. Lecture
2. Problem Based Learning (Critical discussion, Information gathering, Presentation & Report Writing)
3. Cooperative Learning

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1		Course briefing by course coordinator : Implementation of SAF 3021
2		Course Lectures and Project Brief by Course Coordinator
3		Continuation of Course Lectures and Project Brief discussion by student groups
4		Continuation of Course Lectures and Project Brief discussion by student groups
5		Project implementation & design by student group (Group-Course Lecturer discussions & problem solving)
6		Project implementation & design by student group (group-Course Lecturer discussions & problem solving)
7		Preparation of draft individual project report (pre-estimates & schematic drawings) by student sub group and presented to Course Lecturers
8		MID SEMESTER BREAK
9		Preparation of draft individual project report (calculations & schematic drawings) by student sub group and presented to Course Lecturers
10		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
11		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
12		Preparation & compilation of overall final project report by student group
13		Submission of final project report by student group
14		Formal group interview & Poster Session
15		Formal group interview & Poster Session
16 – 18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Akta Jalan, Parit dan Bangunan 1974: Akta 133 Urban Storm water, Management Manual for Malaysia, Drainage and Irrigation Dept., Malaysia, 2001.
2. MWA Design Guideline for Water Supply Systems, The Malaysian Water Associations 1992
3. A Handbook of EIA Guideline, ENSEARCH 1991
4. Guideline for Developers on the Design & Installation of Sewerage Systems, Sewerage Service Dept., Ministry of Housing & Local Government 1995
5. Guideline for the Prevention & Control of Soil Erosion & Siltation in Malaysia, Dept. of Environment Ministry of Science, Technology & Environment 1996

DISTRIBUTION OF MARKS

COURSE ASSESSMENT	
Sub Group Report & Presentation	20%
Overall Group Report & Presentation	50%
Individual Group Member Interview	30%
TOTAL	100%

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers		E-Mail	Room No.	Phone No.
1.	Ir. Azhar Ahmad	azhara@utm.my	M46-359	31623
2.	Dr Mohd Fadhil Md Din	mfadhil@utm.my	C09-221	31685
3.	Mohd Nor Othman	mnor@utm.my	M46-355	31621
4.	Assoc. Prof. Dr Mohd Rosli Hainin	hrosli@utm.my	C09-216 / C07-208	31710 / 31508
5.	Dr Noor Baharim Hashim	nbaharim@utm.my	C07-330	31510
6.	Amat Sairin Demun	asairin@utm.my	C07-321	31524
7.	Assoc. Prof. Dr. Othman Che Puan	ocp@utm.my	M46-144	31719
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9.	Assoc. Prof. Dr. Mushairry Mustaffar	mushairry@utm.my	C09-317	31708
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11.	Assoc. Prof. Dr. Sobri Harun	sobri@utm.my	C07-329	31528
12.	Assoc. Prof. Mohd For Mohd Amin	mohdfor@utm.my		
13.	Assoc. Prof. Dr Ayob Katimon	ayobkatimon@utm.my		
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision : A Date of issue : 15th July 2010 Last Amendment : 15th July 2010 Edition : 1 Procedure No. : FKA/PG/RK/SAF 3031
	INTEGRATED DESIGN PROJECT 2 SKAA 3031 PRE-REQUISITE: EQUIVALENCE : LECTURE HOURS : 2 hours / week

SYNOPSIS

Integrated Design Project 2 (IDP 2) is tailored to expose and familiarize students to conduct a feasibility study and preliminary design of a civil engineering development project that has been developed previously in Integrated Design Project 1 (IDP 1) (conceptual planning stage). The aim of the Feasibility Study phase is to determine the optimum scheme from a technical, economic, environmental, and construction view. A Feasibility Study Report is the minimum expected output of this phase. The Feasibility Report shall encompass all the engineering options and attributes developed in the Planning Stage (IDP 1). Each option shall then be investigated to measure its capability to sufficiently address the project constraints and the optimum scheme determined. The chosen scheme will then be developed to the stage of producing a Detailed Design Brief to be adopted at the final Integrated Design Project phase (SAF 4042). Such exercise shall in part maintain the continuity of the IDP project series. At the end of this course, the students will be able to comprehend the importance of reviewing and selecting a feasible technical proposal and appreciate the importance of integration and synthesis of various discipline of civil engineering knowledge.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Comprehend the general concept of feasibility study in civil engineering	PO1		CA1		C2	PRE
CO2	Demonstrate problem-solving skills and integrate knowledge gained from all relevant core subjects to select the most feasible engineering solution for the overall project.	PO4	CP1	CA2	KP4	C3, C4 P6 A4	PRE
CO3	Produce a feasibility report incorporating preliminary design calculations and supporting drawings/sketches/bills etc. in a team.	PO3	CP8	CA5	KP5, KP6	C5 P7 A5	Pr, INT
CO4	Apply critical reasoning and make informed judgement orally in defending selected engineering proposals.	PO7				C5 P5 A4	Pr, INT

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation
 PRE: Preliminary; INT: Interview

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	6
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	20
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	10
	b. Revision	-
	c. Assessment Preparations	2
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	
Total Student Learning Time* (SLT)		40

TEACHING METHODOLOGY

1. Lecture
2. Problem Based Learning (Critical discussion, Information gathering, Presentation & Report Writing)
3. Cooperative Learning

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1		Course briefing by course coordinator : Implementation of SAF 3031
2		Course Lectures and Project Brief by Course Coordinator
3		Continuation of Course Lectures and Project Brief discussion by student groups
4		Continuation of Course Lectures and Project Brief discussion by student groups
5		Project implementation & design by student group (group-Course Lecturer discussions & problem solving)
6		Project implementation & design by student group (group-Course Lecturer discussions & problem solving)
7		Preparation of draft individual project report (calculations & schematic drawings) by student sub group and presented to Course Lecturers
8		MID SEMESTER BREAK
9		Preparation of draft individual project report (calculations & schematic drawings) by student sub group and presented to Course Lecturers
10		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
11		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
12		Preparation & compilation of overall final project report by student group
13		Submission of final project report by student group
14		Formal group interview & Poster Session
15		Formal group interview & Poster Session
16 – 18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Akta Jalan, Parit dan Bangunan 1974: Akta 133 Urban Storm water, Management Manual for Malaysia, Drainage and Irrigation Dept., Malaysia, 2001.
2. MWA Design Guideline for Water Supply Systems, The Malaysian Water Associations 1992
3. A Handbook of EIA Guideline, ENSEARCH 1991
4. Guideline for Developers on the Design & Installation of Sewerage Systems, Sewerage Service Dept., Ministry of Housing & Local Government 1995
5. Guideline for the Prevention & Control of Soil Erosion & Siltation in Malaysia, Dept. of Environment, Ministry of Science, Technology & Environment 1996

DISTRIBUTION OF MARKS

COURSE ASSESSMENT	
Sub Group Report & Presentation	20%
Overall Group Report & Presentation	50%
Individual Group Member Interview	30%
TOTAL	100%

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-

1. Student must attend not less than 80% of lecture hours as required for the subject.
2. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Ir. Azhar Ahmad	azhara@utm.my	M46-359	31623
2.	PM Dr Mohd Fadhil Md Din	mfadhil@utm.my	C09-221	31685
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9.	Assoc. Prof. Dr. Mushairry Mustaffar	mushairry@utm.my	C09-317	31708
10.	Muhammad Nassir Hanapi	nassir@utm.my	C07-324	31512
11.	Assoc. Prof. Dr. Sobri Harun	sobri@utm.my	C07-329	31528
12.	Assoc. Prof. Mohd For Mohd Amin	mohdfor@utm.my		
13.	Che Ros Ismail	cheros@utm.my	M46-328	31620
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: B
	Date of issue	: 18 th May 2010
	Last Amendment	: 25 th February 2011
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA 3045
INDUSTRIAL TRAININGSKAA 3045 PRE-REQUISITE : All basic Civil Engineering Core Subject EQUIVALENCE : SAB 3045 LECTURE HOURS : 12 weeks of practical training		

SYNOPSIS

This course is a core course which will assign students to work with industries for a period of 12 weeks. The training aims to expose students to real civil engineering practices such as project planning and design, construction management and site supervision and other fields of specialization. Students will gain knowledge and working experience as well as improving their interpersonal skills through working with professionals from the industries. Depending on the nature of work, the students will have opportunity to apply theories learnt in the lecture room into real civil engineering practices..

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Apply theoretical knowledge into practical field implementation for civil engineering work.	PO1	CP1, CP5, CP6	CA2	KP7	C3, P3, A3	R
CO2	Analyse and solve problems, provide and explain idea, and determine alternative solution with good grasp of fundamentals.	PO4				CTPS1, CTPS2, CTPS3	S
CO3	Communicate with team members and alliance in achieving organization goals.	PO5				CS1, CS2	S
CO4	Develop good relationship, interaction with colleagues and work effectively with other people to achieve mutual objective	PO7				TS1, TS2, TS3	S
CO5	Apply high ethical standards in professional practice and social interactions for sustainable development.					EM2, EM3	S

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

R: Report; S: Supervisors

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	On-site training	432
2.	Report writing	40
Total Student Learning Time* (SLT)		472

TEACHING METHODOLOGY

1. Students will be involved in the various aspects of civil engineering works undertaken by the industrial organizations.
2. Students will practice theoretical knowledge and skills acquired during lectures while strengthening and enhancing them in through involvement in real projects.
3. Students will have opportunities to acquire knowledge and experience from the professional engineers while assisting them in undertaking their tasks.
4. Students are required to submit full reports on the Industrial training a week after the end of the training.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1-5		On-site training
6		Visit and assessment by Faculty Supervisor
7-11		On-site training
12		Report writing Assessment by Industrial Supervisor
13		Submission of Final Report and Assessment by Faculty Supervisor

REFERENCES

Industrial Training Guidelines for undergraduate programme, UTM-Faculty of Civil Engineering, Universiti Teknologi Malaysia, 2011

DISTRIBUTION OF MARKS

No.	Assessment	%	Weeks
1.	Assessment by Faculty Supervisor	20	Week 6
2.	Assessment by Industrial Supervisor	30	Week 12
3.	Final Report	40	Week 14
4.	Log Book	10	Week 6 & 12
			100

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation; Student must attend all training period of 12 weeks as required for the subject. Any student who does not achieve 12 weeks of training or not submitted Industrial training report will be given HG and need to repeat Industrial Training in the following semester.

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : F Date of issue : 01 June 2003 Last Amendment : 8 February 2013 Edition : 3 Procedure No. : FKA/PG/RK/SKAA 3122
CONSTRUCTION TECHNOLOGY AND ESTIMATION SKAA 3122 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course emphasizes on the principles of construction in building and civil engineering works, which consists of site preparation and layout, earthwork activities, construction of various building elements such as foundations, floors, walls and roofs. It also covers other important aspects in construction i.e retaining walls, formworks and scaffoldings. General concepts on industrialized building systems including precast, prestressed and modular coordination in construction are also introduced. At the end of the course, the students should be able to describe and distinguish the various building elements, techniques and systems used in a construction. The students should also be able to demonstrate capability of working in a team and some acquirement of contemporary knowledge.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe and illustrate construction tools and techniques used in building and civil engineering works.	PO1	CP1			C4	A, Pr, F
CO2.	Distinguish between building elements and the different types of construction techniques and tools used for their construction.	PO1, PO2	CP1	CA2		C4	A, Pr, F
CO3.	Explain and illustrate effectively and with confidence the various types of construction techniques used in building and civil engineering works including sustainable environment issues	PO1, PO2, P10	CP1	CA2	KP6	P2, A3	Pr, P

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student- Centered Learning (SCL)	
	i. Computer Laboratory	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	
2.	Self-Directed Learning	
	a. Non-face-to-face learning:	
	- information search – 10 hours	
	- library search – 3 hours	
	- reading/revision – 5 hours	18

No.	Teaching and Learning Activities	SLT* (hours)
	b. Student Centered Learning (SCL): - Group discussion - Group presentation i. Assignment (1x) ii. Project (1x)	7 10
3.	Test preparation (2x)	6
4	Exam Preparation (1x)	6
3.	Test (2x)	2
4.	Exam (1x)	3
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lectures
2. Demonstrations

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 2	Introduction to construction industry Construction stages and activities
2	3 4	Site layout – introduction and the importance of site layout Information and preparation processes – entrance access, temporary road and parking Temporary buildings, storage area, hoarding and preliminary works Assignment 1
3	5 6	Introduction to construction plants and machineries Earthwork – earthwork activities and types of plants and machineries
4	7 8	Introduction to foundations Shallow and deep foundations
5	9 10	Pile Pile testing and safety measures in piling works
6	11 12	Floors Walls
7	13 14	Roofs Internal fixtures and fittings Assignment 2
8		MID SEMESTER BREAK
9	15 16	Formwork and falsework. Requirements of a good formwork, types of formwork. Design concepts for a formwork.
10	17 18	Scaffoldings : Types. Scaffoldings : Safety measures.
	11 19 20	Retaining walls : Functions and types. Retaining walls : Principles of design.
12	21 22	External works : roads, pavings, drainage and turf Sewerage & water supply system
13	23 24	Demolition of building : demolition techniques Safety precautions in demolition works
14	25 26	Industrialised building system : precast concrete Modular coordination

Week	Lecture	Topic / Content
15	27 28	Students' project presentations Students' project presentations
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Chudley, R., Construction Technology, 4th Edition. Kuala Lumpur: Addison Wesley Longman Limited, 2005
2. Chudley, R., Advanced Construction Technology, 4th Edition 2006 Prentice Hall
3. Nunnally, S.W., Construction Method and Management, 8th Ed. New Jersey: Prentice Hall, 2010.
4. Ariba, R. B., Construction Buildings, Vol 1-2, 4th Ed. , London: Granada, 1980.
5. Peurifoy, R.L. and Schexnayder, C.J., Construction Planning, Equipment, and Methods. 8th Ed. New York: McGraw Hill, 2010.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	2	25	50	
2.	Final Exam	1	50	50	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1. Dr. Khairulzan Yahya	khairulzan@utm.my	M50 03-25-01	0197782760

2.	Independent Study - self learning - information search - library search - reading	14
3.	Assignment - self learning - group discussion	5
4.	Project - information search - library search - group discussion - report writing	30
5.	Tests and preparation for the test	10
6.	Exam and preparation for the exam	10
Total Student Learning Time* (SLT)		125

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed steel design project.
3. Students will be required to go through the given tutorials.
4. Students will be required to produce design project in group.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction Introduction to the design of steel and timber, their advantages and disadvantages.
	2	Introduction to steel design Types and material properties. Types of steel sections. The use of tables of section properties.
2	3	Local buckling and section classification. Analysis and design of fully restrained beams. General behaviour of beams, load distribution. Definition of restrained and unrestrained beams.
	4	Calculation of bending moment, shear force and deflection
3	5	Bending moment and shear force capacity.
	6	Buckling and bearing capacity of webs. Examples of restrained beam.
4	7	Analysis and design of unrestrained beams. Introduction, the effect of unrestrained condition, lateral torsional buckling, influencing factors.
	8	Moment resistance to lateral torsional buckling Example of design of unrestrained beams.
5	9	Analysis and design of columns Introduction, short and slender columns, behaviour of columns, effective length of columns
	10	Load distribution, compression resistance of columns Work example on design of column subjected to axial loads only.
6	11	Columns subjected to axial loads and moments.
	12	Nominal moment, column design for simple construction method. Work examples.

Week	Lecture	Topic / Content
7	13	Analysis and design of connections
	14	Introduction, bolt and weld connections Design of connections subjected to direct shear Design of bolt connections subjected to shear and moment.
8		MID SEMESTER BREAK
9	15	Work examples
	16	Design of connection subjected to direct shear by welding. Work examples
10	17	Design of connection subjected to shear and moment by welding.
	18	Work examples
11	19	Analysis and design of truss
	20	Analysis and design of purlins Design of compression members Design of members subjected to compression and moment
	21	Worked examples
12	22	Design of tension members and work example. Worked examples on analysis and design of truss
	23	Introduction to timber design
13	24	Introduction, group and grade of timbers, derivation of basic and grade stresses.
	25	Design of flexural members
14	26	Analysis of beam and girder, allowable stress and design checks, coefficient factor $k_1 - k_5$ and k_{kb} Worked example on design of beam and girder
	27	Design of compression members
15	28	Buckling of column, coefficient factor k_6 and k_{kb} Buckling resistance of columns Worked example on design of column
	REVISION WEEK AND FINAL EXAMINATION	

REFERENCES

- BS EN 1990:2002, Eurocode 0 – Basis of Structural Design. British Standards.
- BS EN 1991:2002, Eurocode 1 – Actions on Structures. British Standards.
- BS EN 1993:2005, Eurocode 3 – Design of Steel Structures. British Standards.
- Steel Construction Institute, UK. Publications No P361, P362, P363, P364 and P374.
- British Standard Institution, UK. BS5950 Part 1: 2000. Structural Steelwork in Building.
- British Standard Institution, UK. Section Properties and Member Capacities, 2nd edition, 1987.
- Steel Construction Institute, UK. Steelwork Design Guide to BS5950: Part 1: 1985 Vol.1.
- N.S. Trahair, M.A. Bradford, D.A. Nethercot, and L. Gardner. The Behaviour and Design of 9. Steel Structures to EC3, 4th Ed., Taylor and Francis, UK, 2008.
- Steel Technology Centre, UTM. Steelwork Design Guide to BS 5950-1:2000. Penerbit UTM, 2010.
- Mat Lazim Zakaria, Reka bentuk Struktur Kayu Menurut MS 544, Dewan Bahasa dan Pustaka, 1989.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test 1	1	15	15	
2.	Test 2	1	15	15	
3.	Project and Assignments including Team-working Generic Skills	1	20	20	
4.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply with the above requirement. Zero mark will be given to the subject..

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Prof. Dr. Shahrin Mohammad	shahrin@utm.my	M46-103	31500
2.	Assoc. Prof. Dr. Ahmad Baharuddin Abd Rahman	baharfka@utm.my	M46-138	32449
3.	Assoc. Prof. Dr. A. Aziz Saim	aaziz@utm.my	M50	31684
4.	Assoc. Prof. Dr. Arizu Sulaiman	arizu@utm.my	M46-154	31505
5.	Dr. Shek Poi Ngian	shekpoingian@utm.my	C09	31616

 <b style="font-size: 2em; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 8 th February 2013 Edition : 5 Procedure No. : FKA/PG/RK/SAB 3243
THEORY OF STRUCTURES SAB 3243 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course is designed to expose students to the analysis of determinate and indeterminate structures in civil engineering. The course emphasizes on analysis of beams, portal frames, arches and cable structures subjected to various load conditions using classical techniques. The course is limited to the analysis of elastic behaviour of structures except in plastic analysis where the critical loads at failure of structures are being examined. Students will also be taught on the use of influence diagrams to solve problems involving determinate beams subjected to moving loads. At the end of the course, students should be able to apply the knowledge and use the techniques for solving problems in structural engineering.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Analyse indeterminate and determinate structures by using classical methods.	PO2			KP1	L4	A, CS, T, F
CO2	Able to solve problem in complex situations.	PO4	CP	CA			CS

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation
 CS: Case Study

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40
	b. Revision	20
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

Traditional class lectures

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	3 hours	INTRODUCTION - Structures: type of, classifications - Idealization of structures and loads - Stability and determinacy of structures
2	3 hours	STATICALLY INDETERMINATE BEAMS AND FRAMES - Displacement Method of Analysis: Slope Deflection Equations - Analysis of Beams: No Support Settlements - Analysis of Beams: Support Settlements
3	3 hours	- Analysis of Frames: No Sidesway - Analysis of Frames: Sidesway
4	3 hours	- Displacement Method of Analysis: Moment Distribution Method - Moment Distribution for Beams
5	3 hours	- Moment Distribution for Frames : No Sidesway - Moment Distribution for Frames : Sidesway Problems - Work examples for frames with single sway / multiple sways
6	3 hours	- Force Method of Analysis: Virtual Work Method - work examples for beams - work examples for frames
7	3 hours	STATICALLY INDETERMINATE PLANE TRUSSES - Analysis of statically indeterminate plane trusses by virtual work method. - Work examples for trusses with single internal and external indeterminacy - Test 1, Case Study
8		MID SEMESTER BREAK
9	3 hours	- Work examples for trusses with single internal and external indeterminacy (cont'd) - Truss with two degrees of redundancy
10	3 hours	INFLUENCE LINES FOR STATICALLY DETERMINATE STRUCTURES - Introduction to Influence Lines) - Influence Lines for Beams: Quantitative I.L.
11	3 hours	- Maximum Influence at a Point Due to a Series of Concentrated Loads and Uniformly Distributed Loads - Absolute Maximum Shear and Moment Problems
12	3 hours	TWO-HINGED ARCHES - Introduction - Analysis: Virtual Work Method - Shear and Normal Forces at a Section - Bending Moment Diagrams
13	3 hours	CABLES - Theory and Analysis of Cable Structures - Work Examples - TEST 2
14	3 hours	PLASTIC METHOD FOR BEAMS AND FRAMES - Introduction - Plastic Analysis for Beams: Virtual Work Method - Work Examples
15	3 hours	- Plastic Analysis for Frames: Collapse Mechanisms - Analysis: Virtual Work Method - Work Examples
16-19		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Yusof Ahmad, 'Teori STRUKTUR' Penerbit UTM 2004.
2. Hibbeler, R.C., Structural Analysis, SI Edition, Prentice Hall, Singapore.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	5	2	10	When appropriate
2.	Case Study 6 (for PO4)	1	100	100	Week 9
3.	Quizzes	-	-	-	
4.	Presentation	1	10	10	
5.	Tests (1 & 2)	2	15	30	Week 7, 13
6.	Final Exam	1	50	50	17 to 19
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Dr. Sariffuddin bin Saad	sariffuddin@utm.my	C09-215	0137796300
2.	Assoc. Prof. Dr. Redzuan bin Abdullah	redzuan@utm.my	M50-122	0197720622
3.	Tuan Haji Jalil bin Omar	Amoo.waseem@gmail.com	M46-316	0179731071
4.	Assoc. Prof. Dr. Jamaludin bin Mohamed Yatim	jmyatim@yahoo.com	M46-325	0197749250

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	24
	b. Revision	19
	c. Assessment Preparations	14
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed design project.
3. Students are required to go through the given tutorials.
4. Students are required to produce design project in group

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction - Objective, method and process of design, code of practice, loading and material strength, partial safety factor.
	2	- Stress strain relationships, behavior of beam under flexure, stress strain distribution of a section, types of section failure.
2	3	Analysis and design of section. - Singly reinforced rectangular sections.
	4	- Doubly reinforced rectangular sections, design formulae.
3	5	- Flange section-effective width of flange beam, neutral axis in the flange.
	6	- Flange sections- neutral axis below the flange, design formulae
4	7	Shear, deflection and cracking
	8	- Shear, mode of failure, design procedure and examples. - Deflection and cracking, theory, checking procedure and examples
5	9	Durability and detailing requirements - Concrete cover, minimum and maximum areas of steel, bar anchorage, curtailment and laps.
	10	Beam design - Determination of size, simply supported beams, examples
6		MID SEMESTER BREAK
7	11	- Distribution of slab loading to beams, simply supported beams, related examples.
	12	TEST 1
8	13	- Continuous beam, loading arrangement methods of analysis, application of shear and moment coefficient, examples.
	14	- Elastic analysis using moment distribution methods, examples., moment redistribution, examples
9	15	Slab Design - Introduction, types of slab, method of analysis.
	16	- Simply supported one-way slab, example
10	17	- Continuous one way slab, example.
	18	- Simply supported two way slab, example
11	19	- Restrained two way slab : design rules.
	20	- Restrained two way slab : example
12	21	- Restrained two way slab : detailing
	22	- TEST 2

Week	Lecture	Topic / Content
13	23	Introduction to Prestressed Concrete - Introduction, prestressing methods, advantages, materials, prestressing systems, equipments and usage.
	24	- Design considerations, stress limits, loss of prestress.
14	25	- Design procedure, basic theory, derivation of basic equations
	26	- Checking of stress limits, example
15	27	- Selection of section : trial and error method
	28	- Selection of section : standard section method
REVISION WEEK AND FINAL EXAMINATION		

REFERENCES

- STANDARDS MALAYSIA. MS EN 1990: Eurocode: Basis of structural design. MS, 2010
1a. Malaysia National Annex to Eurocode. MS, 2010
- STANDARDS MALAYSIA. MS EN 1991: Eurocode 1: Actions on structures. MS, 2010
2a. Malaysia National Annex to Eurocode 1. MS, 2010
- STANDARDS MALAYSIA. MS EN 1992: Eurocode 2-Part 1-1: Design of concrete structures- General rules and rules for buildings, MS, 20103a. Malaysia National Annex to Eurocode 2. MS, 2010
- Mosley, B, Bungey, J. & Hulse, R. Reinforced Concrete Design to Eurocode 2, 7th. Edition. Palgrave MacMillan, 2012.
- The Institution of Structural Engineers/The Concrete Centre/BCA, Manual for the design of concrete building structures to Eurocode 2, IStructE, 2006
- Goodchild, C.H, Worked Examples to Eurocode 2: Volume 1, The Concrete Centre, 2009
- Narayanan, R.S, & Goodchild, C.H, Concise Eurocode 2, The Concrete Centre, 2006
- The Institution of Structural Engineers/The Concrete Centre/DTI, Standard method of detailing structural concrete, Third Edition, IStructE, 2006
- Brooker, O, et, al. How to design concrete structures using Eurocode 2, The Concrete Centre, 2006
- Reynold, CE. & Steedman, JC. & Threlfall, A, J., Reinforced Concrete Designer's Handbook, 11th. Ed., Taylor & Francis, 2007
- Laws of Malaysia, Uniform Building By-Laws 1984, International Law Book Services. 2003
- Bhatt, P., MacGinley, T.J., & Choo, B.S., Reinforced concrete, design theory and examples, 3rd. Edition, Taylor & Francis, 2006

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	1	5	5	
2	Project	1	15	15	
3.	Test	2	15	30	
4.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
Ahmad Zaidon bin Rais	ahmadzaidon@utm.my	M46-335	31608
Dr. Zaiton Haron	zaitonharon@utm.my	M47-119	31537

 <p>UTM UNIVERSITI TEKNOLOGI MALAYSIA</p> <p style="font-size: small;">Faculty of Civil Engineering</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Revision</td> <td style="width: 40%;">: G</td> </tr> <tr> <td>Date of issue</td> <td>: 1st June 2003</td> </tr> <tr> <td>Last Amendment</td> <td>: 4th February 2013</td> </tr> <tr> <td>Edition</td> <td>: 5</td> </tr> <tr> <td>Procedure No.</td> <td>: FKA/PG/RK/SKAA 3413</td> </tr> </table>	Revision	: G	Date of issue	: 1 st June 2003	Last Amendment	: 4 th February 2013	Edition	: 5	Procedure No.	: FKA/PG/RK/SKAA 3413
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Date of issue	: 1 st June 2003										
Last Amendment	: 4 th February 2013										
Edition	: 5										
Procedure No.	: FKA/PG/RK/SKAA 3413										
COMPUTER PROGRAMMING SKAA 3413											
PRE-REQUISITE : SAM 2413, SAB 1413, SKAA 3413											
EQUIVALENCE :											
LECTURE HOURS : 2 hours / week											

SYNOPSIS

This course is designed to expose the students on the development of programming skill using a computer language, which is suitable for the current computer operating system. It will emphasize on the general concept of computer programming that includes steps of problem solving using computer, algorithm and program logic tools, interface design, modularization, arrays, files and graphics. Examples, assignments and group projects related to various civil engineering fields are given to the students. At the end of the course, the student should be able to plan, analyse, and write computer programs for basic civil engineering applications.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Define basic computer programming development procedures	PO1			KP2	L1 & C1	A, Q
CO2	Apply logic design tools to produce a computer program	PO3			KP3	L4 & C3	T
CO3	Analyse and develop computer program using programming language	PO2				L5 & C5	T
CO4	Develop computer program to solve relevant civil engineering problems	PO2 PO8	CP2	CA1		L5 & C5	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	24
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	45
	b. Revision	8
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	5
	b. Final Exam	-
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed steel design project.
3. Students are required to go through the given tutorials.
4. Students will require to produce design project in group.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1-4	INTRODUCTION TO PROGRAMMING Introduction to Computers & Programming Process. Logic Design Tools-Flowchart, Pseudocode, Hierarchy charts.
2	5-8	INTRODUCTION TO VISUAL BASIC Visual Basic Environment – Event, Event Procedure, Form User Interface design- Setting Properties HO - Creating VB user interface, setting properties, write simple codes. Assignment 1
3	9-12	VARIABLES AND OPERATORS Variables, constants, Data Types Operators - Arithmetic, Comparison and logical operators HO - Creating simple VB Project using arithmetic operators (HO)
4	13-16	SELECTIVE STRUCTURES IF Statements Nested IF HO – Applying If statements
5	17-20	Data Validation – Existence, Range, Type checks REPETITIVE STRUCTURES Determinate loop – For Next HO – Data validation Quiz 1
6	21-24	Indeterminate loop – Pre-test Indeterminate loop – Post-test HO – Loops
7	25-28	MODULARISATION Functions & Procedures Scope of Variables TEST 1
8		MID SEMESTER BREAK

Week	Lecture	Topic / Content
9	29-32	Calling and Creating function and procedure Passing and Calling arguments/parameters HO – Scope of variables- form >1 event procedures, >1 forms <i>Project –title/scope confirmation</i>
10	33-36	Modules ARRAYS 1D Array, Control array HO – Passing arguments to functions, procedures, creating modules Assignment 2
11	37-40	2D Array, Dynamic array, User defined Type (UDT) Array Files – Types, Format, Accessibility HO – Static array(1D, 2D) & Control Array Dynamic and UDT Arrays
12	41-44	FILES Open & closing data and report files Writing & reading data files HO – Writing & reading data files
13	45-48	Writing report file Reading Report file HO – Writing & reading report files Quiz 2
14	49-52	Project Presentation TEST
15-16		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Alkar R. Harriger, et al., *Introduction to Computer Programming with Visual Basic 6*, QUE E & T, 1999A. Yarwood (2002). *An Introduction to AutoCAD 2002*. Pearson Education
2. David I. Schneider, *An Introduction to Programming Using Visual Basic 6*, Updated 4th Edition, Prentice Hall, 2004.
3. Deitel, Deitel & Nieto, *Visual Basic 6 – How to Program*, Prentice Hall 1999

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	2	5	10	Wk: 2-10
2.	Project	1	20	20	Wk: 14
3.	Quizzes	2	5	10	Wk: 5-13
4.	Presentation	0	0	0	
5.	Test	2	30	60	Wk: 7 & 14
6.	Final Exam	0			
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Rosli bin Anang	roslianang@utm.my	M46-314	31632
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: B
	Date of issue	: 15 th July 2010
	Last Amendment	:
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA 3613
HYDROLOGY AND WATER RESOURCES SKAA 3613		
PRE-REQUISITE	:	SKAA 1513 (Fluid Mechanics), SAB 3613
EQUIVALENCE	:	
LECTURE HOURS	:	3 Hours

SYNOPSIS

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

Upon completion of the course, students are expected to be able to describe and assess all the physical processes found in the hydrologic cycle together with the basic quantitative hydrologic analysis methods.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe the basic concepts of hydrology and integrate the physical hydrological processes.	PO3			KP1	C3	T, F
CO2	Analyze various hydrological data and stream flow quantification.	PO3			KP2	C4	T, F
CO3	Develop precipitation and hydrograph estimation and apply into engineering practices in water resources (flood and low flow management).	PO3			KP3	C5	T, F
CO4	Estimate and compute the discharge for hydrologic design purposes (surface water and ground water).	PO3			KP3	C5	T, F
CO5	Apply various statistical methods for hydrological analysis.	PO3			KP3	C4	T, F
CO6	Analyze engineering problems and explore the solutions in hydrological perspective. Evaluate and criticize the selection of the solutions.	PO4	CP2	CA1	KP4	C6	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	20
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	30
	b. Revision	10
	c. Assessment Preparations	11
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic concepts in structural modeling, from various loads and structures to simple idealised models.
2. Basic fundamental theories on the dynamics and behaviour of simple structures .
3. Basic concepts in stability and buckling loads.
4. Students are required to go through the given assignments
5. Students will require to produce a group project with reports.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1-3	1: INTRODUCTION TO HYDROLOGY - Introduction to the subject o Water supply and demand o Flood and drought occurrence o Water resources planning - The Hydrologic Cycle - River Basin & Catchment Area - Differences between river basin and catchment o Define: natural and urban o Delineation technique - The Hydrologic Water Balance o Continuity equation - Application of the water balance equation
2-3	4-9	2: RAINFALL - Definition precipitation and type of rainfall - Measurement of Rainfall Depth - Establish Rainfall Intensity - Intensity-Duration-Frequency Curve - Rainfall Data Analysis - Filling in Missing Data - Mean Areal Precipitation (MAP)

Week	Lecture	Topic / Content
4	10-12	3: HYDROLOGIC LOSSES - Evaporation and Evapotranspiration <ul style="list-style-type: none"> ○ Introduction to Evaporation and Evapotranspiration ○ Evaporation Measurement ○ Methods of Estimation ○ Penman Method - Infiltration <ul style="list-style-type: none"> ○ Infiltration Measurement ○ Double Ring Infiltrometer ○ Infiltration Estimation ○ Horton Infiltration Curve ○ ϕ-index
5	13-15	4: RIVER FLOW MEASUREMENT - River Stage Measurement - River Flow Measurement <ul style="list-style-type: none"> ○ Velocity-Area Method <ul style="list-style-type: none"> ▪ Float method ▪ Current meter - Development of rating curve equation
6	16-18	5: HYDROGRAPH ANALYSIS - Basic Components of a Hydrograph - Unit Hydrograph and S-Curve - Application of Unit Hydrograph
7	19-21	6: MODELLING IN HYDROLOGY - Model classification - Modelling concept - Modelling approach
8		MID SEMESTER BREAK
9-10	22-27	7: FLOW ESTIMATION - Peak Flow Estimation: Rational Method - Hydrograph Estimation: <ul style="list-style-type: none"> ○ Rational Hydrograph Method ○ Time-Area Methods Example: Drainage design application
11-12	28-33	8: FLOOD ROUTING - Reservoir routing – Level pool method - Channel routing – Muskingum method - Storage design for flood control using detention pond
13	34-36	9: FREQUENCY ANALYSIS - Introduction to probability distribution function - Frequency Analysis Method - Empirical Frequency Distribution (California, Hazen and Weibull) - Normal Probability Distribution - Extreme Value Theory (Gumbel)
14	37-39	10. RESERVOIR - Mass Curve and Storage - Flow Duration Curve - Groundwater resources
15	40-42	11. GROUND WATER - Aquifer and formations - Darcy's Law - Well hydraulics
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. HYDROLOGY AND WATER QUANTITY CONTROL by Martin Wanielista, John Wiley and Sons, 1990.
2. HYDROLOGY, AN INTRODUCTION TO HYDROLOGIC SCIENCE by Rafael L. Bras, Addison Wesley, 1990
3. INTRODUCTION TO HYDROLOGY by Warren Viessman et al, Crowell, Harper and Row, Fourth Edition, 1996
4. HYDROLOGY FOR ENGINEERS by Ray Linsley, Max Kohler and Joseph Paulhaus, McGraw Hill, 1975
5. ENGINEERING HYDROLOGY by E.M. Wilson, Mac millan, 1991
6. APPLIED HYDROLOGY by Vente Chow, David Maidment and Larry W. Ways, McGraw Hill, 1988
7. HYDROLOGIC ANALYSIS AND DESIGN by R. H. McCuen. Prentice Hall, 1989; 2nd Edition
8. HYDROLOGY IN PRACTICE by Elizabeth M. Shaw, Chapman & Hall, 1994
9. HYDROLOGY: PRINCIPLES, ANALYSIS AND DESIGN, H. M. Raghunath, New Age International Publishers, 2006; 2nd Edition
10. URBAN STORMWATER MANAGEMENT MANUAL FOR MALAYSIA Published by Department of and Drainage Malaysia, 2012
11. ADDITIONAL CLASS HANDOUTS

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Essay or report writing	5	10	50	
1.	Assignment	1	10%	10	Wk: 3 - 11
2.	Quizzes	0	0%	0	
3.	Presentation	0	0%	0	
4.	Test	2	20%	40	Wk: 6 & 13
5.	Final Exam	1	50%	50	Wk: 18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

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1.	Dr Arien Heryansyah	arien@utm.my	C09-214	31706
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6.	DrTarmizi Ismail	tarmiziismail@utm.my	M50-03-07	38709
7.	Prof. Dr Zulkifli Yusop	zulkifiyusop@yahoo.com	C09-219	31731

 <b style="font-size: 2em; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : G Date of issue : 1st June 2003 Last Amendment : 29th Jan 2013 Edition : 5 Procedure No. : FKA/PG/RK/SAB 3712
GEOTECHNICS II SAB 3712 PRE-REQUISITE : SAB 2722, SAB 4714 EQUIVALENCE: LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course will provide students with knowledge on site investigation and foundation designs for civil and geotechnical engineering structures. The main topics of the course are site investigations, shallow foundation and pile foundation. The importance of site investigation for safe and economical foundation designs will be emphasized. Methods, procedures and planning of effective site investigation will be addressed. The topic of shallow foundation will be based on Terzaghi’s theory and Meyerhof’s general bearing capacity equations, which will include the effects of ground water and eccentric load. Static formulae (Meyerhof’ method, and methods) and dynamic formula will be introduced to determine pile capacity

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom’s Taxonomy	Assessm. Methods
CO1	Identify methods of collecting/ searching information for a desk study, name tools or equipment for site investigation works, plan & prepare proposal of site investigation.	P01				C1	T, A, F
CO2	Use data from site investigation report to analyse and design shallow and pile foundations under various conditions	P02	CP1	CA2	KP4	C3, C4, A3, P3, CTPS1	T, P, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	4
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	20
	b. Revision	16
	c. Assessment Preparations	8

No.	Teaching and Learning Activities	SLT* (hours)
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lecture and discussion
2. Assignment
3. Independent Study

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	INTRODUCTION – schedule and overview of SAB 3712 (Geotechnics II) and review of SAB 2722 (Geotechnics I), SAB 2712 (Geology) & SAB 1713 (Soil Mechanics). Introduction to problems in Geotechnical Engineering, Foundation Design and the Importance of Site Investigation in Foundation Design
	2	
2	3	SITE INVESTIGATION – Introduction, objectives and general stages of site investigation
	4	Desk Study, Site Reconnaissance/Visit, and Preliminary Investigation
3	5	Soil Investigation – Techniques: geophysical method, TV and borehole camera, trial pits and drilling practice
	6	Drilling techniques – Auger, Percussion rig drilling: ‘Wash Drilling’ and ‘Rotary Core Drilling’
4	7	Layout and depth of boreholes, Sampling – frequency and types. Soil Tests – field and laboratory.
	8	Preparation of site investigation report and Briefing on Group Project Assignment
5	9	SHALLOW FOUNDATION – Introduction to types of shallow foundations and modes of bearing capacity failures
	10	Introduction to Terzaghi’s ultimate bearing capacity equations
6	11	General bearing capacity equations – Meyerhof, and Brinch-Hansen. Shape, depth and inclination factors
	12	Test 1
7	13	Effects of groundwater on bearing capacity
	14	Effects of eccentric load to bearing capacity
8		MID SEMESTER BREAK
9	15	Using field data to estimate bearing capacity of soils, plate bearing test
	16	Immediate settlement and consolidation settlement of shallow foundation
10	17	DEEP FOUNDATION – Introduction to deep foundations and definition of ‘end-bearing’ and ‘skin-friction’
	18	
11	19	Pile foundation in granular soils
	20	Pile foundation in cohesive soils
12	21	Field method to determine pile capacity
	22	Negative skin friction of piles & case of fill embankment/materials and uplift problems
13	23	Dynamic formulae for pile foundation
	24	Pile load test
14	25	Discussion on project assignment
	26	Report write-up & submission
15	27	Review and problem-solving exercises
	28	Test 2
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Nurly Gofar and Khairul Anuar Kassim INTRODUCTION TO GEOTECHNICAL ENGINEERING PART II, Pearson Education, 2006
2. Cheng Liu and Jack Evett SOILS AND FOUNDATION SI ed. by Nurly Gofar, Pearson Education, 2004
3. Bowles, J.E. FOUNDATION ANALYSIS AND DESIGN 4TH ed. Mc Graw Hill, 1989
4. Coduto, D.P. FOUNDATION DESIGN PRINCIPLES AND PRACTICES, Prentice Hall, 1994
5. Tomlinson M.J. FOUNDATION DESIGN AND CONSTRUCTION, 6TH ed., 2001

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	1	5	5	Week 9
2.	Project	1	15	15	Week 14
3.	Test	2	15	30	Week 6 and 15
4.	Final Exam	1	50	50	Week 16
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
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3.	Assoc. Prof. Dr. Kamarudin Ahmad	kamarudin@utm.my	M50-328	38695

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TRAFFIC ENGINEERING SAB 3842 PRE-REQUISITE : SAM 4814 (2 ND PART) EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This is one of the compulsory courses which will expose students to the fundamental theory of traffic engineering. The main content of the course provides students with the fundamental theory of traffic flow and management. Major topics include drivers' behavior and interactions, fundamental theory of speed–flow–density relationships and applications in road performance analysis, traffic studies, design of traffic signal control system, and highway geometric design.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Use appropriate technique to analyse the fundamental theories of traffic flow.	PO2	C3, P2, A3	CP2		KP1	A,T,Q,F
CO2	Carry out, analyse and design the collections of data for traffic design purposes.	PO2	C4, P2, A3			KP2	A,T,Q,F
CO3	Design, evaluate and analyse traffic control systems at intersections and highway geometry layouts for safe and efficient management of traffic.	PO2	C5, A3	CP2		KP5	A,T,Q,F
CO4	Solve complex problem by investigation and integration of knowledge in traffic engineering.	PO4	CTPS2, CTPS3				A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	6
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	18
	b. Revision	10
	c. Assessment Preparations	12

No.	Teaching and Learning Activities	SLT* (hours)
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lecture and Discussion
2. Co-operative Learning
3. Independent Study
4. Group Assignment/Project
5. Outside Visit

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Explanation of syllabus & Introduction to Traffic Engineering Topic 1: Characteristics of Traffic Flow Stream
	2	Traffic System Components – Users, Vehicles, and Roadways Basic traffic parameters
2	3	Needs for traffic studies – traffic volume, speed, density, and headway
	4	Needs for traffic studies – traffic volume, speed, density, and headway (continued).
3	5	Traffic volume, speed, density, and headway data (continued)
	6	Traffic models: speed–flow–density relationships
4		Traffic models: speed–flow–density relationships (continued).
	7	Work examples and Exercises
	8	Assignment #1 (or Group Project)
5		Topic 2: Traffic Data Collection & Analysis Introduction, Data description methods – numerical and graphical.
	9	Techniques to collect and analyse traffic volume data, and speeds and delays on roadways and at junctions.
	10	Work examples
6	11	Techniques to collect and analyse traffic volume data, and speeds and delays on roadways and at junctions (continued).
	12	TEST #1
7	13	Applications of statistics in traffic data analysis
	14	Applications of statistics in traffic data analysis (continued) Work examples & exercises
8		MID SEMESTER BREAK
9	15	Topic 3: Traffic Control System Introduction to types of intersections and traffic control devices.
	16	Warrant Analysis. Terminologies and types of traffic signal systems
10	17	Fixed-time traffic signal design criteria – Arahan Teknik (Jalan) 11/87
	18	Traffic Signal Design Procedure
11	19	Traffic signal design (continued).
	20	Traffic signal design (continued). Examples & exercises.

12	21	Topic 4: Road Geometric Design Introduction to geometric design. Design aspects of consideration, types and road classifications, design control criteria
	22	Stopping and passing sight distance Horizontal alignment – Design of circular curve and transition curve.
13	23	Horizontal alignment – Design of circular curve and transition curve (continued)
	24	Design of vertical alignment Assignment #2
14	25	TEST # 2
	26	Design of vertical alignment (continued)
15	27	Design of road cross-section: elements and standards.
	28	Review and Discussion.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- Othman Che Puan. Modul Kuliah Kejuruteraan Lalu Lintas. Published for Internal Circulation. (2004).
- Garber, N.J., Hoel, L.A., TRAFFIC AND HIGHWAY ENGINEERING, West Publishing Co., 1999.
- Oglesby, C.H., Hicks, R.G., HIGHWAY ENGINEERING, John Wiley & Sons, 1982.
- Jabatan Kerja Raya Malaysia, A GUIDE TO THE DESIGN OF TRAFFIC SIGNALS, Arahan Tekni (Jalan 11/87, 1987.
- Jabatan Kerja Raya Malaysia, A GUIDE ON GEOMETRIC DESIGN OF ROADS, Arahan Teknik (Jalan) 8/86, 1986.
- Transportation Research Board, HIGHWAY CAPACITY MANUAL, Special Report 209, Washington D.C., 1994.
- Salter, R.J., HIGHWAY TRAFFIC ANALYSIS AND DESIGN, MacMillan, 1979.
- McShane, W.R and Roger P. Roess, TRAFFIC ENGINEERING, Prentice Hall, 1990.
- Meor Othman Hamzah, REKA BENTUK GEOMETRI JALAN DAN LEBUH RAYA, USM, Pulau Pinang, 1989.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignment	2	10%	20	
2.	Test	2	20%	40	
3.	Final Exam	1	40%	40	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

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ENVIRONMENTAL MANAGEMENT SKAA 3913 PRE-REQUISITE : SAM 5913 EQUIVALENCE : LECTURE HOURS : 3hours / week	

SYNOPSIS

The course is designed to expose the students to various aspects in environmental pollution and concepts of environmental management. The course will emphasize on discussion in different aspects of water, air, soil, and noise pollution, various pollution control and prevention methods, environmental regulations, environmental impact assessment (EIA), as well as environmental management system (EMS). Upon completion, students should be able to demonstrate and apply the knowledge by the ability to identify specific pollution control technology and methods and the processes in preparing an environmental impact assessment (EIA) report. The students should be able to synthesize the knowledge in a group project and demonstrate a cooperative effort while working in a team as well as develop good relationship as well as interaction with colleagues and work effectively with other people to achieve mutual objective.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
	CO1 Identify the principle aspects that cause environmental pollution and Classify the various types of environmental pollution				KP1	C2	T
	PO1						
CO2	Investigate and analyze the environmental impact and consequences to environmental component due to the presence of environmental pollutant	PO2	CP7	CA4		C4	T, F, Pr
CO3	Investigate and differentiate various mitigation measure and appropriate methods of env. control to solve env. related problems towards sustainable development	PO2			KP7	C4	F
CO4	Produce report or presentation on the given case study that is related to current environmental issues	P10		CA1	KP7	LL1	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	14

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	35
	b. Revision	14
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Question and answer, and informal co-operative learning.
2. Lectures in classes
3. Picture slides and videos presentation during lectures
4. Discussion in groups during lecture time
5. Reports - project assignment
6. Quiz or assignments

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to syllabus, lecture plan and course assessment
	2	Introduction to the concepts of environmental mgt and legislation.
	3	Water pollution: type, sources and effects
2	4	Water pollution: type, sources and effects (cont.)
	5	Water pollution: type, sources and effects (cont.)
	6	Water pollution control
3	7	Water pollution control (cont.)
	8	Water pollution control (cont.)
	9	Environmental law and legislation related to water pollution
4	10	Air pollution: type of pollutants, sources and effects.
	11	Air pollution: type of pollutants, sources and effects (cont.)
	12	Air pollution: type of pollutants, sources and effects.(cont.)
5	13	Air pollution control.
	14	Air pollution control (cont.)
	15	Air pollution control (cont.)
6	16	Environmental law and legislation related to air pollution.
	17	Test 1
	18	Soil pollution: soil composition and important elements
7	19	Soil pollution: soil composition and important elements
	20	Soil pollutants and its effects
	21	Solid waste: type and effect of disposal
8	22	Hazardous waste: type and effect of disposal
	23	Environmental law and legislation related to soil pollution.
	24	Noise pollution and its effects
NOV 5-9TH		SEMESTER BREAK
9	25	Basic physic of noise & noise characteristics
	26	Noise measurement and control
	27	Noise measurement and control (cont.)

Week	Lecture	Topic / Content
10	28 29 30	Student's Presentation Student's Presentation Student's Presentation
12	31 32 33	Environmental Impact Assessment (EIA), legislation related to EIA EIA study planning and management. Impact identification
13	34 35 36	Data collection Impact assessment methods.(Matrices, networks and checklist) EIA report writing
14	37 38 39	Environmental management system: scope and objectives Implementation of Environmental Monitoring Plan Introduction to ISO 14000 Important elements of ISO 14000 series. ISO 14000: Guidelines, documentation and implementation
15-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

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- Stone, B.J. (2012). The City and The Coming Climate: Climate Change in the Places We Live. Cambridge University Press. New York.
- Christensen, T.H. (2011). Solid Waste Technology and Management. Vol. 1. A John Wiley and Sons. West Susses, UK.
- Tiway, A. and Colls, J. (2010). Air Pollution: Measurement, modeling and mitigation. Third Edition. Routledge, New York.
- Houghton, J. (2009). Global Warming, The Complete Briefing. Fourth Edition. Cambridge University Press. New York.
- Theodore, M.K. and Theodore, L. (2009) Introduction to Environmental Management, CRC Press, New York.
- Masters, G. M. (2008). Introduction to Environmental Engineering and Science. Prentice Hall.
- Peirce, J.J., Weiner, R.F. and Verilind, P.A. (1990). Environmental Pollution and Control. Fourth Edition, Elsevier, Butterworth-Heinemann, USA
- Alley, E.R. (2007). Water Quality Control Handbook. Second Edition. WEF Press: New York

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments				
2.	Project-Report writing	1	10	10	
	1	10	10		
3.	Quizzes				
4.	Presentation	1	10	10	
5.	Test 1	1	20	20	
6.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	PM Dr. Khalida Muda	khalida@utm.my	M50-2-48	38653
2.	PM Dr Mohd Ismid Mohd Said	ismid@utm.my; ismid64@gmail.com	M46	31514
3.	Dr Shamila Azman	shamila@utm.my	M50-2-05	38682
4.	Dr. Mohd. Badruddin Mohd. Yusof	mbmy63@yahoo.com; mbmy63@yahoo.com	M50-2-14	38675
5.	Dr Shazwin Mat Taib	shazwin@utm.my	M47-114	38682
6.	Dr Mohd Hafiz Puteh	mhafizputeh@utm.my	C09-228	31637
7.	Puan Norliana Abdullah	norliana@utm.my	M46-229	31596

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : A Date of issue : 15 th July 2010 Last Amendment : 30 th August 2013 Edition : 1 Procedure No. : FKA/PG/RK/SAB4021
	CIVIL ENGINEERING SEMINAR SAB 4021 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week

SYNOPSIS

This course is designed as a compulsory attending course, which is carried out based on a seminar format. Speakers from within the University and from within the practicing civil engineering-based organisations will be invited to talk on specialised topics and issues in civil engineering field including safety and health. At the end of the course, student should be able to understand the actual civil engineer practices in civil-engineering based activities, and adhere to professional ethics.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe the current civil engineering/ management/technology/ in managing project at site/office through seminar and discussion session	PO1				C2,A2,P2	A
CO2	Describe financial methods and techniques in managing projects	PO6				C2,A2,P2	A
CO3	Able to describe professional ethics in Engineering through seminar and interview with professional engineer (lr.)	PO10				C2,A2,P2	A
CO4	Able to discuss sustainable issues in constructions.	PO10				C2,A2,P2	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture/seminar	15
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	25
	b. Revision	-
	c. Assessment Preparations	-

No.	Teaching and Learning Activities	SLT* (hours)
3.	Formal Assessment	
	a. Continuous Assessment	-
	b. Final Exam	-
Total Student Learning Time* (SLT)		40

TEACHING METHODOLOGY

1. Briefing on seminar and professional ethics
2. Lectures on civil engineering practices in various civil engineering disciplines and professional ethics.
3. To produce a written group report.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1		
2		
3		
4		
5		
6	1	Briefing session on the Civil Engineering Seminar
7	Not applicable	Two - days seminar
8		MID SEMESTER BREAK
9		
10		
11		
12		
13		
14		
15		
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Mohd Janib Johari (2001) Etika Professional, Penerbit Universiti Teknologi Malaysia.
2. Universiti Teknologi Malaysia (2001) Kod Etika Profesional Staf Universiti Teknologi Malaysia, Universiti Teknologi Malaysia.
3. International Congress of Engineers (1972) The Training of professional engineers, 5th ed, London: Institution of Civil Engineers.
4. American Society of Civil Engineers (1988) Manual of professional practice: quality in the constructed project: a guideline for owners, designer and constructors, New York.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments				
2.	Group report	1	100	100	
3.	Quizzes				
4.	Presentation				
5.	Test I				
6.	Peer Evaluation				
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
Assoc. Prof. Dr. Johan Sohaili	johansohaili@utm.my	M50-257	5538688
Dr. Mohamad Hidayat Jamal	mhidayat@utm.my	M47-126	5532444
Assoc. Prof. Azaruddin Ressang	aziruddin@utm.my	C09-207	5531711

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 25 th February 2011 Edition : 4 Procedure No. : FKA/PG/RK/SAB 4022
	RESEARCH METHODOLOGY & PRE-PROJECT SAB 4022 PRE-REQUISITE : EQUIVALENCE : SAM 5062 LECTURE HOURS : 16 hours

SYNOPSIS

This course is a compulsory course for all students before they undergo the Final Year Project. In this course, the student will be exposed in various aspect of research including types of research, method of literature review, research design, results and analysis, writing of thesis and journal and also presentation skills. The students will also be exposed to the problem solving methodology, decision-making and data collection process. This helps to prepare the students for Final Year Project. The student has to prepare a Pre-Project report in the topic that will be given by their supervisors. At the end of this course, students should be able to understand all aspects of research, conduct research in a systematic way, solve and analyse data and results and write a project report.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
	CO1 Select information and apply theoretical knowledge and practical skills in addressing civil engineering problem. PO1		CP1, CP2,	CA1, CA3,	KP1, KP2,	C2, C3	T, R
CO2	Recognize and practice the concept of life-long learning in collection of literature reviews for continuous self improvement.	PO8		CA1, CA4	KP1, KP2	LL1	T, R
CO3	Perform basic guided research in a systematic way.	PO2	CP1, CP2, CP3	CA1, CA2,	KP3, KP5,	C3,	R
CO4	Prepare and write a research proposal in systematic way.	PO2	CP1, CP2, CP3	CA1, CA2, CA5	KP3, KP5,	C3	R

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	16
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	24

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	34
	b. Revision	-
	c. Assessment Preparations	4
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Concept of research methodology will be demonstrated to students.
2. Students will require discussing their research work with their supervisor.
3. Students will require producing complete research proposal.
4. A few comments from evaluator will be demonstrated to students.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
	1	Introduction – Importance of research, research practice at universities, research institutions and companies, components of research – conceptual framework and action. – Criteria for problem selection, purpose and objectives (Research problems and research questions), underlying assumption, research scope and limitation. – Pre-Project briefing
	2	
2	3	Literature Review – Purpose of literature review and how to conduct literature review. – Method of reviewing literature in the library. – Method of reviewing literature from other sources. – Common flaws in literature review. – Discussion with supervisor
	4	
3	5,6	Research Design – Introduction, types of research, research design – Physical – Numerical modeling, materials and methods. – Discussion with supervisor
4	7,8	– Sampling design and experimentation. – Variables and indicators Instrumentation and data collection. – Discussion with supervisor
5	9,10	Results and Analysis – Introduction, observation and interpretation. – Error analysis and validity of results. – Discussion with supervisor
6	11,12	– Significance of findings. – Conclusions and recommendation for further work. – Discussion with supervisor. – Student submit pre-project title to coordinator.
7	13,14	Writing and Presentation – Introduction, Presentation / Publication of research finding. – Writing of technical papers / technical reports. – Discussion with supervisor
8		MID SEMESTER BREAK

Week	Lecture	Topic / Content
9	15,16	Writing and Presentation – Writing of thesis / dissertation. – Writing techniques / skill. – Discussion with supervisor
10		Test 1 Discussion with supervisor
11		Discussion with supervisor
12		– Student writes research proposal – Discussion with supervisor
13		– Student writes research proposal – Discussion with supervisor
14		– Students meets evaluator
15		– Students meets evaluator – The student submit research proposal to supervisor – Evaluation of research proposal by the supervisor.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. R. V. Smith, "Graduate Research – A guide for students in the sciences", ISI Press, 1984.
2. D. Madsen, "Successful Dissertation and theses", 2nd Edition, Jossey Bass Pub., 1992.
3. E. M. Phillips and D. S. Pugh, "How to get PhD – Managing the peaks and trough of research", Open University Press, Milton Keynes, Philadelphia, 1987.
4. S. Pokras, "Systematic Problem-Solving and Decision-Making", Kogan Page Ltd., London, UK, 1990.
5. R. B. Maddux, "Team Building – An Exercise in Leadership", Kogan Page Ltd., London, UK, 1988.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test (Research Methodology)	1	30	30	Week 11
2.	Research Proposal	1	70	70	Week 15

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject..

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Shamila Azman (Coordinator)	shamila@utm.my	C07-327	5531532
2.	Lecturers from all departments in the Faculty			

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	57
	b. Revision	-
	c. Assessment Preparations	4
3.	Formal Assessment	
	a. Continuous Assessment	1
	b. Final Exam	-
Total Student Learning Time* (SLT)		16

TEACHING METHODOLOGY

1. Students are required to discuss their research work with their supervisor.
2. Students are required to presenting their project.
3. Students are required to produce complete project report

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1		- Project briefing - Discussion with supervisor
2		- Discussion with supervisor
3		- Discussion with supervisor
4		- Discussion with supervisor
5		- Discussion with supervisor - Student submit first draft report to supervisor
6		- Discussion with supervisor
7		- Discussion with supervisor - Correction of project title and submit to final year project coordinator
8		MID SEMESTER BREAK
9		- Discussion with supervisor
10		- Discussion with supervisor - Student submit second draft of final report to supervisor
11		- Discussion with supervisor
12		- Discussion with supervisor
13		- Panel member for student presentation is published by coordinator - Discussion with supervisor
14		- Submit final draft report to supervisor - Discussion with supervisor
15		- Student submit project synopsis to panel member of presentation
16		- Presentation of final year project by the students
18		- Students submit their final year project and CD to academic office

REFERENCES

1. R. V. Smith, "Graduate Research – A guide for students in the sciences", ISI Press, 1984.
2. D. Madsen, "Successful Dissertation and theses", 2nd Edition, Jossey Bass Pub., 1992.
3. E. M. Phillips and D. S. Pugh, "How to get PhD – Managing the peaks and trough of research", Open University Press, Milton Keynes, Philadelphia, 1987.
4. S. Pokras, "Systematic Problem-Solving and Decision-Making", Kogan Page Ltd., London, UK, 1990.
5. R. B. Maddux, "Team Building – An Exercise in Leadership", Kogan Page Ltd., London, UK, 1988.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Presentation	1	25	25	Week 16
2.	Project Report and Supervisor	1	75	75	Week 18
Overall Total				100	

ATTENDANCE

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 Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.				
2.				

 <b style="font-size: 2em; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : A Date of issue : 15th July 2010 Last Amendment : 15th July 2010 Edition : 1 Procedure No. : FKA/PG/RK/SAF 4042
INTEGRATED DESIGN PROJECT 3 SKAA 4042 PRE-REQUISITE : (To be determined as required basis) EQUIVALENCE : LECTURE HOURS : 2 Hours Lecture + 2 Hours Design Project Assignment / Week	

SYNOPSIS

Integrated Design Project 3 is the final phase of the IDP series tailored to process the Detailed Design Stage of a development project that has previously undergone the (i) Planning Stage Integrated Design Project 1 (IDP 1) and (ii) Feasibility and Preliminary Design stage Integrated Design Project 2 (IDP 2). The subject focuses on the implementation and integration of infrastructure design and building design to produce a comprehensive final technical report including engineering proposals and drawings, specifications and bills of quantities, cost estimates of development projects given to students, working in groups. Apart from basic infrastructure design, students are also required to integrate their knowledge of other civil engineering disciplines such as (but not limited to) structural analysis and design including geotechnical (foundation) design, project scheduling techniques and sustainable development considerations into their overall project work. The content on this subject (apart from structural analysis & design, geotechnical engineering, construction management including sustainable issues etc. which has been covered in other core subjects) covers basic infrastructure design such as earthworks design, storm water drainage design, potable water supply design, sewerage reticulation design and road design. At the end of this course, the students will be able to comprehend the needs and requirements of local/government authorities regarding submission procedures and are able to appreciate the importance of integration and synthesis of various discipline of civil engineering knowledge.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Comprehend the general technical and submission requirements stipulated by LA's for civil engineering projects.	PO1		CA1		C2	Pr
CO2	Apply design procedures in structural, foundation, earthwork, water supply, sewerage, drainage and road design.	PO3	CP1	CA2	KP4	C3, C4 P6, A4	Pr
CO3	Demonstrate problem-solving skills and integrate knowledge gained from all relevant core subjects to propose a final engineering solution on the overall project design.	PO4	CP8	CA5	KP5, KP6	C5 P7 A5	Pr, INT
CO4	Produce a comprehensive detailed technical report incorporating design calculations and supporting drawings/sketches/bills etc. in a team.	PO7				C5 P5 A4	Pr, INT
CO5	Apply critical reasoning and make informed judgement orally in defending selected engineering proposals.	PO5					

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation
 INT: Interview

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	16
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	40
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	20
	b. Revision	-
	c. Assessment Preparations	2
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	-
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lecture
2. Problem Based Learning (Critical discussion, Information gathering, Presentation & Report Writing)
3. Cooperative Learning

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1		Course briefing by course coordinator : Implementation of SAF 4042
2		Course Lectures and Project Brief by Course Coordinator
3		Continuation of Course Lectures and Project Brief discussion by student groups
4		Continuation of Course Lectures and Project Brief discussion by student groups
5		Project implementation & design by student group (group-Course Lecturer discussions & problem solving)
6		Project implementation & design by student group (group-Course Lecturer discussions & problem solving)
7		Preparation of draft individual project report (calculations & schematic drawings) by student sub group and presented to Course Lecturers
8		MID SEMESTER BREAK
9		Preparation of draft individual project report (calculations & schematic drawings) by student sub group and presented to Course Lecturers
10		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
11		Project implementation & design by student group (amendments & editions to draft calculations & drawings)
12		Preparation & compilation of overall final project report by student group
13		Submission of final project report by student group
14		Formal group interview & Poster Session
15		Formal group interview & Poster Session
16 - 18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Akta Jalan, Parit dan Bangunan 1974: Akta 133 Storm water, Management Manual for Malaysia, Drainage and Irrigation Dept., Malaysia, 2001.
2. MWA Design Guideline for Water Supply Systems, The Malaysian Water Associations 1992
3. A Handbook of EIA Guideline, ENSEARCH 1991
4. Guideline for Developers on the Design & Installation of Sewerage Systems, Sewerage Service Dept., Ministry of Housing & Local Government 1995
5. Guideline for the Prevention & Control of Soil Erosion & Siltation in Malaysia, Dept. of Environment, Ministry of Science, Technology & Environment 1996

DISTRIBUTION OF MARKS

COURSE ASSESSMENT	
Sub Group Report & Presentation	20%
Overall Group Report & Presentation	50%
Individual Group Member Interview	30%
TOTAL	100%

ATTENDANCE

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1. Ir. Azhar Ahmad	azhara@utm.my	M46-359	31623
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3. Mohd Nor Othman	mnor@utm.my	M46-355	31621
4. Assoc. Prof. Dr Mohd Rosli Hainin	hrosli@utm.my	C09-216/ C07-208	31710 / 31508
5. Dr Noor Baharim Hashim	nbaharim@utm.my	C07-330	31510
6. Amat Sairin Demun	asairin@utm.my	C07-321	31524
7. Assoc. Prof. Dr. Othman Che Puan	ocp@utm.my	M46-144	31719
8. Ahmad Zaidon Rais	ahmadzaidon@utm.my	M46-335	31608
9. Assoc. Prof. Dr. Mushairry Mustaffar	mushairry@utm.my	C09-317	31708
10. Muhammad Nassir Hanapi	nassir@utm.my	C07-324	31512
11. Assoc. Prof. Dr. Sobri Harun	sobri@utm.my	C07-329	31528
12. Assoc. Prof. Mohd For Mohd Amin	mohdfor@utm.my		
13. Assoc. Prof. Dr Ayob Katimon	ayobkatimon@utm.my		
14. Che Ros Ismail	cheros@utm.my	M46-328	31620
15. Abu Bakar Fadzil	abakar@utm.my	C07-324	31512

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 6 th February 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 4113
CONSTRUCTION & PROJECT MANAGEMENT SKAA 4113 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course aim to develop understanding on the importance of construction management principles and its related tools. The course starts with analyzing the general perspective of management processes and their relationship to construction. The role and responsibilities of a project manager will be explained. Then the focus is on construction project life cycle together with the roles and responsibilities of professionals involved at each stage within different project deliveries methods. Apart from that ethical issue related to engineering profession will be discussed. The second part of the course will include the usage of tools available in construction management particularly in the application of planning and scheduling technique using Gantt Chart and networking technique. The course will also expose the students on the application of contemporary scheduling software available in the market. The application of scheduling technique will cover the issues related to resource management, resource allocation and project time cost trade-off. The final part of the course dedicated in analyzing the project cash flow requirements, project monitoring and control. The course ends with the discussion on contemporary issues in construction.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Explain various issues and processes in managing construction project.	PO2	CP1			L2	T, F
CO2	Analyse resources requirement for manpower, machinery, material and money in construction project.	PO2		CA1		L4	T, F
CO3	Develop construction project schedule using existing scheduling software.	PO6			KP6	L4	Pr, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	14

2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	38
	b. Revision	25
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Face to face contact and lecturing.
2. Printed notes and handout distributed for self study by student.
3. Individual student randomly picked and required to assess and respond to the problem or relevant issue given and later supported by other student.
4. Group work whereby the student divided into groups and required to solve a particular problem given
5. Group presentation for the project solution and will be evaluated at the end of the presentation.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to construction industry.
	2	Introduction to project management, definitions and objectives
	3	Project management process
2	4	Professional responsibilities in construction industry
	5	Organisational function in management
	6	Organisational structures - functional, project and matrix
3	7	Project Manager: Role and responsibilities
	8	Project Manager: Role and responsibilities (continue)
	9	Project Development Process
4	10	Introduction on project planning
	11	Various scheduling techniques
	12	Gantt Chart
5	13	Introduction to the networking technique
	14	Network Technique - types and conventions used
	15	Critical Path Method (CPM)
6	16	Work examples of CPM
	17	Precedence Diagramming Method (PDM)
	18	Work examples of Precedence Diagram
7	19	Introduction to planning software
	20	Planning software demonstration – Microsoft Project and Primavera project planner
	21	Coursework's project briefing
8		MID SEMESTER BREAK
9	22	Engineer & society
	23	Professional and social ethical responsibility
	24	TEST 1

Week	Lecture	Topic / Content
10	25	Resource Management: Introduction and importance
	26	Labour resource management
	27	Resource smoothing
11	28	Resource smoothing(continue)
	29	Resource leveling
	30	Plant and machinery management
12	31	Material management
	32	Project time cost trade off
	33	(continue)
13	34	Project Cash flow: Basic concept
	35	Project Cash flow forecasting
	36	Analysis of cash requirement
14	37	Project monitoring and control
	38	Management of Industrialised Building System
	39	(continue)
15	40	Introduction to project safety and health
	41	Current issues in construction industry
	42	TEST 2
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	1	10	10	Week 2
2.	Project	1	15	15	Week 4
3.	Homework	3	-	-	When necessary
4.	Presentation	1	5	5	Week 8
5.	Test 1 & 2	2	10	20	Week 9 & Week 15
6.	Final Exam	1	50	50%	Week 18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

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 <b style="font-size: 24px; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : G Date of issue : 1 st June 2003 Last Amendment : 27 th July 2013 Edition : 4 Procedure No. : FKA/PG/RK/SKAA 4223
STRUCTURAL ANALYSIS SKAA 4223 PRE-REQUISITE : SKAA 3243 @ SAB 3243 EQUIVALENCE : SAM 4213 LECTURE HOURS : 3 hours lecture @ 2 hours lecture + 2 hours practical	

SYNOPSIS

This course is designed to expose the students in analysing two-dimensional structures using a matrix operational method and computer applications. The matrix operational method is also suitable to be programmed in computers as the solutions adopt the matrix concept. The course consists of the flexibility method, the stiffness method, concept for solving matrices, an introduction to finite element method and also structural modelling using existing software. The structures include beams, trusses and frames. At the end of the course, students should be able to analyse the structures by using the numerical methods and/or the existing computer software. The students should also have a problem solving skill on problems of interest in Civil Engineering structures.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	State the significance of Structural Analysis in the Civil Engineering context.	PO 2			KP 2	L1	A
CO2	Analyse beams, frames and trusses using the Flexibility Method and Stiffness Method. Comprehend an overview of Finite Element analysis.	PO 2			KP 3	L4	T, F
CO3	Use existing analysis software for analysing structures	PO 2	CP 2	CA 1		L5	T, Pr
CO4	Students should attend a minimum of 80% of the lectures	PO 10					Att.

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report
 Att: Attendance

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	32
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	10
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	

No.	Teaching and Learning Activities	SLT* (hours)
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	42
	b. Revision	18
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

- Lectures shall emphasise on theories, followed by worked examples and further applications to problems of interest in Civil Engineering structures.
- Laboratory works (computer) shall be conducted to provide opportunities for students to be in smaller groups and work together to appreciate the theories given in lectures. Students shall discuss amongst themselves and solve given exercises/problems in class in the related field through analyses, with the aid of existing software.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 2 3	INTRODUCTION Load-Deflection Relationship Static Equilibrium and compatibility Degrees of Freedom
2	4 5 6	FLEXIBILITY METHOD Force Method, Relationship Between Internal Force Matrix and External Force Matrix, Relationship Between External Displacement matrix and Internal Displacement matrix, Relationship Between Internal Displacement matrix and Internal Force matrix
3	7 8 9	Solution formula Analysis of Statically Determinate Using Flexibility Method Analysis of Statically Indeterminate Using Flexibility Method Examples
4	10 11 12	STIFFNESS METHOD: Truss Analysis Basic concept of node and member numbering system Member Stiffness Matrix Displacement transformation matrix Force transformation matrix
5	13 14 15	Global Stiffness Matrix Analysis Procedures Introduction to Plane Truss Analysis Examples
6	16 17 18	STIFFNESS METHOD: Beam and Frame Analysis Definitions and concepts, Member Stiffness Matrix Displacement transformation matrix Force transformation matrix Global Stiffness Matrix for Frame Member
7	19 20 21	Global Stiffness Matrix for Beam Member Analysis Procedures Examples
8		MID SEMESTER BREAK
9	22 23 24	INTRODUCTION TO FINITE ELEMENT METHOD Finite element theory Types of finite elements and element discretisation Node numbering system

Week	Lecture	Topic / Content
10	25	Shape functions
	26	Numerical Differentiation and Integration
	27	Analysis of bar
11	28	Lagrange Polynomial
	29	Examples
	30	Stiffness of Plane Stress and Plane Strain elements
12	31	ANALYSIS OF STRUCTURES USING SOFTWARES
	32	Analysis of Portal Frame
	33	Modelling of 3D Portal Frame from 2D Portal Frame Modelling Technique Using Cut and Paste and User Tables
13	34	How to Merge Two Structures
	35	Analysis and Design of RC Frame
	36	Simply Supported Beam With Full Lateral Restraint
14	37	Assignment / Exercise
	38	Assignment / Exercise
	39	Assignment / Exercise
15	40	Simply Supported Beam With Lateral Restraint At Point Loads
	41	Simply Supported Beam Without Intermediate Restraint
	42	Column With Pinned Ends and Intermediate Support
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test 1	1	20	20	
2.	Test 2	1	20	20	
3.	Assignment/project	2	5	10	
4.	Final Exam	1	50	50	
Overall Total				100%	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision : G
	Date of issue : 1 st June 2003
	Last Amendment : 18 th May 2010
	Edition : 4
	Procedure No. : FKA/PG/RK/SKAA 4333
REINFORCED CONCRETE DESIGN 2 SKAA 4333 PRE-REQUISITE : SKAA 3352 (Reinforced Concrete Design 1) EQUIVALENCE : SAB 4333 LECTURE HOURS : 2 Hours Lecture, 2 Hours Practical	

SYNOPSIS

This course is a core course which will exposed students to a wider scope of reinforced concrete design. As a continuation to the Reinforced Concrete Design 1, the topics to be covered are design of staircase, design of column, design of footing and pile cap and design of retaining walls. Furthermore the students will exposed to the method of analysis of reinforced concrete frame.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe and explain the concept and method of analysis and design of reinforced concrete frame, staircase, column, foundation and retaining wall	PO3			KP4	C2, A2	A, F
CO2	Analyze and design reinforced concrete stairs, columns, footings, pile caps and retaining walls.				KP4	C3	T, F
CO3	Analyze, design and prepare a complete design calculation and detailing of reinforced concrete building structures.		CP5	CA2	KP5	C5, A4	Pr, F
CO4	Organize the project in a team and producing design report within a stipulated time frame.	PO7		CA2	KP7	P7	A, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	14
2.	Self-Directed Learning	

No.	Teaching and Learning Activities	SLT* (hours)
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	29
	b. Revision	19
	c. Assessment Preparations	14
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed design project.
3. Students are required to go through the given tutorials.
4. Students are required to produce design project in group

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1 10.09.12	1	Staircase Design – Introduction, types of staircase, elements and dimensions of a staircase, methods of design.
	2	– Continuously supported stairs, stairs spanning into landing.
2 17.09.12	3	– Stairs supported by landing.
	4	– Stairs and landing shared by two right angled flights, stairs with sides embedded in walls.
3 24.09.12	5	Frame Analysis – Introduction, types of frame, and method of analysis.
	6	– Analysis of braced frame: Continuous beam and one point sub-frame.
4 01.10.12	7	– Analysis of braced frame: Two point sub-frame.
	8	– Analysis of braced frame: One level sub-frame.
5 08.10.12	9	– Calculation of wind load.
	10	– Analysis of unbraced frame: Horizontal load.
6 15.10.12	11	– Analysis of unbraced frame: bending moment and shear force diagram.
	12	– TEST 1 (18.10.12)
7 22.10.12	13	Design of Column – Introduction and general design considerations.
	14	– Calculation of effective height of column and slenderness ratio
8 29.10.12	15	– Moment and axial load in column.
	16	– Design of short column: Axial load only, moment and axial load.
9 05.11.12	17	– Design of slender column: Axial load and moment about major or minor axis.
	18	– Design of slender column: Axial load and biaxial bending.
10 12.11.12		MID SEMESTER BREAK
11 19.11.12	19	Design of Foundation – Introduction, types of foundation and design requirements, design of pad footing subject to axial load.
	20	– Design of pad footing subject to axial load and moment, design of combined footing.
12 26.11.12	21	– Design of strap footing.
	22	– Pile foundation and design requirements, design of pile cap using truss theory.
13 03.12.12	23	– Design of pile cap: using beam theory.
	24	– Test 2 :(06.12.12)

Week	Lecture	Topic / Content
14 10.12.12	25 26	Design of Retaining Wall – Introduction, types of retaining walls, design requirements. – Design of cantilever wall : stability analysis
15 17.11.12	27 28	– Design of cantilever wall: element design and detailing. – Design of cantilever wall considering key toe and incline slope.
16-19 24.12.12 – 20.01.13		REVISION WEEK AND FINAL EXAMINATION

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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	5	1	5	
2.	Project	1	15	15	
3.	Test	2	15	30	
4.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

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ACADEMIC STAFF

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 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 25 th February 2011
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 4412
CIVIL ENGINEERING INFORMATION SYSTEM SKAA 4412 PRE-REQUISITE : EQUIVALENCE : SAM 5413 LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course is designed to expose the students in analysing, designing and developing the huge of data. It concerns on the management of information and how to model it in a structured manner. The used of Database Management System (DBMS) as an application tool give the student a further step in order to apply an IT application in solving their problems. This course also exposes the knowledge on the usage, management and sharing of data and information to ensure that information is manipulated and used effectively. The introduction of Knowledge Management also has been introduced. At the end of the course, students should be able to plan, analyse, and modelling the information for develop DBMS related to civil engineering problems.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Explain system analysis concept, information management system and basic knowledge management.	PO1				L1	A, T, F
CO2	Analyse the work of process related to civil engineering problem by using Data Flow Diagram.	PO2			KP8	L4	A, T, F
CO3	Develop information model by using Entity Relationship Diagram.	PO3				L3	F
CO4	Identify relevant information to produce database management system using computer software.	PO8	CP4	CA1		L6	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	26
	b. Revision	14
	c. Assessment Preparations	8
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	2
Total Student Learning Time* (SLT)		80

TEACHING METHODOLOGY

1. Lecture
2. Demonstration of software
3. Assignment and discussion in class
4. Project and presentation

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to the course Information Management
	2	The role of information in the construction Why bother managing information
2	3	Information in the construction industry Project co-ordination, the needs and benefits Project information and Information Technology (IT)
	4	Managing the flow of information The role of IT for managing the information System Development Live Cycle (SDLC) Assignment 1
3	5	Information Modelling Approach The need for information modelling Activity/process modelling Data modelling
	6	Data Flow Diagram Diagram (DFD) Introduction & basic terminology and review
4	7	Levelling a DFD – scope, level and input/output
	8	Levelling a DFD – level of details & numbering the bubbles Drawing a DFD, steps to follow
5	9	Case study of a system
	10	Assignment 2
6	11	Introduction to database Data and information
	12	Methods of storing data manually and computerised Database management system (DBMS)
7	13	Entity-Relationship Diagrams Entity-Relationship analysis
	14	Data analysis & conceptual modelling ERD modelling, terminology, ERD structures Test

Week	Lecture	Topic / Content
8		MID SEMESTER BREAK
9	15 16	More about E-R analysis Attributes and modelling relationship cardinality Building an ERD Each set to model one concept Choosing attributes Choosing object set names An analysis sequence
10	17 18	Case-study – using an ERD ERD and DFD Reducing ERD into tables
11	19 20	Prototyping The importance of a prototype Building and evaluate a prototype Develop test plan Mapping Project
12	21 22	Introduction to Microsoft Access MS Access environment and build the table Relationship between ERD and Access Query
13	23 24	Form and Report Macro Compile the Access works
14	25 26	System Implementation and System Maintenance Convert to the new system Create user documents
15	27 28	Past year examination questions discussion Syllabus Review and Discussion
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. B. L. (1990), Information Management of Construction Projects (Draft), Published by T. W. Crow Associates and Crow Maunsell Pty. Ltd. Management and Project Consultants, Sydney, Australia, ISBN: 0 7316 8420 6.
2. Kendall KE and Kendal JE , Systems Analysis and Design, Prentice-Hall Inc., 1992
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5. Dewitz SD, "Systems Analysis and Design and the Transition to Objects", McGraw Hill, 1996.
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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignment and Project	2	10	20	Week 2 & 5
2.	Test	1	15	15	Week 7
3.	Project	1	15	15	Week 11
4.	Final Examination	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/ULAB 1122
Academic English Skills ULAB 1122		
PRE-REQUISITE :		
EQUIVALENCE :		
LECTURE HOURS : 3 hours / week		

SYNOPSIS

This course emphasizes the four language skills. It focuses on developing students' productive and receptive skills through student-centred activities in academic situations. This includes reading academic texts, listening for main ideas and details, taking notes, writing clearly and coherently, and participating in oral presentation and class discussions. Additionally, enrichment grammar activities are also incorporated to integrate the skills and knowledge. At the end of this course, students should be able to use the English language in daily and academic activities.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
	CO1 Identify key information in oral and written texts PO5					C3	T, Q
CO2	Participate in group discussions with a fair degree of confidence and fluency	PO5				C6, P3	Diss.
CO3	Communicate orally in English for academic purposes	PO5				C6, P3	P
CO4	Write clear, organised and coherent essay	PO5				P3	Writing
CO5	Use self-access learning materials for language development	PO5				C6	MylinE

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face to Face Learning	28
a. Lecturer-Centred Learning	
i. Lecture	14
b. Student-Centred Learning (SCL)	14
i. Practical/Tutorial	
ii. Student-centred learning activities	
• In-class Group Discussion	
• Reading tasks	
• Writing tasks	
• Listening tasks	
2. Self-Directed Learning	36

Teaching and Learning Activities	SLT* (hours)
a. Non-face-to-face learning or student-centred learning (SCL) such as assignment, module, e-Learning, etc.	
i. Reading Circle	8
• Reading and preparation	
• Group Discussion	
ii. MyLinE Activities	2
• Forum	
• Grammar Exercises	
b. Revision	20
c. Assessment Preparations	6
3. Formal Assessment 14	
a. Ongoing Assessment	
i. Group Discussion	4
ii. Oral Presentation	5
iii. Essay Writing Tests	2
iv. Listening Quizzes	1
v. Note-taking	2
4. Final Exam	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Lecture, Group Discussion, Practice Exercises, and Independent Study.

WEEKLYSCHEDULE

Week	Topic / Content
1-2	Introduction to the Course <ul style="list-style-type: none"> • Briefing on course content, mode of implementation and assessment - Reading: <ul style="list-style-type: none"> • Scanning and skimming for the main idea and specific information • Vocabulary - Listening <ul style="list-style-type: none"> • General listening strategies • Listening for main ideas - Writing <ul style="list-style-type: none"> • Components of a good essay • Writing the introduction and thesis statement
3-4	- Reading <ul style="list-style-type: none"> • Reference words • Contextual clues • Note-taking: Cause-and-effect organization - Listening <ul style="list-style-type: none"> • Listening for specific information - Speaking: Input on Group Discussion <ul style="list-style-type: none"> • introducing oneself, presenting opinion, responding to opinions, proposing ideas, interrupting, referring to other opinion, asking questions, taking turns, respecting other views, concentrating, agreeing, disagreeing politely, building to decision, understanding the result

Week	Topic / Content
4-5	<ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Identifying the main ideas and details • Recognizing coherence and cohesion: using connectors and transition words for cohesion - Listening <ul style="list-style-type: none"> • Listening for speech markers: Expressions used to show organization of lectures and introduce examples • Listening for supporting details - Speaking <ul style="list-style-type: none"> • Group Discussion Practice - Grammar Input
6-7	<ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Identifying topic sentence and supporting details • Distinguishing facts from opinions - Listening <ul style="list-style-type: none"> • Note taking - Writing <ul style="list-style-type: none"> • Body of the Essay • Topic Sentence • Supporting Details - Speaking <ul style="list-style-type: none"> • Structuring your presentation Language input: Preparing note cards for a short presentation - Grammar Input
8-9	<ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Reading and Making Inferences and Predictions • Steps in note-taking/note-making • Forms of notes: marking the text, linear, key words or glossary, matrix or table, tree diagram, pictorial, flow chart, time line - Listening <ul style="list-style-type: none"> • Recognizing a speaker's attitude, roles and relationships <ul style="list-style-type: none"> ○ Listening from two different sources ○ Listening from news report excerpts - Writing <ul style="list-style-type: none"> • Writing conclusion • Cause and Effect Essay - Speaking <ul style="list-style-type: none"> • Preparing and practising oral presentation: Using connectors and speech markers for cohesion • Stating and justifying points of view
10-11	<ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Making Judgements and Drawing conclusions • Techniques in note-taking/note-making: mind-map, outlining, summarising, paraphrasing - Listening/Speaking <ul style="list-style-type: none"> • Identifying support for opinions • Listening critically - Writing <ul style="list-style-type: none"> • Writing conclusion • Argumentative Essay - Grammar Input
12-13	<ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Interpreting writers' point of view, attitudes or intentions • Information transfer - Speaking <ul style="list-style-type: none"> • Using stress, intonation, and pause to express meaning • Oral Presentation (Assessment)
14-15	<ul style="list-style-type: none"> - Speaking <ul style="list-style-type: none"> • Group Discussion (Assessment)

Revision Week

REFERENCES

1. Soo, K.S.. and Chin, F.C. (2006) Progressive English: Book 2. Malaysia: McGraw Hill.
2. Deanne, M. S. (2004). *Improving Reading Skills: Contemporary Readings For College Students*. 5th ed. New York: McGraw Hill.
3. Ferrari, B. T. (2012). *Power Listening: Mastering The Most Critical Business Skill Of All*. New York: Penguin Books Ltd.
4. Lynn, S. (2010). *Q: Skills for Success – Reading And Writing*. China: Oxford University Press.
5. Mc Pherson, F. (2007). *Effective Note-making*. New Zealand: Wayz Press.
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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Group Discussion	1	10	10	14 - 15
2.	Oral Presentation	1	10	10	12 - 13
3.	Essay Writing	2	10	20	8 - 9 10 - 11
4.	Listening Quiz	1	10	10	5
5.	MyLinE Resources	1	10	10	3-14
6.	Final Exam Reading Comprehension	1	30	30	17
	Overall Total			100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject..

ACADEMIC STAFF

	Lecturers	E-Mail	Phone No.
1.	Pn. Rohani Othman	rohaniothman@utm.my	36441

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/ULAB 2122
ADVANCED ACADEMIC ENGLISH SKILLS ULAB 2122 PRE-REQUISITE : ULAB 1122 EQUIVALENCE : LECTURE HOURS : 3 hours x 14weeks (42 hours)		

SYNOPSIS

This course reinforces and enhances all four key language skills to facilitate students' language acquisition in academic situations. This includes reading and synthesizing information, listening for main ideas and details (e.g. lectures and excerpts), taking notes, writing clearly and coherently, and participating in oral presentation and class discussions. The course also incorporates key vocabulary items and grammar. In addition, the course fosters independent learning activities facilitated by online resources. At the end of the course students should be able to integrate skills and knowledge to perform tasks in academic contexts

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Evaluate text for academic purposes	PO5				C6, A2	T
CO2	Apply effective writing skills to express ideas, give information, and persuade readers.	PO5				C3	T
CO3	Communicate orally in English for academic purposes.	PO5				C6, P4	Diss.
CO4	Use appropriate grammar and vocabulary in contexts via online resources	PO5				C4	MyLinE

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face to Face Learning	28
a. Lecturer-Centered Learning	14
i. Lecture	
b. Student-Centered Learning (SCL)	14
i. Practical/Tutorial	
ii. Student-centered learning activities	
• Endnote training	
• Oral presentation practice	
• Reading skills practice	
• Term paper writing exercises	
2. Self-Directed Learning	44

Teaching and Learning Activities	SLT* (hours)
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc. <ul style="list-style-type: none"> • MyLinE Self Access 	12
b. Revision	20
c. Assessment Preparations	12
3.	8
a. Ongoing Assessment <ul style="list-style-type: none"> • Oral Presentation Assessment / Group discussion • Writing Assessment 	4
	2
b. Final Exam	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Lecture and Discussion, Practice Exercises, and Independent Study.

WEEKLY SCHEDULE

Week	Topic / Content
Week 1	Introduction to the Course - Briefing on course content, mode of implementation and assessment Academic Skills Focus : Argumentative Text - Reading: <ul style="list-style-type: none"> • Features of an argumentative text • Language expressions in argumentative text • Analysis of argumentative text - Writing <ul style="list-style-type: none"> • Recognizing organisational structures of an argumentative text • Writing argumentative paragraphs
Week 2-3	Academic Skills Focus : Problem-Solution Text - Reading <ul style="list-style-type: none"> • Features of a Problem-solution text • Language expressions in Problem-solution text • Reading comprehension - Speaking: Input on Oral Presentation <ul style="list-style-type: none"> • Persuasion techniques • Structuring your presentation • Preparing note cards for a short presentation - Writing <ul style="list-style-type: none"> • Recognizing organisational structures of a problem-solution text • Writing problem-solution paragraphs
Week 4-5	Academic Skills Focus : Articles - Reading <ul style="list-style-type: none"> • Features of articles • Language expressions in Articles • Reading comprehension - Speaking <ul style="list-style-type: none"> • Input on impromptu speech • Preparing and practising impromptu speech - Writing <ul style="list-style-type: none"> • Abstract writing

Week	Topic / Content
Week 6-8	<p>Academic Skills Focus : Term Paper</p> <ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Features of a term paper • Understanding the structure of a term paper • Critical reading • Citations - Speaking <ul style="list-style-type: none"> • Input on group discussion -Writing <ul style="list-style-type: none"> - Outlining - Drafting - Preparing Introductory and Concluding paragraph - Critical response to ideas - Writing Thesis Statement - Writing Introduction and Conclusion paragraphs - Writing Citations and References
Week 9-10	<p>Academic Skills Focus : Synthesizing Information</p> <ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Recognizing relationships between different pieces of information • Recognizing the relationships between abstract concepts and concrete information • Synthesizing information from two or more sources - Listening/Speaking <ul style="list-style-type: none"> • Discussing ideas from written sources - Writing <ul style="list-style-type: none"> • Critique writing exercises
Week 11-12	<p>Academic Skills Focus : Distinguishing Facts from Opinions</p> <ul style="list-style-type: none"> - Reading <ul style="list-style-type: none"> • Identifying facts • Identifying opinions - Listening/Speaking <ul style="list-style-type: none"> • Recognizing a speaker's degree of certainty • Identifying support for opinions • Discussions: <ul style="list-style-type: none"> ○ Giving and supporting an opinion ○ Showing agreement and disagreement
Week 13-14	<p>Academic Skills Focus : Revising, Editing, Proofreading</p> <ul style="list-style-type: none"> - Writing <ul style="list-style-type: none"> • Revise draft • Edit and proofread draft • Identify subject verb agreement errors • Identify fragment errors • Identify run-on errors • Identify reported speech errors

REFERENCES

1. Azian Abd Aziz, Fatimah Puteh, Hafilah Zainal Abidin, Marzilah A Aziz, Masputeriah Hamzah, Mohd Faisal Hanapiah, Noor Zainab Abd Razak and Yasmin Hanafi Zaid (2005). *English for Academic Communication*. McGraw Hill.
2. Cassriel, B. and Martinsen, M.T. (2010). *Academic Connections 1*. New York: Pearson Education
3. Miller, J. L. and Cohen, R. F. (2001). *Reason to Write. Strategies for Success in Academic Writing: Low Intermediate*. Oxford: Oxford University Press.
4. Williams, J. and Evans, J. R. (2002). *Getting There: Tasks for Academic Writing*. Fort Worth: Harcourt.
5. Zukowsk, J. and Faust (2002). *Out of the Ordinary: Refining Academic Reading Skills*. UK: Thomson Learning.
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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Reading Skills (Individual)	1	10	10	9
2.	Impromptu Speech (Individual)	1	10	10	6
3.	Group Discussion	1	10	10	11
4.	Term Paper (Individual)	1	30	30	14
5.	<i>MyLinE</i> Self-Access (Individual)	1	10	10	4-14
6.	Final Exam			30	17
	Overall Total			100	

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/ULAB 3162
ULAB 3162 English for Professional Purposes PRE-REQUISITE : ULAB 2122 EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This course prepares students with the skills of effective communication that are necessary in order for them to be employable upon graduation. At the beginning of the course, students are required to do enculturation tasks in order to discover their potentials and possible expectations of the prospective working culture. Through active learning, it emphasises oral and written communication skills that are practiced in workplace situation. Using authentic workplace scenarios in the form of case studies, students will be given opportunities to negotiate and present information through group discussions and presentations. By the end of the course, students should be able to function as individuals and team members using appropriate communication skills at the workplace.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Use appropriate language to accomplish tasks through reflection journal writing and reaction paper	PO5 CS1				C3	Reflection Journal Writing, MyLine activities
CO2	Engage interactively in argumentative group discussion	PO5 CS5				C6, A2	Group Discussion of Case a Study
CO3	Deliver effective oral presentation with the support of appropriate visual aids	PO5				C6	Reaction Paper, Essay Oral Presentation

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face to Face Learning	42 hours
a. Lecture-Centered Learning	14 hours
i. Lecture	
b. Student-Centered Learning (SCL)	28 hours
i. Group discussion	
ii. Oral Presentation	
iii. Preparing visual aids	

Teaching and Learning Activities	SLT* (hours)
2. Self-Directed Learning a. Non-face-to-face learning such as through module, and e-learning • My-LinE forum	8 hours
b. Revision c. Assessment Preparation d. Reflection Journal Writing e. Reaction Paper f. Essay	14 hours
3. Assessment a. On-going assessment • Group Discussion • Oral Presentation	16 hours 8 hours 8 hours
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Lectures and Discussions, Oral and Written Assignments and Independent Study, MyLinE resources (Ready 4 Work)

WEEKLY SCHEDULE

Week 1	Introduction to the Course & Ice-breaking Activities Input on Career Exploration and Opportunities Language Input: using appropriate expressions for making enquiries to prospective employers, seeking information, responding to enquiries, identifying relevant information in company websites and profiles. * MyLinE Activity (Ready4Work)
Week 2 - 3	Enculturation Tasks- Getting to know work culture and employers' expectations Language Input: Exploring information about work culture through extensive reading and discussion, using descriptive adjectives to describe positive image and assets, using appropriate action verbs to highlight work culture
Week 4-6	Case Study 1: Bridging the gap between academic and professional practices and expectations Interpersonal Communication Skills Language input of groups discussion: making comparison, clarifying, compromising, persuading, presenting and discussing plans/intentions, expressing future plans and expectations, responding, talking about future possibilities , effective listening, non-verbal communication, ethical behaviour in personal and professional relationship
Week 7-9	Case Study 2: Discovering about Corporate World / Workplace Communication On the Job Skills: Meetings and Discussions Language input: discussing relevant issues about corporate world , giving and responding to opinion, agreeing, disagreeing, reaching a decision, talking about corporate culture, making suggestions and recommendation
Week 10-12	Case Study 3: Trends and Changes in Workplace Negotiation Skills Language input: compromising present or past practices with new technologies, discussion of changes and trends, contrasting and comparing past, present and future work trends, approaches to negotiation, language forms and functions of negotiation process
Week 13-14	Oral Presentation Language Input : Introducing, explaining and expanding notes and information, making comparisons, responding to difficult questions and comments, giving formal presentation, previewing questions, referring to visuals, explaining reasons/ benefits

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1. Faizah Mohamad Nor, Ghazali Bunari, Hanita Hassan, Marzilah Abd Aziz, Noor Mala Ibrahim (2007). *English for Career Search*. Petaling Jaya: Prentice Hall
2. Hughes, J. & Naunton, J. (2007). *Business Results. Intermediate*. Oxford: Oxford University Press
3. Nor Azni Abdullah (2008). *Communication Skills for the Workplace*. Petaling Jaya: August Publishing Sdn. Bhd.
4. Keyton, J. (2002). *Communicating in groups: Building relationship for effective decision making* (2nd ed.). Boston: McGraw-Hill.
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DISTRIBUTION OF MARKS

	Assessment	Number	% each	% total	Week
1	MyLinE Activities (Individual)	1	10	10	2-7
2	Reflection Journal Writing (Individual)	1	15	15	4
3	Group Discussion of Case Study (Group)	1	15	15	8-10
4	Essay (Individual)	1	15	15	10
5	Reaction Paper (Group)	1	15	15	12
6	Oral Presentation				13-14
	<ul style="list-style-type: none"> • Oral Presentation (Individual) • Visual Aids 	1	20	20	
		1	10	10	
	Overall Total			100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 <b style="font-size: 24pt; font-weight: bold;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1st June 2003 Last Amendment : 26th June 2013 Edition : 5 Procedure No. : FKA/PG/RK/SSE 1693
SSE1693 – ENGINEERING MATHEMATICS I PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This is a first course in Engineering Mathematics. It covers topics including differentiation and integration which focus on hyperbolic and inverse functions. Improper integrals are also studied. Vectors and matrices including basic operations, solving related problems in 3 dimensions are discussed. In addition, vector spaces, eigenvalues and eigenvectors are introduced. Sketching of polar graphs is discussed. This course also covers complex numbers, function of complex variable, series and power series.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	produce derivatives and integrals of inverse functions and solve improper integrals.	PO1, PO2				C3, P3,A2	Q1,T1, F
CO2	Use vectors and matrices to solve linear system and produce eigenvalues and eigenvectors.	PO1, PO2				C3, P3, A2	T1,F
CO3	identify vector spaces and determine basis of a vector space and its properties.	PO1, PO2				C2, C3, P1	A1, T2,F
CO4	transform Cartesian equations to polar and sketch polar equations using its symmetrical properties.	PO1, PO2				C2, C3, P4,A2	Q2,T2,F
CO5	solve basic equations on complex numbers including powers and roots;and represent complex function as hyperbolic and trigonometric functions.	PO1, PO2				C3, P4,A2	T2,F
CO6	Produce power series of functions using Taylor's and Maclaurin series and determine its convergence.	PO1, PO2				C1, C3, P1, A2	Q3,A2, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face-to-Face Learning	
a. Lecturer-Centered Learning	
i. Lecture	42
b. Student-Centered Learning (SCL)	
i. Laboratory/Tutorial	
ii. Student-centered learning activities – Active Learning, Project Based Learning	14

2. Self-Directed Learning	
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	12
b. Revision	35
c. Assessment Preparations	10
3. Formal Assessment	
a. Continuous Assessment	4
b. Final Exam	3
Total Student Learning Time, SLT	120

TEACHING METHODOLOGY

Lecture and Discussion, Assignments, Quizzes, Independent Study

WEEKLY SCHEDULE

Week 1 - 2	:	Further Transcendental Functions: Inverse trigonometric functions, hyperbolic functions and inverse hyperbolic functions Differentiation: Differentiation of composite functions involving inverse trigonometric functions, hyperbolic functions and inverse hyperbolic functions
Week 3 - 4	:	Integration: Review on integration techniques. Integration of expressions involving inverse trigonometric functions, hyperbolic functions, inverse hyperbolic functions. Techniques of integration using table of integral.
Week 5	:	Improper Integrals: evaluation of limits including using L'Hopital Rule, limits of indeterminate forms of type $0/0$ and ∞/∞ . Improper integrals, infinite limits of integration and infinite integrands.
Week 6 - 7	:	Vectors: Scalars and vectors, notation, equality of vectors, vectors in space, dot product, cross product, the vector equation of line $\mathbf{r} = \mathbf{a} + t \mathbf{b}$, vector equation of a plane; $\mathbf{r} \cdot \mathbf{n} = \mathbf{a} \cdot \mathbf{n}$, , angle between two lines, intersection of two lines, distance from a point to a line, distance between two skewed lines, equation of a plane, angle between two planes, angle between a line and a plane, shortest distance from a point to a plane, line to plane, between skewed lines, line intersection of two planes.
Week 8	:	Mid Semester Break
Week 9 - 10	:	Matrix: Minors, cofactors, adjoints, and determinants. Solve system of linear equation using Cramer's rule and inverse matrix Rank of matrix and determine whether a system of linear equations has a unique solution, no solution or infinite solutions. Elementary row operations. Solve system of linear equation using Gauss elimination. Eigen value, eigen vector. Vector space: properties, linear combinations, basis, linear independent, spanning.
Week 11	:	Polar Coordinates: point representation in polar coordinates, relationship between polar and Cartesian coordinates, parametric equations. Graph sketching in polar coordinates.
Week 12	:	Complex Numbers: Definition of complex and imaginary numbers, operations on complex numbers, modulus and argument, basic equations of complex numbers
Week 13	:	Euler form, function of complex variable eg $\sin(z)$, relationship between circular and hyperbolic function, de Moivre's theorem to show some trigonometric identities, power and roots of complex numbers.
Week 14-15	:	Series: expansion of finite series, infinite series, power series, and the summations of r , r^2 and r^3 . Test of convergence-root and ratio test. Taylor's Theorem and Maclaurin's Theorem and its applications
Week 16-18	:	Revision Week and Final Examination

REFERENCES

Course Text:

1. Glynn James, (2005). *Advanced Modern Engineering Mathematics*, Prentice Hall.

Supplementary Texts:

2. Kreyzig, Erwin (1993). *Advanced Engineering Mathematics*, John Wiley, New York (TA 330 K7 1993)
 3. Stroud K.A (1996). *Advanced Engineering Mathematics*; MacMillan Ltd.
 4. Alan Jeffrey (2002). *Advanced Engineering Mathematics*, Academic Press.
 5. Bradley, G.L and Smith (1998), *Calculus*, Prentice Hall International Inc.
- Finey, R., Weir, M and Giordano, F. (2001), *Thomas' Calculus*, Addison-Wesley Pub

DISTRIBUTION OF MARKS

No	Type of Assessment	Number	% each	% total	Date
1	Assignment	2	2.5	5	W5, W14
2	Quiz	3	5(best 2)	10	W3, W11, W15
2	Test 1	1	20	15	W7
3	Test 2	1	20	20	W13
4	Final Examination	1	50	50	W17-W18
	Total			100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SSE 1793
Differential Equations SSE1793 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

This is an introductory course on differential equations. Topics include first order ordinary differential equations (ODEs), linear second order ODEs with constant coefficients up to fourth order, the Laplace transform and its inverse, Fourier series, and partial differential equations (PDEs). Students will learn how to classify and solve first order ODEs, use the techniques of undetermined coefficients, variation of parameters and the Laplace transform to solve ODEs with specified initial and boundary conditions, and use the technique of separation of variables to solve linear second order PDEs and the method of d'Alembert to solve wave equation.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Use appropriate techniques to find the solution of first order differential equation.	PO1 PO2				C3, A2, P3	T1, F
CO2	Use the method of undetermined coefficients and the method of variation of parameters to find the solution of second order of linear differential equations with constant coefficients up to fourth order.	PO1 PO2				C3, A2, P3	Q, T2, F
CO3	Produce the Laplace transforms and its inverses for standard functions.	PO1 PO2				C3, A2, P3	Q, T2, F
CO4	Solve initial and boundary value problems using Laplace transforms.	PO1 PO2				C3, A2, P3	F
CO5	Produce Fourier series of given functions.	PO1 PO2				C3, A2, P3	F
CO6	Solve second order linear partial differential equations using the method of separation of variables and the method of d'Alembert for solving wave (Helmholtz) equations..	PO1 PO2				C3, A2, P3	A, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	14
	ii. Student-centered learning activities – Active Learning, Project Based Learning	
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	12
	b. Revision	37
	c. Assessment Preparations	9
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

Lecture and Discussion, Assignments and/or Quizzes.

WEEKLY SCHEDULE

Week	Topic / Content
Week 1	First order ordinary differential equations: Definition and classification of differential equations. Basic ideas; solutions of differential equations, initial and boundary value problems. Review on separable and linear equations. Methods of solution homogeneous and exact equations,
Week 2	Bernoulli equations and other substitutions. Applications of first order ODE's:
Week 3	Newton' Law of Cooling , the free fall, electrical circuits, chemical reactions and other applications.
Week 4	Linear second order ordinary differential equations with constant coefficients: Second order homogeneous differential equations. Solution of non-homogenous equations. Method of undetermined coefficients.
Week 5	Method of the undetermined coefficients to higher order ODE's up to fourth order (beam bending), method of variation of parameters.
Week 6	Applications of second order differential equations: mechanical vibrations and electrical circuits; damped and undamped free and forced vibrations, circuits with and without impedance/resistance, and other applications.
Week 7	Laplace transforms: Definition of Laplace transforms, derivation of Laplace transforms for standard elementary functions. Linearity property, first shifting theorem, multiplication by Laplace transforms of unit step functions.
Week 8	Mid-Semester Break
Week 9	Laplace transforms of Delta Dirac functions and periodic functions; Second shifting Theorem, Laplace transforms of the derivatives. Inverse Laplace transforms, transfer functions.
Week 10	Convolution theorem:. Solving initial value problems (IVP) and boundary value problems (BVP). Solving simultaneous 1st order differential equations.
Week 11	Fourier series: Even and odd functions. Fourier series for periodic functions. Fourier series for even and odd functions.

Week	Topic / Content
Week 12	Half-range Fourier series. Convergence of Fourier series, approximation summation using Fourier series.
Week 13	Partial differential equations. Basic concepts, classifications. Method of separation of Variables for solving heat equation (consolidation theory).
Week 14	Method of separation of variables and d'Alembert for solving wave (Helmholtz) equations.
Week 15	Laplace equations and Transverse Vibrations of a beam.
Week 16-18	Revision Week and Final Examination.

REFERENCES :

Course Text:

1. Glynn James, (2005). *Advanced Modern Engineering Mathematics*, Prentice Hall.

Supplementary Texts:

2. Kreyzig, Erwin (1993). *Advanced Engineering Mathematics*, John Wiley, New York (TA 330 K7 1993)
3. Stroud K.A (1996). *Advanced Engineering Mathematics*; MacMillan Ltd.
4. Alan Jeffrey (2002). *Advanced Engineering Mathematics*, Academic Press.
5. Nagel *et al.* (2004). *Fundamentals of Differential Equations*, 5th ed., Addison Wesley Longman. (QA371 N33 2004)
6. Abd Wahid Md. Raji and Mohd Nor Mohamad (2008); *Differential Equations for Engineering Students*, Jabatan Matematik, UTM.
7. Normah Maan, et. al., (2008) *Differential Equations Module*, Jabatan Matematik, UTM.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1	Test 1	1	15	15	Week 5
2	Test 2	1	25	25	Week 10
3	Assignment/Quiz	2	5	10	Anytime
4	Final Examination	1	50	50	Exam Week

ATTENDANCE

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SSCE 1993
SSCE 1993 Engineering Mathematics II PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 42 hours		

SYNOPSIS

This course is about multivariable calculus of real and vector-valued functions. The basic theory of partial derivatives and multiple integrals of real functions with their applications are discussed. This theory is extended to vector valued functions to describe motion in space, directional derivatives, gradient, divergence and curl, line integrals, surface integrals and volume integral. Related theorems, namely Green's Theorem, Stokes' Theorem and Gauss Divergence Theorem and their applications are discussed.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Express functions of two and three variables using graphical representations.	PO1 PO2				C2,C3,P4, A2	T1,F
CO2	Apply partial derivatives on problems involving rate of change, estimations, relative and absolute extrema.	PO1 PO2				C3,P3, A2	T1,A1,F
CO3	Solve double and triple integrals in various coordinate systems involving area, volume, centre of mass and moment.	PO1 PO2				C3, P3,A2	T2,F
CO4	Express directional derivatives, tangent , normal vectors, divergence and curl of vector valued functions using del operator.	PO1 PO2				C2,C3, P4, A2	T2,A2,F
CO5	Solve line and surface integrals, and apply related theorems to engineering problems (chemical/civil/ electrical/ mechanical).	PO1 PO2				C3,P3,A2	F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	14
	i. Laboratory / Tutorial	
	ii. Student-centered learning activities – Active Learning, Project Based Learning	

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	9
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	
	b. Revision	40
	c. Assessment Preparations	9
3.	Formal Assessment	
	a. Continuous Assessment	2x1.5=3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

Lecture, Directed Reading, Group Discussion, Problem-solving

WEEKLY SCHEDULE

Week	Topic / Content
Week 1	Functions of several variables: Domain and range, level curves
Week 2	Common surfaces; level surfaces
Week 3	Partial derivatives: Rate of change; the chain rule; increments and differential
Week 4	Extrema of multivariable functions – relative and absolute
Week 5	Double integrals: Integrals in rectangular coordinates; iterated integrals and Fubini's Theorem; changing the order of integration
Week 6	Double integrals in polar coordinates; Application of double integral: Area, volume, mass, centre of mass, and moments
Week 7	Triple integrals: Triple integral in rectangular coordinates, Triple integral in cylindrical coordinates; Triple integral in spherical coordinates
Week 8	Mid-Semester Break
Week 9	Applications of the triple integral: Mass, centre of mass, and moments
Week 10	Vector-valued functions : Graphs of vector functions, differentiation and integration of vectors; velocity, acceleration, tangents and normals
Week 11	Scalar and vector fields; Del operator, gradient; directional derivatives; divergence and curl
Week 12	Vector Calculus: Line Integrals - line integrals in scalar and vector fields; path independence, potential functions and conservative fields
Week 13	Green's Theorem Surface integrals - surface integrals of scalar and vector fields
Week 14	Stokes' Theorem and applications
Week 15	Gauss' Divergence Theorem and applications
Week 16	Revision Week
Week 17-18	Final Examination

REFERENCES

Main Text :

Glyn James(1999). Advanced Modern Engineering Mathematics. 2nd Edition. Prentice Hall

Other References

1. Maslan Osman & Yusof Yaacob, 2008. Multivariable and Vector Calculus, UTM Press.
2. Yudariah, Roselainy & Sabariah. Multivariable Calculus for Indpnt. Learners, 2nd Ed. 2009. Pearson Educ. Pub.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1	Assignment	2	5	10	Week 4, Week 10
2	Test	2	15 + 25	40	Week 6, Week 12
3	Final Exam	1	50	50	Weeks 16 - 17
	Total		100%		

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SSCE 2193
ENGINEERING STATISTICS SSCE 2193/ SSE 2193 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 42 hours		

SYNOPSIS

This course begins with basic statistics, elementary probability theory and properties of probability distributions. Introduction to sampling distribution, point and interval estimation of parameters and hypothesis testing are also covered. Simple linear regression and one-way analysis of variance are also taught in this course. Students will be taught on how to use and incorporate statistical tools and software for solving engineering statistics problem through a group assignment.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe data numerically and graphically using any statistical tools.	PO1				C1, P2, A2	Q
CO2	Use random variables concept in probability distributions of a parameter and a statistic.	PO1				C3, P3, A2	A, T, F
CO3	Use statistical methods for inference and decision making in engineering statistics problem.	PO1				C3, P3, A3	Q, T, F
CO4	Use analysis of variance on engineering statistics problem.	PO1				C3, P3, A3	F
CO5	Use simple linear regression on two variables linear relationship.	PO1				C3, P3, A2	F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
I.	Face-to-Face Learning	
a.	Lecturer-Centered Learning	
i.	Lecture (3 hrs x 14 weeks)	42
a.	Student-Centered Learning (SCL)	
ii.	Laboratory/Tutorial	-
	Student-centered learning activities – Active Learning, Project Based Learning	

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning: Group assignment	10
	b. Revision	53
	c. Assessment Preparations	9
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total (SLT)		120

TEACHING METHODOLOGY

Lecture and Discussion, Independent Study and Group Assignment

WEEKLYSCHEDULE

Week	Activities
1	Basic Statistics: Statistics in Engineering, Data description; Experiments and sampling, Histograms, Alternative types of plot,
2	Probabilities of Random Events : Interpretations of probability, Sample space and events, Axioms of probability, Conditional probability, Independence. Random Variables: Univariate (Probability functions, Properties and Expected Values)
3	Special probability distributions: binomial, poisson, negative binomial, hypergeometric, geometric,
4	exponential, erlang, gamma, weibull, normal, lognormal distribution; random variables for simulation. (Quiz 1)
5	Sampling Distributions: Central limit theorem, sampling distributions for mean and proportion, sampling distributions for the difference between two means and sampling distributions for the difference between two proportions.
6	Estimation: Point and interval estimations, confidence intervals for mean, variance, and proportion from a single population.
7	confidence intervals for the difference between two means, confidence interval for the ratio of variances, and confidence intervals for the difference between two proportions from two populations. (Test 1)
8	Tests of Hypotheses: Test for variance and proportion from a single population,
9	Mid-semester break
10	Tests for the difference between two means, for the ratio of variances, and for the difference between two proportions from two populations.
11	Goodness-of-fit test, independence test and homogeneity test.
12	Analysis of Variance: Designing Engineering Experiments, Completely Randomized Single-Factor Experiment. (Test 2)
13	One-way ANOVA for equal and unequal sample sizes.
14	Simple Linear Regression and Correlation: Scatter diagram, simple linear regression model, properties of least squares estimators, test for linearity of regression, confidence intervals,
15	Adequacy of regression model, Transformation, Pearson product moment correlation coefficient. (Quiz 2)
16	Revision Week

REFERENCES

Coursenote:

Z. M. Khalid, N. M. Ismail, A. Bahar, I. Mohamad, M. H. Lee, N. Ismail & N. Ahmad (2013) Introductory Statistics for Engineering Students, Dept. of Mathematical Sciences, UTM

Other References:

1. Montgomery, D. C. and Runger, G. C. (2007) Applied Statistics and Probability for Engineers.4th ed. New York: John Wiley & Sons. (QA276.12 M68 2007)
2. Montgomery, D. C., Runger, G. C., and Hubele, N. F. (2007).Engineering Statistics.4th ed. New York: John Wiley & Sons. (QA276.12 M65 2007)
3. Ledolter, J., Hogg, R. V. (2010). Applied Statistics for Engineers and Physical Scientists. 3rd ed. New Jersey : Pearson Prentice Hall (TA340 L42 2010)
4. Walpole, R.E and Myers, R.H. (2006). Probability and Statistics for Engineers and Scientists. 8th Edition. Prentice Hall: New Jersey. (TA340 P76 2006)

DISTRIBUTION OF MARKS

No.	Type of Assessment	No. of Assessment	% each	% total	Weeks
1	Test 1	1	15	15	
2	Test 2	1	15	15	
3	Quiz	2	4 & 6	10	
4	Assignment	1	10	10	
4	Final Examination	1	50	50	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 <b style="font-size: 24px; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small style="font-size: 10px; margin-left: 20px;">Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 26 th June 2013 Edition : 5 Procedure No. : FKA/PG/RK/SAB 4813
Numerical Method (SSE2393) PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course discusses problem solving using numerical methods that involve non-linear equations, systems of linear equation, interpolation and curve fitting, numerical differentiation and numerical integration, eigenvalue problems, ordinary differential equations and partial differential equations.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Solve the nonlinear equations using bisection, simple iterative method and Newton method.	PO1, PO2				C3, P3, A2	T1, F
CO2	Solve the interpolation problem of given uniform data or non uniform data using Lagrange interpolation polynomial, Newton's divided difference Newton's forward and least square curve fitting method.	PO1, PO2				C3, P3, A2	T1, F
CO3	Produce the derivative of a function or table of function values up to fourth order using Taylor's series and perform numerical integration of the function or table of function values using trapezoidal, Simpson's 1/3 and Gaussian Quadrature	PO1, PO2				C3, P3, A2	T2, F
CO4	Solve the linear and nonlinear first order initial value problems using Euler, Taylor's series and Runge-Kutta methods.	PO1, PO2				C3, P3, A2	F, P
CO5	Solve up to fourth order boundary value problems using finite difference methods	PO1, PO2				C3, P3, A2	F, P
CO6	Solve the linear system of equations using Gaussian elimination, Decomposition methods such as Doolittle, Cholesky, Thomas Algorithm and Gauss-Seidel iterative method	PO1, PO2				C3, P3, A2	T2, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face-to-Face Learning	
a. Lecturer-Centered Learning	
i. Lecture	28
b. Student-Centered Learning (SCL)	
i. Student-centered learning activities – Active Learning, Project Based Learning	14
2. Self-Directed Learning	
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	27
b. Revision	36
c. Assessment Preparations	2 1.5 1+3 2=9
3. Formal Assessment	
a. Continuous Assessment	2 1.5=3
b. Final Exam	3
Total Student Learning Time* (SLT)	120

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative Learning & Independent Study.

WEEKLY SCHEDULE

Week	Topic
Week 1	Nonlinear Equations: Bisection, simple iterative methods and Newton-Raphson methods
Week 2	Interpolation: Lagrange, Newton's divided difference and Newton's forward methods.
Week 3	least square curve fitting method. Numerical Differentiation: Estimating derivative up to forth order using Taylor series
Week 4	Linear and nonlinear first order initial value problems: Euler, Taylor's series, fourth order Runge-Kutta methods. Case study: flood routing.
Week 5	Boundary value problems: Second Order linear differential equations, Finite difference methods. Case study: Bar problem or antenna design.
Week 6	Fourth Order linear differential equations, Finite difference methods. Case study: Beam problem or antenna design.
Week 7	Linear System: Gaussian elimination, Decomposition methods such as Doolittle, Cholesky
Mid semester break	
Week 8	Thomas Algorithm, iterative methods such as Gauss-Seidel method.
Week 9	First order Partial Differential Equations: Finite difference and Newton Raphson. Case study: flood routing. Second order Partial Differential Equations Elliptic equation; Finite difference methods.
Week 10	Case study: plate bending or transmission line Second order PDE: parabolic equations, Finite difference methods.
Week 11	Case study: consolidation theory or propagation of wave Second order PDE: Hyperbolic equation, finite difference methods
Week 12	Eigenvalue Problem: Gerschgorin circle theorem, Power Method, Shifted power method. Case study: buckling of beam or wave guide problem.
Week 13	Numerical Integration: Derivation and application of Trapezoidal, Simpson's 1/3 rule,
Week 14	2 points, 3 points, 4 points Gaussian quadrature
Week 15 -18	Study week and Final examination

REFERENCES :

Course Text:

1. Rao, Singiresu S (2001). *Applied Numerical Methods for Engineer Scientist*, Prentice Hall, London

Supplementary Texts:

2. Kreyzig, Erwin (1993). *Advanced Engineering Mathematics*, John Wiley, New York (TA 330 K7 1993)
3. Stroud K.A (1996). *Advanced Engineering Mathematics*; MacMillan Ltd.
4. Chapra S.C& Canale R.P, *Numerical Methods fo Engineers*, 5th, 2006.
5. Glynn James, (2005). *Advanced Modern Engineering Mathematics*, Prentice Hall

DISTRIBUTION OF MARKS

No.	Type of Assessment	Number	% each	% total	Dates
1	Assignments/Project	2	10	20	W7, W13
2	Test 1	1	15	15	W5
3	Test 2	1	15	15	W10
4	Final Exam	1	50	50	W17-W19
	Overall Total			100	

ATTENDANCE

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UHAS 1172
Dinamika Malaysia (UHAS 1172)		
PRE-REQUISITE :		
EQUIVALENCE :		
LECTURE HOURS : 2 hours / week		

SYNOPSIS

Kursus ini merangkumi pelbagai disiplin ilmu sains sosial, yang meliputi ilmu sosiologi, sains politik, sejarah dan hubungan antarabangsa. Kursus ini memberi nilai tambah kepada pelajar UTM untuk membentuk jati diri, memupuk semangat perpaduan dalam kalangan pelajar, serta melahirkan pelajar yang dinamik dan berfikiran global.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Menghuraikan konsep-konsep yang berkaitan dengan sejarah, masyarakat, budaya, kenegaraan, politik, kuasa dan ideologi.	PO 1				C4	Ujian Pep. Akhir
CO2	Membincangkan proses transformasi ekonomi, sosial dan politik di peringkat nasional dan antarabangsa.	PO 7				A3	
CO3	Menganalisis ilmu dalam konteks global.	PO 8				C4, A3	Tugasan (Kumpulan) Pep. Akhir

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Aktiviti Pengajaran dan Pembelajaran	SLT* (hours)
1. Pembelajaran Bersemuka (PB)	
a. Pembelajaran Berpusatkan Pensyarah	
i. Syarahan	20
b. Pembelajaran Berpusatkan Pelajar (SCL)	
i. Aktiviti pembelajaran berpusatkan pelajar (SCL)	8
2. Pembelajaran Kendiri	
a. Pembelajaran Tak Bersemuka (PTB) atau SCL seperti manual, tugasan, modul, e-Pembelajaran dan sebagainya	15
b. Ulangkaji	28
c. Persediaan Penilaian	6
3. Penilaian Formal	
a. Penilaian Berterusan	1
b. Peperiksaan Akhir	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Syarahan, Perbincangan, Kerja berkumpulan, Pembelajaran Kendiri, Tugas Kumpulan dan Pembentangan Tugas

WEEKLY SCHEDULE

Minggu 1	1.0 Sejarah, masyarakat dan budaya 1.1 Konsep sejarah, masyarakat, budaya, kenegaraan, politik, kuasa dan ideologi.
Minggu 2	2.0 Sistem politik dan kerajaan 2.1 Sistem kesultanan, sistem demokrasi berparlimen, raja berperlembagaan.
Minggu 3	3.0 Imperialisme, Kolonialisme dan Kapitalisme 3.1 Imperialisme dan kolonialisme di Malaysia 3.2 Dominasi kapitalisme di Malaysia
Minggu 4	4.0 Masyarakat multi etnik di Malaysia 4.1 Proses Pembentukan Masyarakat Majmuk Di Malaysia 4.2 Gagasan 1 Malaysia 4.3 Cabaran integrasi nasional
Minggu 5	5.0 Islam di Malaysia 5.1 Perkembangan awal 5.2 Kedudukan Islam dalam perlembagaan 5.3 Islam dan transformasi pentadbiran
Minggu 6 - 7	6.0 Pembangunan Ekonomi di Malaysia 6.1 Transformasi ekonomi perindustrian 6.2 K Ekonomi Kewarganegaraan 6.3 Model Baru Ekonomi 6.4 Wawasan 2020
Minggu 8 Ujian	7.0 Pembangunan Sosial 7.1 Transformasi pendidikan 7.2 Impak teknologi ke atas masyarakat 7.3 Pembangunan luar bandar
Minggu 9 - 10	8.0 Perlembagaan Malaysia 8.1 Prinsip, kandungan, fungsi Perlembagaan 8.2 Kontrak Sosial 8.3 Rukun Negara
Minggu 11 – 12 Pembentangan	9.0 Pemikiran Politik di Malaysia 9.1 Politik kepartian 9.2 Isu-isu kepimpinan 9.3 Sistem Parlimen, Badan Perundangan dan Sistem Federalisme
Minggu 13 - 14	10.0 Malaysia dan Globalisasi 10.1 Dasar Luar Malaysia 10.2 Peranan Malaysia di peringkat antarabangsa 10.3 Impak globalisasi ke atas masyarakat Malaysia

REFERENCES

- Andaya, Barbara dan Leonard Y., 1983. *Sejarah Malaysia* KL MacMillan Publisher.
- Cheah Boon Keng, Abu Talib Ahmad (eds.) 1990 *Kolonialisme Di Malaysia Dan Negara-negara Lain*, Petaling Jaya, Penerbit Fajar Bakti.
- Gullick, J.M. 1972. *Sistem Politik Bumiputera Tanah Melayu*, Kuala Lumpur, DBP.
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- Rex, John, 1985. *Hubungan Ras Dalam Teori Sosiologi*, (terjemahan oleh A. Nazri Abdullah), Kuala Lumpur DBP.
- S. Husin Ali (ed.), 1984. *Kaum, Kelas dan Pembangunan*, Kuala Lumpur, Persatuan Sains Sosial Malaysia.
- Shamsul Amri Baharudin, 1986. *From British to Bumiputera Rule*, Singapore: ISEAS.
- Ting Chew Peh, 1980. *Konsep Asas Sosiologi*, Kuala Lumpur, DBP.
- Wan Hashim Wan Teh, 1983. *Race Relations in Malaysia*, Petaling Jaya: Heinemann Educational Books.
- Ting Chew Peh, 1987. *Hubungan Ras dan Etnik: Suatu Pengantar*, KL: Pustaka Dimensi.

DISTRIBUTION OF MARKS

No.	Penilaian	Nombor	Setiap Satu (%)	Jumlah (%)	Minggu
	Ujian	1	30	30	7
2	Pembentangan (Kumpulan)	1	10	10	10 – 12
3	Tugasan (Kumpulan)	1	20	20	11
4	Ulasan artikel	1	10	10	5-6
5	Peperiksaan Akhir	1	30	30	16 – 18
Jumlah				100	

ATTENDANCE

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UHAS 2052
Komunikasi Berkesan (UHAS 2052)		
PRE-REQUISITE :		
EQUIVALENCE :		
LECTURE HOURS : 2 hours / week		

SYNOPSIS

Kursus ini memberi pendedahan kepada pelajar mengenai teori dan praktis berkomunikasi secara berkesan. Penekanan diberikan kepada kefahaman tentang pengertian komunikasi dan bagaimana komunikasi berlaku. Kemahiran yang diterapkan ialah kemahiran mencerap (mendengar), penggunaan mesej lisan (verbal) dan bukan lisan (non-verbal) komunikasi dan sendiri, komunikasi antara peribadi, komunikasi kumpulan kecil, komunikasi publik (perucapan dan pembentangan) dan komunikasi antara budaya.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Menghuraikan kaedah komunikasi berkesan dalam konteks antara peribadi, kumpulan, publik dan antarabudaya.	PO5				C4, P2, A2	Ujian, Tugas (Kumpulan), Peperiksaan Akhir
CO2	Mengaplikasi kaedah berkomunikasi secara berkesan melalui perbincangan kumpulan	PO5				C3, P3, A2	Ujian, Tugas (Kumpulan) Peperiksaan Akhir
CO3	Membina kompetensi berkomunikasi dalam konteks antara peribadi, kumpulan, publik dan antara budaya melalui penguasaan pengetahuan, motivasi dan kemahiran	PO7				P4, A3	Pembentangan (Kumpulan)

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Aktiviti Pengajaran dan Pembelajaran	SLT* (hours)
Lecture	39
1. Pembelajaran Bersemuka (PB)	
a. Pembelajaran Berpusatkan Pensyarah	28
i. Syarahan	
b. Pembelajaran Berpusatkan Pelajar (SCL)	8
i. Aktiviti pembelajaran berpusatkan pelajar (SCL)	
2. Pembelajaran Kendiri	
a. Pembelajaran Tak Bersemuka (PTB) atau SCL seperti manual, tugas, modul, e-Pembelajaran dan sebagainya	20
b. Ulangkaji	14
c. Persediaan Penilaian	6
3. Penilaian Formal	
a. Ujian	2
b. Peperiksaan Akhir	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Kuliah dan perbincangan, perbincangan kumpulan, pembelajaran persendirian, projek kumpulan dan pembentangan

WEEKLY SCHEDULE

Minggu 1	<p>1.0. Pengertian komunikasi dan fungsi komunikasi</p> <p>1.1 Pengertian komunikasi 1.2 Fungsi komunikasi</p>
Minggu 2	<p>2.0. Teori dan model komunikasi</p> <p>1.1 Model-model komunikasi (model lini, interaktif dan transaksional) 1.2 Konteks komunikasi 1.3 Aksiom komunikasi</p>
Minggu 3	<p>3.0. Prinsip-prinsip komunikasi berkesan</p> <p>1.1 Kompetensi komunikasi</p> <p style="padding-left: 40px;">3.0.1. Pengetahuan tentang komunikasi 3.0.2. Motivasi untuk berkomunikasi 3.0.3. Kemahiran dalam komunikasi</p>
Minggu 4	<p>4.0. Kendiri dan komunikasi</p> <p>4.1. Berfikir dan persepsi (intrapersonal) 4.2. Konsep diri 4.3. Kesedaran diri 4.4. Harga diri dalam komunikasi</p>
Minggu 5	<p>5.0. Kemahiran menceraap (mendengar)</p> <p>1.1 Perbezaan menceraap (listening) dan mendengar (hearing) 1.2 Proses menceraap dalam komunikasi 1.3 Halangan kepada menceraap 1.4 Menceraap secara berkesan</p>
Minggu 6	<p>6.0. Komunikasi lisan</p> <p>6.1. Halangan kepada komunikasi lisan 6.2. Penggunaan bahasa yang berkesan</p>
Minggu 7	<p>7.0. Komunikasi bukan lisan (non-verbal)</p> <p>7.1. Jenis komunikasi bukan lisan</p> <p style="padding-left: 20px;">7.1.1. Proksemik (jarak dan ruang kawasan) 7.1.2. Kinesik (gestural, postura, mimik muka) 7.1.3. Paralinguistik (nada suara, kekuatan suara) 7.1.4. Kronemik (penggunaan masa) 7.1.5. Artifaktual (penampilan fizikal, aksesori)</p>
Minggu 8	Cuti Pertengahan Semester
Minggu 9	<p>8.0. Komunikasi antara peribadi (interpersonal)</p> <p>8.1. Pengertian komunikasi antara peribadi 8.2. Proses komunikasi antara peribadi 8.3. Komunikasi antara peribadi yang berkesan</p>
Minggu 10	<p>8.0. Komunikasi antara peribadi</p> <p>8.4. Personaliti dalam komunikasi antara peribadi 8.5. Kebimbangan dalam berkomunikasi 8.6. Asertif dalam komunikasi antara peribadi</p>
Minggu 11	<p>9.0. Komunikasi kumpulan kecil</p> <p>9.1. Jenis kumpulan 9.2. Peranan dalam kumpulan 9.3. Norma kumpulan 9.4. Kumpulan yang berkesan</p>
Minggu 12	<p>Komunikasi kumpulan kecil</p> <p>9.5. Kepimpinan dalam kumpulan 9.6. Membuat keputusan dan penyelesaian masalah 9.7. Menangani konflik dalam kumpulan</p>

Minggu 13	10.0. Komunikasi publik 10.1. Persediaan ucapan 10.2. Jenis-jenis ucapan
Minggu 14	10.0 Komunikasi publik 10.3 Penyampaian ucapan yang bekesan
Minggu 15	11.0. Komunikasi antara budaya 11.1. Pengertian komunikasi antara budaya, komunikasi silang budaya dan komunikasi antara ras 11.2. Komunikasi antara budaya yang berkesan
Minggu 16-18	Minggu Ulangkaji & Peperiksaan Akhir

REFERENCES

Teks Utama

- DeVito, J. (2009). *Human Communication: The Basic Course (11th ed.)*. Boston: Pearson
- Hashim Fauzy Yaacob (2001). *Komunikasi Antara Manusia*. Skudai: Penerbit UTM

Teks

- Beebe, S.A. & Masterson, J.T. (2006). *Communicating in Small Groups: Principles and Practices*. Boston: Allyn & Bacon.
- Knapp, M.L. & Vangelisti, A.I. (1992). *Interpersonal Communication and Human Relationship*. Boston: Allyn and Bacon.
- Orbe, M.P. & Harris, T.M. (2008). *Interracial Communication: Theory into Practice*. Los Angeles: Sage Publication

DISTRIBUTION OF MARKS

No.	Penilaian	Bilangan	Peratus	Jumlah	Minggu
1	Tugasan (Kumpulan)	1	30%	30%	10
2	Ujian	1	20%	20%	7
3	Pembentangan (Kumpulan)	1	10%	10%	13
4	Peperiksaan akhir	1	40%	40%	16

ATTENDANCE

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UHAS 3012
Entrepreneurship and Enterprise Development (UHAS 3012)		
PRE-REQUISITE	:	
EQUIVALENCE	:	
LECTURE HOURS	:	28 hours / week

SYNOPSIS

This course introduces the concepts and principles of entrepreneurship and the process of starting a business venture. A three-stage approach is used to achieve the course learning outcome: (a) understanding the individual characteristics of an entrepreneur, (b) analysing business opportunities and forming an entrepreneurial venture, and (c) developing a business plan for the venture. During the first stage, students will be exposed to the concepts and principles of entrepreneurship and individual characteristics and the required skills to successfully manage business ventures. After that, they will be introduced to techniques and tools to analyse and assess business ideas and the procedures to set up business ventures in Malaysia. Finally, they will be guided through every stages of the business plan development using their business ideas as case study. In addition to guided T&L, students will also be exposed to real life entrepreneurial activities through entrepreneurship carnivals containing talks by successful entrepreneurs, entrepreneurial workshops and entrepreneurial activities.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Explain the concept of entrepreneurs and entrepreneurship and their importance to business and economic development	PO9 KK1				C2, P2, A2	T
CO2	Sketch their individual entrepreneurial profile based on the result of the entrepreneurial self-assessment test	PO9 KK1 CS1				C2, P2, A3	T
CO3	Prepare an entrepreneur profile report based on interview with a selected entrepreneur according to the guideline	PO9, KK1 CS1, 2 TS1,2				C2, P2, A2	Pr
CO4	Analyse and select business ideas and subsequently fulfil the business registration procedures according to the latest guidelines provided by the Companies Commission of Malaysia	PO9 KK1				C4, P2, A2	T
CO5	Complete every components of the business plan for their proposed business venture according to the suggested models and present the report to a panel and class members in in-class seminar	PO9 KK1				C4, P2, A2	T, P
CO6	Organise and run entrepreneurship carnival according to a properly planned programme with the assistance of lecturers and the university	KK1 CS1 TS1, 2, 3				P3, A3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face to Face Learning	
a. Lecture-Centred Learning	14
i. Lecture	
b. Student-Centred Learning	14
i. Practical/Tutorial	
ii. Student-Centred learning activities	
2. Self-Directed Learning	
a. Non-face-to-face learning or student-centred learning such as manual, assignment, module, e-learning, etc	46
b. Revision	2
c. Assessment Preparations	2
3. Formal Assessment	
a. Ongoing assessment	2
b. Final Examination	0
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Lecture & e-learning, in class group discussion & presentation, problem-based exercises and activities, in class entrepreneurial self-assessment test, guided progressive business plan development, Web access: CCM, MARA, INSKEN, guest entrepreneurs and entrepreneurship carnival

WEEKLY SCHEDULE

Week 1	<p>The concept and Principles of Entrepreneurship</p> <ul style="list-style-type: none"> • History and background of entrepreneurship • Definition of entrepreneurs and entrepreneurship • The role of entrepreneurship in economic and social development • Entrepreneurship of development in Malaysia • Islam and entrepreneurship
Week 2	<p>Characteristics of Successful Entrepreneur</p> <ul style="list-style-type: none"> • Characteristics of successful entrepreneurs • Entrepreneurial self-assessment test • Entrepreneurs, managers and businessman • Creativity, innovation and entrepreneurship
Week 3 - 4	<p>Identifying, Evaluating and Selecting Business Ideas</p> <ul style="list-style-type: none"> • Techniques to generate business ideas creatively and innovatively • Understanding the consumer needs and wants • Understanding and analysing business environment' • Evaluating business opportunity • Selecting business ideas
Week 5 - 6	<p>Forms of Business, Legal, Aspects and Support System</p> <ul style="list-style-type: none"> • Legal forms of business • Business registration procedures • Business support system • Sources of capital and business financing <p>BUSINESS CARNIVAL</p>
Week 7	<p>Introduction to Business Plan</p> <ul style="list-style-type: none"> • Definition of business plan • The importance of business plan • The purpose of business plan • Important elements and format of business plan

Week 8	<p>Administration and Organisation Plan</p> <ul style="list-style-type: none"> • Form and business background • Organisational chart • Human resource planning, schedules of responsibility and remuneration • Administration and organisational budget
Week 9	<p>Production and Operation Plan</p> <ul style="list-style-type: none"> • Production process and flow • Production schedule and material, labour and overhead requirements • Production budget
Week 10 - 11	<p>Marketing Plan</p> <ul style="list-style-type: none"> • Production description • Target market, market size, competition and market share • Sales forecast • Marketing strategies • Marketing budget
Week 12 - 13	<p>Financial Plan</p> <ul style="list-style-type: none"> • Project implementation costs • Sources and uses of funds • Schedules of loans and hire-purchase amortisation • Pro forma cash flow statement • Pro forma financial statement • Financial analysis <p>MID TERM TEST</p>
Week 14	Business Plan Presentation

REFERENCES

1. Kamariah et al (2009). Technology Entrepreneurship. Pearson Prentice Hall Malaysia.
2. UiTM Entrepreneurship Study Group, (2004). *Fundamentals of Entrepreneurship*. Pearson Prentice Hall Malaysia.
3. Ab Aziz Yusof, Perumal, S., Faizuniah Pangil (2005). *Principles of Entrepreneurship*. Pearson Prentice Hall Malaysia
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5. Lambing, P.A. and Kuehl, S.R. (2007). *Entrepreneurship*. 4th Ed. Pearson Prentice Hall USA.
6. Zimmerer, T.W. and Scarborough, N.M. (200). *Essentials of Entrepreneurship and Small Business Management*. 4th .ed. Pearson Educational International
7. Mohd Khairuddin Hashim, (2007). *SMEs in Malaysia: A brief handbook*. Augus Publishing, Malaysia.
8. *Small Business Planning & Information Books from the Entrepreneur’s Guidebook Series* <http://www.smbtn.com/businessplanguides>

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1	Projects	2	20	40	6, 13
2	Presentation	1	15	15	12 - 14
3	Mid-term test	1	10	10	7
4	Peer evaluation	1	5	5	
5	Business Activity	1	30	30	14
	Overall Total			100	

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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UHAS 3022
Engineering Communication (UHAS 3022)		
PRE-REQUISITE :		
EQUIVALENCE :		
LECTURE HOURS : 2 hours / week		

SYNOPSIS

The aim of this course is to develop students competency in communication related to engineers workplace. For that purpose we expose the basic skills in communication of taking students through the basic process in communication. The content of this course also include a communication skills related to technical field such as interpersonal skills for engineers, writing skills, presentation skills, instructional skills, supervisory communication for engineers, negotiation and consultation skills.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Acquire a knowledge and skills in communication	PO5					T, Q, HW, F
CO2	Accelerate student potential to be more confident and competence in communication	PO5					T, Pr, HW, P, F
CO3	Accomplish competency in communication for practice in engineering workplace and organization	PO5					T, Pr, Q, HW, P, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

Teaching and Learning Activities	SLT* (hours)
1. Face to Face Learning	
a. Lecturer-Centered Learning	28
i. Lecture	
b. Student-Centered Learning (SCL)	
i. Practical/Tutorial	
ii. Student-centered learning activities	
2. Self-Directed Learning	
a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	25
b. Revision	14
c. Assessment Preparations	10
3. Formal Assessment	
a. Ongoing Assessment	1
b. Final Exam	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Lecture and discussion, group assignment, presentation, group activities, quizzes, test and final exam

WEEKLY SCHEDULE

Week 1	:	1.0 Introduction to communication in engineering 1.1 Communication and engineering 1.2 Function of communication in engineering 1.3 Communication model
Week 2	:	2.0 Process of communication in engineering 2.1 Sender, receiver, message, channel (medium), noise and feedback 2.2 Face to face communication 2.3 Writing Communication 2.4 Technology mediated communication
Week 3	:	3.0 Basic communication skills for engineers 3.1 Listening
Week 4	:	Basic communication skills for engineers 3.2 Verbal and non-verbal skill
Week 5	:	Basic communication skills for engineers 3.3 Communication and information seeking
Week 6	:	Interpersonal skills 3.4 Interpersonal communication
Week 7	:	4.0 Interpersonal skills 4.1 Supervisory communication
Week 8	:	Mid-Semester Break
Week 9	:	Interpersonal skills 4.2 Instructional communication
Week 10	:	Interpersonal skills 4.3 Negotiation in engineering
Week 11	:	Interpersonal skills 4.4 Communication and engineering consultation
Week 12	:	5.0 Communication in group 5.1 Concept of group and team
Week 13	:	5.0 Communication in group 5.2 Communication and problem solving in engineering 5.3 Communication and making decision in engineering
Week 14	:	6.0 Communication in public 5.1 Speech and presentation 5.2 Technical presentation
Week 15	:	5.0 Communication and project management 5.1 Communication with internal engineering stakeholder 5.2 Communication with external engineering stakeholder
Week 16-18	:	Revision Week and Final Examination

REFERENCES

Main Text:

Hashim Fauzy Yaacob (2007). *Kemahiran Komunikasi*. Skudai: Penerbitan Hasfa

Main References:

Davies, J.W. (2001). **Communication Skills: A Guide for Engineering and Applied Science Students**. Essex: Prentice Hall
 Ellis, R. (1997). **Communication for Engineers: Bridge that Gap**. London: Arnold
 Gurak, J. (2000). **Oral Presentation for Technical Communication**. Boston: Allyn and Bacon
 Hart, H. (2005). **Introduction to Engineering Communication**. New Jersey: Prentice Hall
 Ingre, D. (2008). **Engineering Communication: A Practical Guide to Workplace Communications for Engineers**. Toronto: Thomson Raman, M. & Sharma, S. (2005). **Technical Communication: Principles and Practice**. New Delhi: Oxford University Press

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	Weeks
1	Test 1	1	25	7
2	Group project	1	25	12
3	Presentation	1	5	13-15
4	Final exam	1	40	16-18
5	Peer assessment	1	5	

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ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UICI 1012
Tamadun Islam dan Tamadun Asia UICI 1012/ULT 1022 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

Kursus ini membincangkan Ilmu Ketamadunan: Objektif ilmu ketamadunan, konsep tamadun, hubungan dengan agama, budaya dan bangsa, ciri-ciri, kelahiran, perkembangan dan keruntuhan, interaksi, persamaan dan perbezaan antara tamadun; Tamadun Islam, konsep, sumber, asas dan matlamat, pandangan semesta, dan ciri-ciri; Tamadun Melayu, sejarah, Islam di Alam Melayu, warisan pra Islam dan kemunculan pandangan semesta Melayu-Islam, pengaruh tamadun Islam ke atas masyarakat Melayu, kolonialisme dan sekularisme di Alam Melayu, Tamadun Melayu teras pembinaan Tamadun Malaysia; Tamadun Cina: pandangan semesta dan sistem nilai dalam Tamadun Cina, pengaruh Islam di China; Tamadun India: pandangan semesta dan sistem nilai, pengaruh Islam di India; Isu-isu semasa ketamadunan: hegemoni Barat, globalisasi, Islam dan hak asasi manusia, alam sekitar, konsep jihad; dialog peradaban: kepentingan dan tujuan, Langkah dan cadangan membentuk dialog peradaban, isu-isu dialog peradaban, persefahaman antara kaum berasaskan tamadun, dialog antara tamadun (Barat, Islam dan Asia), syarat-syarat dialog: Kesefahaman, menghormati perbezaan, berilmu, menjaga adab-adab berdialog, dan tidak menggunakan pendekatan teologi, pendekatan dialog dalam konsep 1Malaysia.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Menjelaskan objektif ilmu ketamadunan konsep tamadun, hubungan dengan agama, budaya dan bangsa, ciri-ciri, kelahiran, perkembangan dan keruntuhan, interaksi, persamaan dan perbezaan antara tamadun.	PO1				C 2	PA, LS
CO2	Membandingkan konsep, pandangan semesta dan sistem nilai dalam tamadun: Islam, Melayu, Cina, dan India.	PO8				C3	PA,LS
CO3	Menganalisis isu-isu ketamadunan semasa dan dialog peradaban: hegemoni Barat, globalisasi, hak asasi manusia, alam sekitar, konsep jihad, dan pendekatan dialog dalam konsep 1Malaysia	PO7				C4, P3	PA, PK, Pm, LP

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

Aktiviti Pengajaran dan Pembelajaran	SLT* (hours)
1. Pembelajaran Bersemuka <ul style="list-style-type: none"> - Syarahan - Seminar pengukuhan - Aktiviti penyelidikan dan SCL 	10 2 16
2. Pembelajaran Tidak Bersemuka <ul style="list-style-type: none"> - Tugas - E-Pembelajaran - Ulangkaji - Persediaan penilaian 	10 14 20 6
3. Penilaian Formal <ul style="list-style-type: none"> - Peperiksaan akhir 	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

Kuliah, seminar, pembacaan terarah, pembelajaran sendiri, penyelidikan berkumpulan, dan pembentangan

WEEKLY SCHEDULE

	TAJUK	CATATAN/ISI
1	Pengenalan Ilmu Keta- madunan	<ul style="list-style-type: none"> • Pendahuluan: objektif ilmu ketamadunan • Konsep tamadun: Takrif dan sejarah tamadun • Hubungan tamadun dengan agama, budaya dan bangsa
2	Ilmu Ketamadunan	<ul style="list-style-type: none"> • Ciri-ciri tamadun • Kelahiran,perkembangan dan keruntuhan tamadun
3	Ilmu Ketamadunan	<ul style="list-style-type: none"> • Interaksi antara tamadun • Persamaan dan perbezaan antara tamadun
4	Tamadun Islam	<p>Konsep Tamadun Islam:</p> <ul style="list-style-type: none"> • Takrif , Sumber-sumber Primer dan Sekunder
5	Tamadun Islam	<ul style="list-style-type: none"> • Asas Tamadun Islam: Akidah, syariat dan akhlak • Matlamat Tamadun Islam: Memelihara Lima Asas Tujuan Perundangan (agama, nyawa, akal, keturunan, dan harta)
6	Tamadun Islam	<p>Konsep dan asas Pandangan Semesta Islam:</p> <ul style="list-style-type: none"> • Tuhan, Alam dan Manusia • Kepentingan Pandangan Semesta • Ciri-Ciri Tamadun Islam: Umum dan Khusus
7	Tamadun Asia: Tamadun Melayu	<p>Tamadun Melayu:</p> <ul style="list-style-type: none"> • Pengenalan • Sejarah Tamadun Melayu • Islam di Alam Melayu • Warisan pra Islam dan kemunculan pandangan semesta Melayu Islam • Pengaruh tamadun Islam ke atas masyarakat Melayu: ekonomi, politik, sosial, pendidikan, dan perundangan
8	Ujian Pertengahan Semester	UJIAN PERTENGAHAN SEMESTER
9	Tamadun Melayu	<ul style="list-style-type: none"> • Kolonialisme dan sekularisme di Alam Melayu • Tamadun Melayu Teras Pembinaan Tamadun Malaysia • Membentuk <i>world view</i>: Budaya ilmu, jati diri, penulisan kitab, kesenian/ kesusasteraan, kerohanian

	TAJUK	CATATAN/ISI
10	Tamadun Cina	<ul style="list-style-type: none"> Pengenalan, pandangan semesta; monotheisme, sistem nilai, pengaruh dan sumbangan Islam terhadap ketamadunan Cina, kesan interaksi tamadun Cina dengan tamadun luar
11	Tamadun India	<p>Pengenalan, pandangan semesta;</p> <ul style="list-style-type: none"> sistem nilai, pengaruh dan sumbangan Islam terhadap ketamadunan India, kesan interaksi tamadun India dengan tamadun luar
12	Isu-Isu Semasa Ketamadunan	<ul style="list-style-type: none"> Pendahuluan, pertembungan antara tamadun (Contoh: Islamfobia, bahaya hijau, terrorisme), hegemoni Barat, globalisasi, hak asasi manusia, alam sekitar, dan konsep jihad.
13	Dialog Peradaban	<ul style="list-style-type: none"> Dialog peradaban: kepentingan dan tujuan Langkah dan cadangan membentuk dialog peradaban, isu-isu dialog peradaban, persefahaman antara kaum berasaskan tamadun, dialog antara tamadun (Barat, Islam dan Asia)
14	Dialog Peradaban	<p>Syarat-syarat dialog peradaban:</p> <ul style="list-style-type: none"> Kesefahaman, menghormati perbezaan, berilmu, menjaga adab-adab berdialog, dan tidak menggunakan pendekatan teologi; Pendekatan dialog dalam konsep 1Malaysia.

REFERENCES

DISTRIBUTION OF MARKS

No.	Penilaian	Bilangan	% setiap satu	% jumlah	Tarikh
1	Proposal Kajian	1	10%	10	Minggu 2-3
2	Kerja Berkumpulan	1	10%	10	Minggu 4-9
3	Seminar Pengukuhan	1	10%	10	Minggu 10
4	Pembentangan	1	10%	10	Minggu 11-12
5	Laporan Penyelidikan	1	20%	20	Minggu 13-14
6	Peperiksaan Akhir	1	40%	40	Minggu 15
	Jumlah Keseluruhan			100	

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	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/UICI 3042
INSTITUSI-INSTITUSI ISLAM (UICI 3042) PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week		

SYNOPSIS

Kursus ini membincangkan institusi-institusi keluarga, kemasyarakatan, pendidikan, ekonomi, perundangan, kehakiman, penguatkuasaan dan politik dalam Islam. Perbincangan difokuskan kepada konsep kekeluargaan, penghayatan dan pelaksanaannya; konsep kemasyarakatan dan tanggungjawab; falsafah dan sistem pendidikan Islam; konsep ekonomi Islam, perbankan dan insuran; konsep dan ciri-ciri perundangan, kedudukan perundangan Islam dalam perlembagaan Malaysia; persaksian, pendakwaan, pembuktian dan keterangan; pemantauan dan penguatkuasaan; konsep politik dan bidang kuasanya.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Memahami konsep dan fungsi institusi Islam dalam kehidupan muslim.	PO1					U, K, T, Pm, PA
CO2	Menjelaskan institusi Islam sebagai alternatif bagi menyelesaikan masalah ummah.	PO1, PO4, PO6, PO7, PO10					U, K, T, Pm, PA
CO3	Membincangkan institusi Islam dalam konteks kehidupan semasa masyarakat dan negara.	PO1, PO4, PO6, PO7, PO10					U, K, T, Pm, PA

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

Kuliah, seminar, pembacaan terarah, pembelajaran sendiri, kajian berkumpulan

Aktiviti Pengajaran dan Pembelajaran	SLT* (hours)
1. Pembelajaran Bersemuka	
- syarahan	22
- aktiviti SCL	6
2. Pembelajaran Kendiri	
- pembelajaran tak bersemuka	10
- ulangkaji	28
- persediaan penilaian	10
3. Penilaian Formal	
- ujian	1
- kuiz	1
- peperiksaan akhir	2
Total Student Learning Time* (SLT)	80

TEACHING METHODOLOGY

1. Lecture

WEEKLY SCHEDULE

Week	Topic / Content
Minggu 1-2	<p>1.0 Institusi Keluarga</p> <p>1.1 Konsep Perkahwinan</p> <ul style="list-style-type: none"> • Definasi & Dalil • Hukum Perkahwinan • Hikmah Perkahwinan <p>1.2 Pra Perkahwinan</p> <ul style="list-style-type: none"> • Kriteria Pemilihan Calon • Merisik • Bertunang <p>1.3 Pernikahan</p> <ul style="list-style-type: none"> • Rukun Nikah • Perceraian • Poligami <p>1.4 Tanggungjawab & Hak Suami dan isteri</p> <p>1.5 Tanggungjawab & Hak Anak</p> <p>1.6 Isu dalam Kekeluargaan</p> <ul style="list-style-type: none"> • Hadhanah • Nafkah • Krisis Rumahtangga
Minggu 3	<p>2.0 Institusi Kemasyarakatan</p> <p>2.1 Konsep Masyarakat</p> <ul style="list-style-type: none"> • Asas Pembentukan Kemasyarakatan • Pembentukan Masyarakat Madinah di Zaman Rasulullah SAW. <p>2.2 Tanggungjawab Kemasyarakatan</p> <ul style="list-style-type: none"> • Jaminan Kemasyarakatan / Hak-hak Asasi dalam Sistem Sosial Islam <p>2.3 Toleransi Dalam Masyarakat Majmuk</p>
Minggu 4	<p>2.4 Isu-isu kemasyarakatan</p> <ul style="list-style-type: none"> • Perkauman • Hak Jiran • Dekadensi Moral <p>3.0 Institusi Pendidikan</p> <p>3.1 Falsafah Pendidikan Islam</p> <ul style="list-style-type: none"> • Konsep Pendidikan • Matlamat Pendidikan • Sumber & Asas Pendidikan Islam <p>3.2 Institusi Pendidikan Islam</p>
Minggu 5	<p>3.3 Metodologi Pendidikan Islam</p> <ul style="list-style-type: none"> • Kaedah Pengajaran Dalam Islam • Metode Pengajaran & Pembelajaran Rasulullah SAW <p>3.4 Adab Menuntut Ilmu</p> <p>3.5 Tanggungjawab Ilmuan</p>
Minggu 6	<p>3.6 Isu-isu Pendidikan Islam</p> <ul style="list-style-type: none"> • Masalah Penguasaan Jawi & Al-Quran. • Keberkesanan Pendidikan Islam dalam Kurikulum Kebangsaan <p>4.0 Institusi Ekonomi</p> <p>4.1 Falsafah Ekonomi Islam</p> <ul style="list-style-type: none"> • Konsep Ekonomi • Sistem Ekonomi Barat • Sistem Ekonomi Islam / Muamalah <p>4.2 Konsep Pemilikan Harta</p>

Week	Topic / Content
Minggu 7 (UJIAN 1)	<p>4.3 Institusi-Institusi Ekonomi Dalam Islam</p> <ul style="list-style-type: none"> • Sistem Perbankan • Insuran (Takaful) • Gadaian (Al-Rahnu) <p>4.4 Isu-isu Ekonomi Islam</p> <ul style="list-style-type: none"> • Budaya Berhutang • Skim Cepat Kaya • Dinar Emas • Perbankan Internet • Spekulasi • Keusahawanan
Minggu 8	Cuti Pertengahan Semester
Minggu 9	<p>5.0 Institusi Perundangan Islam</p> <ul style="list-style-type: none"> • Falsafah Perundangan Islam • Sumber Undang-undang Islam • Matlamat Perundangan Islam • Keistimewaan perundangan Islam • Perbezaan Perundangan Islam dan Barat <p>5.1 Undang-undang Jenayah Islam</p> <ul style="list-style-type: none"> • Hudud • Qisas • Takzir
Minggu 10	<p>1.2 Perundangan Islam di Malaysia</p> <ul style="list-style-type: none"> • Kedudukan Islam dalam Perlembagaan Malaysia • Peranan Majlis & Jabatan Agama Negeri <p>5.3 Isu-isu perundangan Islam</p> <ul style="list-style-type: none"> • Murtad • IFC • Undang-undang Moral
Minggu 11	<p>6.0 Institusi Kehakiman</p> <ul style="list-style-type: none"> • Falsafah & Konsep Kehakiman Islam • Prinsip Kehakiman dalam Islam • Perlantikan Hakim • Persaksian • Syarat-syarat Saksi • Pendakwaan dan Pembuktian / Keterangan
Minggu 12	<p>1.1 Sistem Kehakiman Di Malaysia</p> <ul style="list-style-type: none"> • Mahkamah Syariah dan Bidang Kuasanya • Mahkamah Sivil dan Bidang Kuasanya <p>1.2 Isu-isu Kehakiman</p> <ul style="list-style-type: none"> • Kedudukan Mahkamah Syariah & Mahkamah Sivil • Hakim Syarie Wanita • Kedudukan Hakim Bukan Islam
Minggu 13	<p>7.0 Institusi Penguatkuasaan</p> <p>7.1 Konsep Hisbah</p> <ul style="list-style-type: none"> • Definasi Hisbah • Amar Makruf dan Nahi Munkar • Skop Dan Bidang-Bidang Tugas • Kategori Hisbah • Institusi Hisbah Dalam Islam <p>1.2 Isu-isu Penguatkuasaan</p> <ul style="list-style-type: none"> • Sistem penguatkuasaan di Malaysia • Institusi Berkaitan Penguatkuasaan • Sistem Penjara Dari Perspektif Islam

Week	Topic / Content
Minggu 14	<p>8.0 Institusi Politik</p> <p>8.1 Teori & Falsafah</p> <ul style="list-style-type: none"> • Definisi Politik dan Agama Menurut Perspektif Islam • Kedudukan Politik Dalam Islam • Asas-asas dan Ciri-ciri Politik Islam • Kepentingan Pembentukan Pemerintahan <p>8.2 Institusi Dan Bidang Kuasa Dalam Struktur Pemerintahan Islam</p> <ul style="list-style-type: none"> • Cara Pemilihan Khalifah & Pemerintahan Negara • Syarat-syarat Khalifah & Tanggungjawabnya. <p>1.3 Isu-isu Politik Dalam Islam</p> <ul style="list-style-type: none"> • Sistem Syura • Sistem Demokrasi • Kedaulatan Politik • Campurtangan Eksekutif Dalam Badan Perundangan & Kehakiman. • Hak Asasi.

REFERENCES

1. Abd. al-Monir Yaacob. (1988). *Sejarah Perundangan Islam*. Kuala Lumpur: Dewan Bahasa dan Pustaka.
2. Afzal al-Rahman. (1991). (Terj.). *Doktrin Ekonomi Islam*. Kuala Lumpur: Dewan Bahasa & Pustaka.
3. Hassan Salleh (1992). *Asas Kekeluargaan Islam*. Dewan Bahasa dan Pustaka..
4. Harun Din (1990). *Manusia dan Islam*. Kuala Lumpur: Dewan Bahasa dan Pustaka
5. Hasan Langgulung. (1991). *Asas Pendidikan Islam*. Cet. 1. Kuala Lumpur: Dewan Bahasa Pustaka.
6. Jamaali, Muhammad Faadhil (1984).(Terj.) *Filsafah Pendidikan dalam Al-Quran*. Kelantan: Pustaka Asa Kenali.
7. Mannan, M.A. (1980). *Islamic Economics: Theory and Practice*. Delhi: Idarahi Adabiyat.
8. Mawdudi, Sayed Abul A'la (1984) (Terj). *Khalifah dan Kerajaan*. Bandung: Penerbit Mizan.
9. Mohd Said Ishak. (2000). *Umar Ibn al-Khaththab: Pelaksanaan Hukum Islam*. Johor : Penerbitan UTM.
10. Mustafa Daud. (1993). *Perkahwinan Menurut Islam*. Kuala Lumpur: Utusan Publications and Distributors.
11. Shalaby, Ahmad (1976). (Terj.) *Sejarah Pendidikan Islam*. Singapura: Pustaka Nasional.
12. Syaukah 'Ilyan. (1977). *Qadha' al Mazalim fi al-Islam*. Baghdad: Mathbaa'ah al- Jami'ah.

DISTRIBUTION OF MARKS

No.	Penilaian	Bilangan	% setiap satu	% jumlah
1	Ujian	1	20%	20
2	Tugasan	1	20%	20
3	Pembentangan	1	10%	10
4	Kuiz / E-learning	1	10%	10
5	Peperiksaan Akhir	1	40%	40
	Jumlah Keseluruhan			100

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : A
	Date of issue : 31 st Jan 2013
	Last Amendment : 19 th June 2013
	Edition : 1
	Procedure No. : FKA/PG/RK/SKAA 4143
CONSTRUCTION PLANTS AND EQUIPMENTS SKAA 4143 PRE-REQUISITE : - EQUIVALENCE : SAB 4143 LECTURE HOURS : 3 hours / week	

SYNOPSIS

This course introduces the techniques of applying engineering fundamentals and analyses to the planning, selection and utilisation of construction equipment. In general, the right selection, efficient utilization and cost-effectiveness of major construction operations have significant impacts on the overall cost and duration of construction activities. This course uses concepts from various engineering disciplines such as Engineering Economics, Geotechnical, Mechanical, Structural and Environmental Engineering, among others. At the end of this course, the students should be able to apply engineering fundamentals and analyses to the planning, selection and utilisation of construction equipment. This includes a thorough understanding on the total construction process and how construction equipment should be selected and used to produce the intended quality in the most cost-effective manner.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe and analyse functions, operations, site condition, total cost, power, torque, resistance to motion, traction, gear and rimpull of construction equipment.	PO1				C4	A, T
CO2	Estimate production rates and justify optimum equipment combination and interdependence.	PO1, PO8				C5, LL1	A, T, F
CO3	Evaluate and justify plant stock & budgetary control, plant selection process, safety, acquisition and maintenance.	PO1, PO8				C5, A2, LL2	A, T, P, F
CO4	Organize and revise plant, transportation, hire rate setting and replacement year.	PO1, PO8	CP1	CA1	KP5	C6, A3, LL2	A, T, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	50
	b. Revision	10
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total (SLT)		120

TEACHING METHODOLOGY

1. Conventional lecturing is the main method of delivery.
2. Students will be given sample problems and assignments regularly through out the semester.
3. Students will also be assessed in tests and a project.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction & Cost Overview
	2	
	3	
2	4	Basic Components & Earthmoving Fundamentals
	5	
	6	
3	7	Dozers, Rippers, Loaders & Haulers
	8	
	9	
4	10	Excavators, Scrapers & Compactors
	11	
	12	
5	13	Decision-Making in Plant Selection [Test 1]
	14	
	15	
6	16	Pump Selection Process & Construction Plant Safety
	17	
	18	
7	19	Plant Acquisition & Maintenance
	20	
	21	
8		MID SEMESTER BREAK
9	22	Stock & Budgetary Controls
	23	
	24	
10	25	Pile-Driving Equipment
	26	
	27	
11	28	Techniques in Crane Selection - Analytical Hierarchy Process (AHP)
	29	
	30	

Week	Lecture	Topic / Content
12	31 32 33	Intelligent Earthwork System
13	34 35 36	Plant Transportation
14	37 38 39	Plant Hire Rate Setting
15	40 41 42	Plant Replacement Year [Test 2]
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Peurifoy, R.L. and Schexnayder, C.J., Construction Planning, Equipment, and Methods. McGraw Hill, 2002.
2. Peurifoy, R.L., Ledbetter, W., and Schexnayder, C.J., Construction Planning, Equipment, and Methods. McGraw Hill, 1996.
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10. Harris, F and McCaffer, R., Construction Plant., Granada ,1996.
11. Harris, F and McCaffer, R., Modern Construction Management., Granada ,1996.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total
1.	Assignment and generic skill			15
2.	Project	1	15	15
2.	Test	2	10	20
3.	Final Exam and generic skill	1	50	50
Overall Total				100

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation:-
Students must attend not less than 80% of lecture hours as required for the subject. Students will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given for the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Shaiful Amri Mansur	shaifulamri@utm.my	M46-315	607-5531636
2.	Assoc. Prof. Aziruddin Ressang	aziruddin_r@hotmail.com	C09-207	607-5532079

 UTM UNIVERSITI TEKNOLOGI MALAYSIA <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 25 th February 2011
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 4163
CONCRETE TECHNOLOGY SKAA 4163 PRE-REQUISITE : EQUIVALENCE : SAM 5163 LECTURE HOURS : 3 hours / week		

SYNOPSIS

This course is designed to introduce students and enhance their knowledge on concrete technology. It will emphasize on the rheology of fresh concrete, the various design of concrete mixes, the different types and properties of cement replacement materials, special concretes which include fibre reinforced concrete, high strength concrete, lightweight aggregate concrete, and polymer concrete. Other topics that will be covered include concrete deformations, durability of concrete, and repair of concrete structures due to various causes of deterioration. At the end of the course students should be able to identify, discuss and apply the materials and technology available in producing good concrete that is suitable for different applications.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Design and modify concrete mix and explain its principles according to DoE method	PO1			KP4	C3, P2, A3	T, F
CO2	Discuss in writing concrete deformation and deterioration of concrete.	PO1				C2, P2, A2	T, F
CO3	Describe and discuss in writing special concretes and point out their application in practice.	PO1				C4, P3, A3	T, F
CO4	Analyze and select an effective repair methods to the deteriorated concrete.	PO1			KP3	C6, P4, A3	T, F
CO5	Find up-to-date information relating to the subject.	PO8				LL1, LL3	A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	Lecturer-Centered Learning	
	i. Lecture	42
	Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40
	Revision	20
	Assessment Preparations	12

3.	Formal Assessment	
	Continuous Assessment	3
	Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

Lectures

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to concrete mix design.
	2	Concept and background information.
	3	Design process and trial mixes.
2	4	Concrete mix design examples.
	5	Modification to the mix design method for air entrainment and pfa/ggbfs mixes.
	6	(cont.)
3	7	Concrete mix design exercise.
	8	Rheology of concrete: Introduction.
	9	Bingham model.
4	10	Workability measurement and flow concrete.
	11	Concrete Deformation : Introduction.
	12	Elastic deformation and creep.
5	13	Shrinkage.
	14	Durability of Concrete : Introduction.
	15	Chemical Attack.
6	16	Alkali Silica Reaction (ASR) / Alkali Aggregate Reaction (AAR)/ Effect of ASR / AAR on
	17	durability of concrete (cont.)
	18	[TEST 1]
7	19	Abrasion / weathering effect on durability of concrete.
	20	Corrosion of steel reinforcement.
	21	Design for durable concrete.
8		MID SEMESTER BREAK
9	22	Special Concrete: Cement Replacement materials.
	23	pfa, ggbfs, RHA.
	24	[cont.]
10	25	(Cont.) / silica fume, Palm Oil Fuel Ash (POFA).
	26	Lightweight concrete (LWC).
	27	Types and application of LWC.
11	28	High strength concrete – Introduction.
	29	Design for high strength concrete (HSC).
	30	Application of HSC.
12	31	Fibre Reinforced Concrete (FRC).
	32	Types of FRC.
	33	Application of FRC.
13	34	Ferrocement.
	35	Application of ferrocement in construction industry.
	36	[TEST 2]

Week	Lecture	Topic / Content
14	37 38 39	Introduction to repair of concrete structures. Causes of deterioration. (Cont.)
15	40 41 42	Types of concrete deterioration. Diagnosis and methods of structural assessment. Repair techniques.
16-19		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. A.M. Neville, "Properties of Concrete", Pitman Publishing, 1995.
2. A. Bentur and S. Mindness, "Fibre Reinforced Cementitious Composites", Elsevier Applied Science, London, 1990.
3. B.K. Paul & B.P. Pama, "Ferrocement", IFIC Bangkok Thailand.
4. Design of Normal Concrete Mixes, Department of the Environment, Building Research Establishment Report, 1988.
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6. M. L. Gambhir, "Concrete Technology", Third Edition, Tata McGraw Hill, 2004.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Dates/Weeks
1.	Assignments	2	10	20	Week 7 and 14
4.	Test 1	1	15	15	Week 6
5.	Test 2	1	15	15	Week 13
6.	Final Exam	1	50	50	Week 17-19
				100%	

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ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Prof. Ir. Dr. Mohd. Warid Hussin	warid@fka.utm.my	M46-356	31607
2.	Prof. Dr. Salihuddin Radin Sumadi	radin@fka.utm.my	M46-313	31590
3.	Assoc. Prof. Dr. Abdul Rahman Mohd. Sam	abdrahman@utm.my	M46-353	31601
4.	Assoc. Prof. Dr. Ahmad Mahir Makhtar	amahir@utm.my	M46-334	31619
5.	Prof. Dr. Mohammad Ismail	mohammad@utm.my	C09-313	31688

 <b style="font-size: 2em; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : F Date of issue : 1 st June 2003 Last Amendment : 10 th June 2009 Edition : 3 Procedure No. : FKA/PG/RK/SAB 4203
STRUCTURAL DYNAMICS AND INSTABILITY SAB 4203	
PRE-REQUISITE : SAB 3243 – Theory of Structures, SAB 4223 – Structural Analysis EQUIVALENCE : LECTURE HOURS : 3 hours / week	

SYNOPSIS

This is an elective subject that is offered to final year students. This structural dynamics covers introduction, natural frequency, single degree of freedom, multi-degree of freedom system, Eigenvalues and Eigenvectors, free vibration response. Structural instability covers concept, simple model, Euler column instability, stability functions, Bolton Method and Horne Method. At the end of the course the students should be able to solve numerous problems which involves dynamics and instability. The students will also be able to develop and master the skills of reducing any problems from its physical description to a model or symbolic representative to which the principles may be applied.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Able to recognise various types of structural elements and simplify to one degree of freedom model equation of motion	PO1				C2	T, Q, F
CO2	Able to understand the concepts of response to dynamic forces to the sdof models and perform analysis	PO1				C4	T, Q, F
CO3	Able to analyse MDOF structures frequencies and interpret mode shapes	PO1				C4	T, Pr, F
CO4	Able to formulate the buckling loads of columns with different end conditions and beam-columns with different types of loads	PO1				C5	T, Q, F
CO5	Able to use the stability functions in the analysis to find the critical load of frames and truss members.	PO1				C4	T, Q, F
CO6	Prepare a report based on the dynamic analysis of MDOF buildings and construct their mode shapes by using computer tools.	PO4	CP2	CA2	KP2	CTPS3, P3, A4	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT (hours)
1.	Lecture	39
1.	Lecture	39
2.	Guided Tutorial	
2.	Independent Study - self learning - information search - library search - reading	35

3.	Assignment - self learning - group discussion	8
4.	Project - information search - library search - group discussion - report writing	28
5.	Tests and preparation for the test	9
6.	Exam and preparation for the exam	6
Total Student Learning Time (SLT)		125

TEACHING METHODOLOGY

1. Basic concepts in structural modeling, from various loads and structures to simple idealised models.
2. Basic fundamental theories on the dynamics and behaviour of simple structures .
3. Basic concepts in stability and buckling loads.
4. Students are required to go through the given assignments
5. Students will require to produce a group project with reports.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Equations of motion, problem statement and solution methods
	2	- simple structures
	3	- single degree of freedom system - force-displacement relation - damping force - equation of motion : external force - mass-spring-damper system - problem statement and element forces - combining static and dynamic responses - methods of solution of the differential equation Free Vibration - undamped free vibration - viscously damped free vibration
2	4	Response to Harmonic and Periodic Excitations
	5	- Viscous Damped System: Harmonic Vibration of undamped system Harmonic Vibration with viscous damping
	6	- Viscously Damped System: Response to vibration generator natural frequency and damping from harmonic tests
3	7	Response to Arbitrarily Time-Varying Forces
	8	- Response to unit impulse
	9	- Response to arbitrary force Response to Step and Ramp forces - Step force - Ramp or linearly increasing force - Step force with finite rise time

Week	Lecture	Topic / Content
4	10 11 12	Response to pulse excitations - Solution methods - Rectangular pulse force - Half-cycle sine pulse force - Symmetrical triangular pulse force - Effects of pulse shape and approximate analysis for short pulses - Effects of viscous damping - Response to ground motion
5	13 14 15	Generalised single-degree-of-freedom systems - Generalized SDOF systems - Rigid-body assemblages - Systems with distributed mass and elasticity - Lumped-mass system : Shear Buildings
6	16 17 18	Multi-degree-of-freedom systems Equations of motion, problem statement and solution - Simple system : two-storey shear building - General approach to linear systems - Static condensation - Planar or symmetric-plane systems : Ground Motion - Inelastic systems - Problem statement - Element forces - Methods for solving the equations of motion : Overview Free Vibration : natural vibration frequencies and modes - Systems without damping - Natural vibration frequencies and modes - Modal and spectral matrices - Orthogonality of modes - Interpretation of modal orthogonality - Normalization of modes - Modal expansion of displacements
7	19 20 21	Free Vibration Response - Solution of free vibration equations : undamped systems - Free vibration of systems with damping - Solution of free vibration equations Two-degree-of-freedom systems - Analysis of two-dof systems without damping - Vibration absorber or tuned mass damper Modal Analysis - Modal equations for undamped systems - Modal equations for damped systems - Displacement response - Element forces Test 1
8		MID SEMESTER BREAK
9	22 23 24	Structural Instability Introduction, Definition of column, beam and beam-column Buckling loads of axially loaded members (columns) with different end conditions: hinged-hinged strut, fixed-free cantilever strut, fixed-hinged strut, struts with elastic supports, framed columns. Concept of effective length.
10	25 26 27	Stability Analysis of Beam-column. Derivation of basic equation, analysis of beam-columns: beam-column with concentrated loads, beam-column with an interior moment, beam-column subjected to end moments.
11	28 29 30	Stability analysis of frames. Difference of slope-deflection equation and stability function equation. Introduction to stability function function: s , c , m . Elastic critical load for frames.

Week	Lecture	Topic / Content
12	31 32 33	Introduction of functions: n, o . Computation of elastic critical loads of frames by using functions n, o . Approximate methods to compute elastic critical load for non-sway and sway frame.
13	34 35 36	Application of stability analysis of frames in steel and concrete design.
14	37 38 39	Elastic Critical Loads of rigidly connected truss Test 2
15	40 41 42	Project Discussion and Presentation on the Application of Stability to Structures
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. P.A. Kirby, D.A. Nethercot, "Design for Structural Stability", Chapman and Hall, 1979
2. A.K. Chopra, Dynamics of Structures, Prentice Hall, 1995
3. M.R.Horne, W.Merchant, "The Stability of Frames", 1965
4. The Structural Use of Steelwork in Buildings; Code of Practice for Design of Simple and Continuous Construction, British Standard 5950, Part 1:(1985)
5. R.C. Coates, M.G. Coutie, F.K. Kong, "Structural Analysis", , 1980
6. Mario Paz, Structural Dynamics, Theory and Computation, Terjemahan Penerbit UTM, 1996
7. Nethercot, D.A, Limit State Design of Structural Steelwork, Van Nostrand Reinhold(UK), 1986
8. Gambhir, M.L. , Stability Analysis and Design of Structures, Springer, 2004

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Essay or report writing	5	10	50	
2.	Presentation (individual)	1	10	10	
3.	Group competition and teamwork	1	40	40	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: B
	Date of issue	: 15 th July 2010
	Last Amendment	: 25 th April 2011
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA 4233
OFFSHORE STRUCTURESSKAA 4233 PRE-REQUISITE : SKAA 3243 (Theory of Structures) SKAA 3352 (Reinforced Concrete Design 1) SKAA 3233 (Design of Steel and Timber Structures) EQUIVALENCE : SAB 4233 (Offshore Structures) LECTURE HOURS : 3hours / week		

SYNOPSIS

This course emphasizes on the overview of offshore structural engineering related to oil and gas industry by covering vast amount of fundamental topics such as Front-end engineering design (FEED), Environmental loads, Response of Structures to environmental loading, Analysis and Design of Offshore Steel platforms, Analysis and Design of Offshore Topsides Modules, Construction of Steel Platforms, Load-out, installation, hook-up and commissioning of offshore structures, Inspection, repair and Maintenance, Structural assessment of existing structures as well as removal of disused structures

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Recognize and identify the engineering fundamentals of offshore structures and all relevant aspects pertaining to design and analysis.	PO1			K4	C1	T, F, A
CO2	Relate the theoretical aspects of environmental loading with the reliability of offshore structures during its designed lifetime.	PO1			K4	C2	T, F
CO3	Develop relationships between the fabrication, transportation and installation activities, and comprehend the sequence of offshore structures construction.	PO1			K4	C3,C4	T, F
CO4	Identify the differences in terms of engineering requirements and basis of design between land-based and offshore structures.	PO1			K4	C5	T, F, PR, A
CO5	Organize, form and demonstrate team working element effectively and creatively in a team within available resources.	PO7	CP1	CA2	K6	C6	PR, Pr, A

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	14
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	29
	b. Revision	20
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Analysis and Design philosophies related to offshore structures will be demonstrated.
2. Students are required to write reports and/or discussed an on-going or completed offshore construction and installation project after attending site visit program (optional)
3. Students are required to find extra reading materials to equip themselves with sufficient knowledge for group project.
4. Students are required to produce individual creative assignment and platform design project in group.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to Offshore Structural Engineering
	2	Categories and Selection of Offshore Structures
	3	Subsea Engineering & Deepwater Technology
2	4	Philosophy of Analysis and Design of Structures
	5	Analysis and Design Criteria
	6	Structural Conceptual & Front End Engineering Design (FEED)
3	7	Environmental Loads - Wind Load, Seabed movement
	8	Environmental Loads – Temperature, wave, marine growth
	9	Environmental Loads – Current, tide, earthquake, ice & snow
4	10	Introduction to Wave Theories
	11	Wave Linear Airy Theory – Particle Velocity and Acceleration
	12	Morrison Equation
5	13	Dead Load and Live Load
	14	Fabrication and Installation load
	15	Load combinations
6	16	Limit State Design Philosophy
	17	Loading-Resistance Interference
	18	TEST

Week	Lecture	Topic / Content
7	19	Steel Materials – Introduction
	20	Steel Fracture Toughness & Through-Thickness ductility
	21	Structural In-place and Dynamic Analysis
8		MID SEMESTER BREAK
8	22	Joint Design
	23	Introduction to Deck Modules (Superstructure)
	24	Deck Flooring Design
9	25	Fabrication of Steel Structures
	26	Procedures and Design of Loading out
	27	Transportation of Modules
10	28	Introduction to Platform Installation
	29	Jacket Launching and Upending
	30	Piling Design and Installation
11	31	Introduction to Pipelines
	32	Pipelines Lay Methods
	33	Pipelines Inspection and maintenance
12	34	Risk-based Inspection
	35	Repair Work Offshore
	36	Maintenance Work Offshore
13	37	Introduction to Platform Removal and Decommissioning
	38	Removal and Decommissioning Techniques & Issues
	39	Introduction to Port and Jetties
14	40	Projects on Offshore Structures
	41	Projects on Offshore Structures (cont)
	42	Projects on Offshore Structures (cont)
15	43	Project presentation/report
	44	Project presentation/report (cont)
	45	Project presentation/report (cont)
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Dawson, T. "Offshore Structural Engineering" Prentice Hall, 1982
2. Dean, R.G., Dalrymple, R.A. "Water Wave Mechanics for Engineers and Scientists", Prentice-Hall, 1985
3. Gerwick, B.C. "Construction of Offshore Structures", John Wiley & Sons, 1986.
4. API, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms, American Petroleum Institute Publication RP2A Dallas, 1985.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Essay or report writing	5	10	50	
2.	Presentation (individual)	1	10	10	
3.	Group competition and teamwork	1	40	40	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Norhazilan Md Noor	norhazilan@utm.my	C09-329	31626
2.	Assoc. Prof. Dr. Nordin Yahaya	nordiny@utm.my	M46-344	31595

 <p>UTM UNIVERSITI TEKNOLOGI MALAYSIA</p> <p>Faculty of Civil Engineering</p>	Revision	: B
	Date of issue	: 20 th February 2013
	Last Amendment	:
	Edition	: 2
	Procedure No.	: FKA/PG/RK/SKAA 4243
FINITE ELEMENT FOR STRUCTURAL ANALYSIS SKAA 4243		
PRE-REQUISITE	: SAB 4223 (Structural Analysis) SAB 4243, MAE 1143	
EQUIVALENCE	:	
LECTURE HOURS	: 3 hours / week	

SYNOPSIS

This course is developed to expose students to the fundamental theory and application of the finite element method. The course covers linear analyses for displacements and stresses in continuum structures. Formulation of stiffness matrices for one-dimensional elements, beams, plane stress and plane strain are presented in detail. Grillage, plate bending, shell, Axisymmetric and solid elements are also discussed. Isoparametric formulation is emphasized. Use of finite element software for modeling and analysis is also emphasized. At the end of the course, students should be able to apply the finite element method by hand calculation for simple problems. For more complicated problems, the students should be able to create finite element model, choose correct elements, analyze and interpret results using Finite Element software. Students also should be able to analyze practical problems by implementation through final project and make class presentation to demonstrate their understanding about the course materials

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Perform structural analysis for framed structures using stiffness matrix method.	PO2			KP2	C3, A2	A, T, F
CO2	Formulate element stiffness, system stiffness and loading vector using energy method and perform analysis by hand calculation. The element types include bar, beam, plane stress and plane strain.	PO2			KP3	C5, A4	A, T, F
CO3	Use general purpose finite element software to analyze various civil engineering structures which include the use of common type elements such as truss, beam and frame, grillage, plane stress, plane strain, plate, shell, and axisymmetric.	PO2	CP2	CA1	KP6	C4, P4, A4	A
CO4	Develop finite element models for realistic and complex structural engineering problems using finite element software, perform analysis, interpret, verify and control result accuracy	PO4	CP2	CA1	KP6	C6, P5, A5, CTPS1, CTPS2, CTPS3	P
CO5	Deliver effective and convincing presentation on the Finite Element analysis of complex engineering problem	PO5	CP3	CA2			Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	20
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	27
	b. Revision	10
	c. Assessment Preparations	14
3.	Formal Assessment	
	a. Continuous Assessment	4
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lecture
2. Laboratory/hands on training
3. Assignment project

WEEKLY SCHEDULE

1	1, 2	Review of the matrix stiffness method: 2D truss
2	3, 4	Review of the matrix stiffness method: beam and 2D frame Software application and demonstration
3	5, 6	Introduction to the FE procedures. Fundamental concept, Equation of equilibrium, stress-strain relations, strain-displacement relations. Principle of minimum potential energy, Galerkin's method, variational method to derive stiffness and equilibrium equation.
4	7, 8	One-dimensional element: 2-node element
5	9, 10	One-dimensional element: 2-node element, isoparametric formulation
6	11, 12	One-dimensional element: 3-node element, isoparametric formulation, Lagrange interpolation
7	13, 14	Beam element: Bernoulli/Engineering beam
8		MID SEMESTER BREAK
9	15, 16	Beam with shear deformation, Mindlin and Timoshenko beams. Software application and demonstration.
10	17, 18	Introduction to two-dimensional stress analysis: Plane stress and plane strain. Triangular element, isoparametric formulation.

1	1, 2	Review of the matrix stiffness method: 2D truss
11	19, 20	Quadrilateral element: Isoparametric formulation, coordinate mapping. Numerical integration: Newton-Cotes and Gauss quadrature.
12	21, 22	Quadrilateral element: Stress interpolation. Software application and demonstration.
13	23, 24	Modeling issue, convergence of solution, result interpretation. Software application and demonstration.
14	25, 26	Behavior of plate bending element, shell and membrane elements, and axisymmetric element. Application using software.
15	27, 28	Three-dimensional problems in stress analysis: Tetrahedral and Hexahedral elements.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Chandrupatla and Belegundu (2002). Introduction to finite element in engineering, Prentice Hall
2. Logan, D. L. (2002). A first course in the finite element method, 3rd Edition. Thomson.
3. Hutton, David V. (2004). Fundamentals of finite element analysis, 1st. Edition. McGraw Hill
4. Carroll, W. F. (1999). A Primer for Finite Elements in Elastic Structures, John Wiley & Sons, Inc.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	5	4	20	
2.	Projects	1	15	15	
3.	Quizzes	-			
4.	Presentation	1	5	5	
5.	Test	2	10	20	
6.	Final Exam	1	40	40	
Overall Total				100 %	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Redzuan Abdullah	redzuan@utm.my	M47-122	07-5538654
2.	Dr. Ahmad Kueh Beng Hong	kbahmad@utm.my	C09-229	017-8980788

 <b style="font-size: 2em;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : G Date of issue : 1 st June 2003 Last Amendment : 28 th Feb 2013 Edition : 4 Procedure No. : FKA/PG/RK/SAB 4263
STRUCTURAL WIND AND EARTHQUAKE ENGINEERING SAB 4263 SAM 5263 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 2 hours / week	

SYNOPSIS

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Ability to analyse and design of buildings for wind.	PO1			KP 2	L1	T, A, F
CO2	Ability to analyse and design of buildings for earthquake.	P01, P02, P03			KP 3	L4	A, F
CO3	Ability to Produce response spectra curves of an earthquake.	P01, P02, P03, P04(2)			KP 3	L4	A, F
CO4	Ability to understand performance and behaviour of buildings under earthquake and wind loadings using existing software: SAP2000.	P01, P02, P03, P04(2), P08(1)	CP 2	CA 1		L5	P

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Lecture	42
2.	Independent Study - self learning - information search - library search - reading - group discussion	20
3.	Assignment (5x) - self learning - group discussion	20
4.	Project - information search - library search - group discussion - report writing	20
5.	Presentation - preparation - group discussion	5

No.	Teaching and Learning Activities	SLT* (hours)
6.	Test and preparation for the test	8
7.	Exam and preparation for the exam	15
Total Student Learning Time* (SLT)		130

TEACHING METHODOLOGY

1. Lecture and Hands-on
2. Co-operative Learning
3. Assignment
4. Project
5. Presentation

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction to structural design from dynamic effect.
	2	Importance of dynamic effect.
	3	Dynamic loading effect.
2	4	Introduction to design for wind load.
	5	Wind characteristics.
	6	Structural static and dynamic effect due to wind. Assignment 1
3	7	Design code usage.
	8	Wind load on structure.
	9	Types of structure involved. Assignment 2
4	10	Analysis for building base on code.
	11	Wind pressure distribution.
	12	Analysis base on distribution. Assignment 3
5	13	Wind design procedure (UBC)
	14	Wind analysis (UBC)
	15	Wind example(UBC)
6	16	Dynamic wind load
	17	IBC design code
	18	Wind design method
7	19	Wind design procedure (IBC)
	20	Wind example (IBC)
	21	Test #1.
8		MID SEMESTER BREAK
9	22	Wind vs earthquake design
	23	Introduction to structural dynamic
	24	Equation of motion
10	25	Single degree of freedom structure
	26	Response Spectrum
	27	Example
11	28	Multi degree of freedom structure
	29	Analysis procedure
	30	example
12	31	Introduction to Earthquake Resistant Design
	32	Building types
	33	Design concepts Assignment 4

Week	Lecture	Topic / Content
13	34 35 36	Introduction to IBC 2000 Design procedure Example Assignment 5
14	37 38 39	Introduction to Eurocode 8 Design requirement and base shear Design procedure and lateral load distribution
15	40 41 42	Presentation part 1 Presentation part 2 Presentation part 3
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Ghosh, S.K. and Domel, A.W., Design of Concrete Buildings for Earthquake and Wind Forces, Portland Cement Association, Skokie, Illinois, 1992
2. Chopra, A.K., Dynamics of Structures, Prentice Hall, Eagle Wood Cliffs, NJ, 1995.
3. Naeim, F. (Editor), The Seismic Design Handbook, van Nostrand Reinhold, New York, NY, 1989.
Newmark, N.M. and Rosenblueth, E., 'Fundamentals of Earthquake Engineering', Prentice Hall, Eagle Wood Cliffs, NJ, 1971.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	5	3	15	Week 2, 3, 4, 12 & 13
2.	Test	1	15	20	Week 7
3.	Project	1	15	20	Week 15
4.	Presentation	1	5	5	Week 15
5.	Final Exam	1	50	40	Week 17-18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1			
2			
3			

 <b style="font-size: 24px; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : G Date of issue : 17 th July 2010 Last Amendment : 24 th April 2012 Procedure No. : FKA/PG/RK/SKAA 4313
ADVANCED REINFORCED CONCRETE DESIGN SKAA 4313 PRE-REQUISITE : SKAA 4333 (Reinforced Concrete Design 2) EQUIVALENCE : LECTURE HOURS : 3 hours / week	

SYNOPSIS

This is elective course which will provide extra knowledge on the aspect of design of reinforced concrete structural elements. As a continuation to the Reinforced Concrete Design 1 and 2, the topics discussed are analysis and design of ribbed, waffle and flat slabs, water retaining structures, shear walls, corbel and nibs. Furthermore students will be exposed to the methods of deflection calculation, design of elements for torsion and design of raft foundations

COURSE LEARNING OUTCOMES

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

No.	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Analyze and design reinforced concrete ribbed, waffle and flat slabs, shear walls, corbels, nibs and torsion elements.	PO3			KP4	C5, P3	A, T, F
CO2	Analyze and design of reinforced concrete water retaining structures, raft foundations and perform deflection calculation.				KP4	C5, P3	A, Pr, F
CO3	Develop want to know mind and knowledge, and acquire & manage relevant information from various sources.	PO8	CP5	CA5	KP8	C5, A4	A, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	28
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial / Practical	5
	ii. Student-centered learning activities – Active Learning, Project Based Learning	28
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	3
	b. Revision	5
	c. Assessment Preparations	20
3.	Formal Assessment	
	a. Continuous Assessment	21
	b. Final Exam	10
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed design project.
3. Students are required to go through the given tutorials.
4. Students are required to produce design project in group.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content	
1 06.10.12	1 2 3	Introduction and Revision	
		- Introduction	
		- Design procedure	
	4 5 6 7		- Ultimate limit state & Serviceability limit state
			Design of Ribbed, Waffle and Flat Slabs
			- Introduction
			- Design requirements : Ribbed and waffle slabs
2 07.10.12	8 9 10	- Design example – ribbed slabs	
		- Detailing of ribbed slab	
		- Design requirements – flat slab	
	11 12		- Design example – waffle slabs
			- Detailing of Waffle slab
	3 10.11.12	13 14 15	- Design requirements – flat slab
			- Design example – flat slab
- Detailing			
16 17 18			Design of Corbel and Nib
			- Introduction & general design considerations
4 11.11.12	19 20 21	- Design example - corbel	
		- Design example - nib	
		Design of Water Retaining Structures	
	22 23 24		- Introduction and design basis
			- Crack width calculation – thermal & direct tension
			- Crack width calculation – flexural tension
5 15.12.12	25 26 27	- Crack width calculation – combined flexural & direct tension	
		- Circular tanks : structural behaviour	
		- Design example	
	28 29 30 31		- Rectangular tanks : Structural behaviour
			- Design example
			- Detailing
			Calculation of Deflection
6 16.12.12	32 33 34	- Introduction, load-deflection behavior, calculation methods	
		- Calculation of curvature – cracked section	
		- Calculation of curvature – uncracked section	
	35 36 37		- Short term deflection
			- Long term deflection – approximate method
			- Long term deflection – exact method
7 24.12.12 – 20.01.13	38 39 40	Design of Shear Walls	
		- Introduction & general design requirements	
		- Reinforced concrete walls	
	41 42		- Design example
			- Plain concrete walls : design requirements
	43 44 45 46		- Design example
			- TEST 1
Design for Torsion			
- Introduction & general design requirements			
47 48 49		- Design examples	
		- Detailing	
		Design of Raft Foundation	
50 51 52		- Introduction	
		- General design consideration	
		- Design example	
24.12.12 – 20.01.13		REVISION WEEK AND FINAL EXAMINATION	

REFERENCES

1. STANDARDS MALAYSIA. MS EN 1990: *Eurocode: Basis of structural design*. MS, 2010
1a. *Malaysia National Annex to Eurocode*. MS, 2010
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2a. *Malaysia National Annex to Eurocode 1*. MS, 2010
3. STANDARDS MALAYSIA. MS EN 1992: *Eurocode 2-Part 1-1: Design of concrete structures- General rules and rules for buildings*, MS, 2010
3a. *Malaysia National Annex to Eurocode 2*. MS, 2010
4. Mosley, B,Bungey, J.&Hulse, R. *Reinforced Concrete Design to Eurocode 2*, 7th. Edition. Palgrave McMillan, 2012
5. The Institution of Structural Engineers/The Concrete Centre/BCA, *Manual for the design of concrete building structures to Eurocode 2*, IStructE, 2006
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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	5	3	15	
2.	Project	1	15	15	
3.	Test	1	20	20	
4.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation. Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Dr. Ramli Abdullah	ramlia@utm.my	M46-338	31585
2.	Ir. MohamadSallehYassin	salleh@utm.my	M46-233	31603
3.	Ir. Azhar Ahmad	azhara@utm.my	M46-359	31623
4.	Assoc. Prof. Dr. Abd. LatifSaleh	alatif@utm.my	C09-210	31505

 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: G
	Date of issue	: 1st June 2003
	Last Amendment	: 7th February 2013
	Edition	: 4
	Procedure No.	: FKA/PG/RK/SAB 4323
DESIGN OF PRESTRESSED CONCRETE SAB 4323 PRE-REQUISITE : SAB 3353, SAM 5323 EQUIVALENCE : LECTURE HOURS : 3 hours / week		

SYNOPSIS

This is an elective subject, which will provide students an understanding and ability to analyse and design prestressed concrete structural elements. Topics discussed include the concept and principles of prestressing, methods of prestressing concrete, stress limits, losses of prestress, selection of section, serviceability and strength requirements. Students will also be exposed to the complete analysis and design procedure of simply supported prestressed concrete non-composite and composite beams, and design principles of continuous beams.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe the concept and philosophy of prestressed concrete design	PO1			KP2	C1	P, T, F
CO2	Describe and define the requirements and procedure for the design of prestressed concrete structural elements.	PO1	CP5	CA1	KP3	C1, A2	P, T, F
CO3	Analyse and design prestressed concrete elements according to the relevant code of practise.	PO2, PO3	CP5	CA1	KP4	C4, P4, A4	P, T, F
CO4	Produce structural design report and detailed drawings.	PO2, PO3			KP5 KP6	C5, P4, A4	P, Pr
CO5.	Organise the project in a team producing a design report within a stipulated time frame.	PO7				TS1, TS2	P, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	39
	b. Student-Centered Learning (SCL)	
	i. Project Presentation/ Tutorial	3
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40
	b. Revision	20
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Concept and principle of prestressed concrete will be demonstrated.
2. Method of analysis and design procedure of prestressed concrete structural elements will be demonstrated.
3. Students will be required to write reports and/or discussed an on-going or completed prestressed concrete design project.
4. Students are required to go through the given assignments.
5. Students will be required to produce complete design project report in group.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction – Basic concept of prestressing, prestressing methods, materials. – Facilities, equipments and hardware, reinforced vs. prestressed concrete – BS 8110 design considerations.
	2	
	3	
2	4	Elastic analysis of sections for flexure – Section properties, sign convention, example. – Stresses in concrete due to prestress and external loads, cracking moment, example. – Loads and loading stages, critical loadings, stresses at critical loadings, example
	5	
	6	
3	7	Preliminary design for flexure – Stress range at a section, permissible stresses and inequality conditions, selection of sections. – Graphical interpretation of inequality conditions. – Determination of prestressing force and eccentricity.
	8	
	9	
4	10	– Detailing of sections, design example. – Design of deflected tendons, example – Design of debonded tendons, example
	11	
	12	
5	13	Losses of prestress – Sources of prestress loss, immediate and deferred losses. – Estimation of prestress losses: friction, anchorage slip, elastic shortening of concrete. – Creep and shrinkage of concrete and relaxation of steel
	14	
	15	

6	16 17 18	<p>Deflection</p> <ul style="list-style-type: none"> – Deflection of prestressed concrete beams, short-term deflection – Calculation of long-term deflection – Example
7	19 20 21	<p>Design for ultimate strength in flexure</p> <ul style="list-style-type: none"> – Analysis of sections at collapse, use of non-prestressed reinforcement, design considerations. – Design example – Test 1
8		MID SEMESTER BREAK
9	22 23 24	<p>Design for shear</p> <ul style="list-style-type: none"> – Overload behaviour of beams in combined bending and shear, benefits of prestressing – Shear resistance of uncracked & cracked sections – Design example
10	25 26 27	<p>Design of anchorage zone</p> <ul style="list-style-type: none"> – Anchorage zone for pre-tensioned and post tensioned members, transmission length – End block for post-tensioned members – Examples
11	28 29 30	<p>Composite beams</p> <ul style="list-style-type: none"> – Composite construction, advantages, design differences. – Stages of loading, unshored and shored construction. – Stress range and inequality conditions.
12	31 32 33	<ul style="list-style-type: none"> – Determination of prestressing force and eccentricity. – Design example – Design for horizontal shear.
13	34 35 36	<p>Design of continuous beams</p> <ul style="list-style-type: none"> – Introduction – Advantages of continuity – Tendon profiles
14	37 38 39	<ul style="list-style-type: none"> – Linear transformation and concordancy. – Example – Test 2
15	40 41 42	<p>Presentation of Design Project.</p>
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. BS EN 1992-1-1:2004: "Eurocode 2: Design of concrete structures", BSI, 2004
2. BS EN 206-1:2000: "Concrete Specification, performance, production and conformity", BSI, 2000
3. Bratt, P., "Prestressed Concrete Design To Eurocodes", Spoon Press, 2011.
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6. M.K Hurst, Pre-stressed Concrete Design, E&FN Spon, 1998
7. Lin, T.Y. and Burns, N.H., "Design of Prestressed Concrete Structures", 3rd Ed, John Wiley & Sons, 1981
8. A.E. Naaman, Prestressed Concrete Analysis and Design Fundamentals, 2nd Ed., Techno Press 3000, 2004

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test 1	1	10	10	
2.	Test 2	1	10	10	
3.	Assignments	2	5	10	
4.	Project	1	20	20	
5.	Final Exam	1	50	50	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Baderul Hisham Ahmad	baderul@utm.my	C09-218	31638
2.	Dr. Roslli Noor Mohamed	roslli@utm.my	M50-106	38683

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1st June 2003
	Last Amendment	: 21st February 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 4523
COASTAL ENGINEERING SKAA 4523 PRE-REQUISITE : SKAA 2513 / SAM 3513 (Hydraulics) EQUIVALENCE : SAM 5523 LECTURE HOURS : 3 hours / week		

SYNOPSIS

The course covers theoretical and fundamental principles of coastal hydrodynamics and processes. It gives background knowledge of the various hydrodynamic parameters acting in the coastal region due to waves, tides and currents. Sediment transport mechanism in the littoral zone leading to the understanding of coastal morphology, erosion and accretion processes are described. Underlying principles of coastal engineering works, coastal erosion management and implications from implementing coastal structures in the coastal environment are delivered. Emphasis in solving and tackling coastal engineering problems adopts the use of established analytical techniques. The application of state-of-the-art computational techniques as a tool in several aspects of coastal engineering and management works are introduced. At the end of the course, students should be able to describe and analyse the various coastal processes and the effect of these forces on the coastal zone. The students should be able to quantify coastal environmental parameters. They should also be capable of proposing methods to manage and control the coastal processes when applied to solve coastal engineering problems.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assesm. Methods
CO1	Define the coastal area and explain the types, functions, objectives and impacts of several types of coastal engineering structures used in coastal engineering works.	PO1			KP1	C2, P1, A2	Q, A, F
CO2	Explain the theories and mechanisms of each coastal environmental parameters, compute the mathematical characteristics of each parameter and calculate their design values using several analytical techniques.	PO4	CP2	CA2	KP4	C3, P1, A2	CS, T, F
CO3	Define and explain the sediment transport processes and the beach morphology in the coastal zone.	PO1			KP1	C2, P1, A2	Q, A, F
CO4	Compute the coastal sediment transport mechanism in the littoral zone and use various estimation equations to analyse the sediment budget and estimate sediment transport rates.	PO2	CP2		KP3	C4, P1, A2	T, F
CO5	Describe the causes of coastal erosion, their hazards and identify available solutions to overcome problems.	PO1	CP1		KP1	C2, P1, A2	F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report
 CS: Case Study

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	45
	b. Revision	20
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

- Lectures shall emphasize on theories, followed by worked examples and further applications to problems of interest in Coastal Engineering.
- Case Study (Group) shall be given to provide opportunities for students to learn and discuss work in smaller groups and to cooperate as a team to apply the theories given in lectures to coastal engineering case studies.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	<p style="text-align: center;">Introduction to Coastal Engineering</p> 1.1 Overview of development projects in coastal areas 1.2 The Coastal Area – definitions and classification, physical features 1.3 Environmental forces 1.4 Dynamic Equilibrium
2 - 3	2 - 12	<p style="text-align: center;">Wave Mechanics</p> 1.1 Wave fundamentals 1.2 Wave Theory 1.3 Wave transformation – shoaling, refraction 1.4 Wave energy decay – diffraction, reflection, breaking
4 - 5	10 - 15	<p style="text-align: center;">Wave Prediction</p> 1.1 Wave data collection and analysis 1.2 Wave height predictions – significant wave height, zero-crossing wave height, design wave height 1.3 Wave hindcasting
6	15 - 18	<p style="text-align: center;">Tides and water level fluctuations</p> 1.1 Astronomical tides 1.2 Tidal cycles 1.3 Tidal levels 1.4 Sea level rise 1.5 Storm surge, wind set-up, wave set-up 1.6 Design water levels

7	19 - 20	<p>Field Investigations and Measuring Equipment</p> <p>1.7 The need for field measurements 1.8 Primary and secondary data collection 1.9 Water level data and measurement 1.10 Wave data and measurement 1.11 Current data and measurement 1.12 River discharges and measurement 1.13 Water temperature, water quality and salinity 1.14 Wind data collection</p>
8		MID SEMESTER BREAK
9	22 - 24	<p style="text-align: center;">Nearshore currents</p> <p>5 6 6.1 Types of nearshore currents 6.2 Tidal currents 6.3 Surface currents 6.4 Wave-induced currents – longshore, onshore-offshore, rip currents</p>
10	25 - 27	<p>Littoral Process</p> <p>6 7 7.1 Littoral materials, sediment types and size 7.2 Beach profile – storm and swell profile 7.3 Beach types – dissipative and reflective 7.4 Littoral cells - definition</p>
11	28 - 30	<p>Sediment Transport</p> <p>1.1 Sediment transport mode 1.2 Shear stress 1.3 Shield's parameter 1.4 sediment transport calculation (wave and currents)</p>
12	31 - 33	<p>Coastal Sediment Transport</p> <p>7 8 9 9.1 Nearshore circulation and littoral drift 9.2 Longshore transport 9.3 Onshore-offshore transport 9.4 Indicators of net longshore transport direction 9.5 Estimating longshore transport rates (using Energy Flux Method)</p>
13	34 - 36	<p>Coastal Morphology</p> <p>9 10 10.1 Sediment sources and sinks 10.2 Sediment Budget Analysis 10.3 Shoreline changes – long term and short term variations 10.4 Analytical techniques – remote-sensing photogrammetry, numerical models</p>
14	37 - 39	<p>Coastal Erosion</p> <p>11 11.1 Coastal erosion hazards 11.2 Causes of erosion 11.3 Categories of erosion (NCES Classification)</p> <p>Coastal Impact Assessment</p> <p>11 12 12.1 Types of coastal development projects 12.2 Effects of coastal structures on littoral drift 12.3 Effects of reclamation and dredging Case examples</p>

15	40 - 42	Coastal Erosion Management 10 11 12 13 13.1 Structural measures – hard structures (seawalls, revetments, groynes, breakwaters) 13.2 Soft engineering methods – beach nourishment, beach drainage system, reef breakwaters 13.3 Non-structural measures – land use zoning, setback policies, ICZM, SMP, EIA.
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- 1 Kamphuis, J. William. *Introduction to Coastal Engineering and Management*, Advanced Series on Ocean Engineering – Volume 16, World Scientific, 2002.
- 2 US Army Corps of Engineers. *Shore Protection Manual*, Washington, 1984.
- 3 US Army Corps of Engineers. *Coastal Engineering Manual*, Washington, 1998
- 4 Dean, R. G. and R. A. Dalrymple. *Water Wave Mechanics for Engineers and Scientists*, Prentice Hall – republished as Advanced Series on Ocean Engineering, Vol. 2, World Scientific, 1992.
- 5 Reeve D., Chadwick A. and Fleming C. *Coastal Engineering- Processes, Theory and Design Practice*, SPON Press, 2005.
- 6 Soulsby, R.L. 1997. *Dynamics of Marine Sands*, Thomas Telford, HR Wallingford, London, U.K

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	1	5	5	8
2.	Case Study	1	10	10	10
3.	Quizzes	1	5	5	6
4.	Presentation	0			
5.	Test	2	15	30	7, 13
6.	Final Exam	1	50	50	17-18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers		E-Mail	Room No.
1.	Assoc. Prof. Ir. Faridah Jaffar Sidek	faridah@ic.utm.my	In UTMJB : M50-320 In UTMIC : COEI 03-2615 ext 4370
2.	Dr. Mohamad Hidayat Jamal	mhidayat@utm.my	M47-126 32444
3.	Prof. Hadibah Ismail	hadibah@ic.utm.my	C09-308 31713
4.	Prof. Dr. Ahmad Khairi Abd. Wahab	khairi@utm.my	C07-211 31587
5.	Mr. Abu Bakar Fadzil	abubakar@utm.my	C09-322 31521

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 8 th February 2013 Edition : 5 Procedure No. : FKA/PG/RK/SKAA 4613
	INTEGRATED WATER RESOURCES MANAGEMENT SKAA 4613 PRE-REQUISITE : SAB 3613 (Hydrology) EQUIVALENCE : SAM 5613 LECTURE HOURS : 3hours / week

SYNOPSIS

This is an elective course aim to equip students with in-depth knowledge in water resources design and management. This course highlights major water resources management issues with the emphasis on the integration of various management components. While the course contents maintain the technical elements of water resources system and engineering, students are also exposed to the realities of the political, economic, and social settings that influent the decision making process. Upon completion of this course, the students should be able to demonstrate the diverse and complicated issues in water resource management, discuss the need and steps for integrated management approach, analyse and determine viable project options, propose appropriate management strategies, and apply the appropriate techniques and strategies in reservoir planning and design.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Apply principles of integrated catchment management for sustainable water resource management.	PO3			KP1	L2	A, T, F
CO2	Analyze economic tools for determining the viability of water resources projects.	PO2			KP2	L3	HW, T, F
CO3	Design a reservoir system incorporating with the aspect of reliability with respect to unregulated flow, reservoir release and reservoir capacity.	PO4	CP1	CA1	KP6	L4	P, Pr, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	17
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	30
	b. Revision	10
	c. Assessment Preparations	3

No.	Teaching and Learning Activities	SLT* (hours)
3.	Formal Assessment	
	a. Continuous Assessment	15
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Students are given lectures on the basic principle and concepts for each topics
2. Students are given several general topics related to water resources and required to choose a topic of their interest for their project work
3. Students are required to acquire/obtain the relevant water resources related data before they are required to produce a detail analysis towards getting a comprehensive water resource design addressing the integrated management approach.
4. Students are required to produce a technical report as well as to present their finding

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction: Definition: Availability of resources - global and local perspective: Water allocation: Supply and demand scenarios: Major issues in water management.
	2	
2	3	Catchment as a planning and management tool; Integrated Catchment Management (ICM): Catchment vs. sectoral management approach.
	4	
3	5	Understanding the elements in ICM; Strategies and steps towards implementing ICM.
	6	
4	7	Hydrological impacts of catchment disturbances: Type and level of disturbances: Impacts on Water yield, dry season flow, flood potential, erosion and sedimentation, micro-climate.
	8	
5	9	Cumulative watershed effects: Case studies for implementing ICM Test I
	10	
6	11	Economic assessment of water resource projects: Objective of economic analysis: Investment in water resource project: Benefit-cost analysis: Discounting factors: Tangible and non- tangible costs: Evaluating project options
	12	
7	13	Hydrologic extreme events in benefit-cost analysis: Cost allocation for multi-purposes project
	14	
8		MID SEMESTER BREAK
9	15	Reservoir design and management: Introduction to reservoir design; storage-yield function, storage capacity determination and design
	16	
10	17	Simulation: Concepts in Probability, statistics and stochastic modeling; model sensitivity and uncertainty analysis; statistical summaries of performance criteria
	18	
11	19	Low Flow Frequency Analysis: Flow duration curves; Low flow frequency curves; Graphical approach in frequency analysis
	20	
12	21	Low Flow Frequency Analysis (continue): Analytical approach in frequency analysis (Generalized Extreme Value, Gumbel, Frechet, Weibull, Generalized Pareto, Exponential, Pearson Type III, Log Pearson Type III, and Lognormal distributions)
	22	
13	23	Optimization: Linear and non-linear optimization models and solution procedures TEST II
	24	
14	25	Optimization: concept of Storage-Yield-Performance in reservoir; river basin analysis Optimization using Visual Basic Application in MS Excel
	26	
15	27	Presentation of group project
	28	
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Loucks, D.P., van Beek, E., Stedinger, J.R., Dijkman, J.P.M, Villars, M.T. (2005) Water Resource Systems Planning and Management: An Introduction to Methods, Models and Applications. UNESCO Publishing
2. Mays L. M. & Tung Y. K. (1992) Hydrosystems Engineering & Management , McGraw-Hill
3. Linsley R. K., Franzini J. B., Freyberg D. L. & Tchobanoglous G. (1992) Water-Resources Engineering, McGraw-Hill
4. Chang M. (2003) Forest Hydrology An Introduction to Water and Forests. CRC Press, Boca Raton 373 pp.
5. Field, B.C. (1997) Environmental Economics An Introduction. McGraw Hill.
6. Chin, D.A. (2006) Water Resources Engineering. Prentice Hall
7. McMahon, T.A. and Mein, R.G. (1978) Reservoir Capacity and Yield. Elsevier Sci.Publ.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Project/Presentation	1	30	30	
2.	Test	2	10	20	
3.	Assignment/Homework	2	5	10	
4.	Final Exam	2	20	40	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Dr. Muhamad Askari	muhaskari@utm.my	C07-318	31536
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 <p>UTM UNIVERSITI TEKNOLOGI MALAYSIA</p> <p>Faculty of Civil Engineering</p>	Revision	:	
	Date of issue	:	1st SEPT 2012
	Last Amendment	:	1st SEPT 2012
	Edition	:	4
	Procedure No.	:	FKA/PG/RK/SAB4743
ADVANCED ROCK MECHANICS & ENGINEERING GEOLOGY SAB 4743			
PRE-REQUISITE : SAB 2712			
EQUIVALENCE :			
LECTURE HOURS : 3 hours / week			

SYNOPSIS

This course consists of 2 parts; Engineering Geology & Rock Mechanics. The content is tailored to enable students to acquire knowledge on fundamental elements of engineering geology & rock mechanics, and subsequently able to apply essential principles of engineering geology and rock mechanics in designing rock engineering structures. In engineering geology, effect of elements like rock types, discontinuities and weathering on construction are discussed. Students are also enlightened on the importance of geological environments on various construction works in rock. In the second part, students are introduced to relevant principles of rock mechanics in understanding the characteristics & behavior of geological elements. This aspect enables the students to appreciate the response of geological materials to construction induced stresses. Engineering properties of rock are discussed with focus on how they are measured and evaluated, and their significance in construction. Methods and approach used to improve various mode of instability in rock mass are also discussed, particularly in evaluating and selecting suitable method for rock mass stabilization. At the end of the course, students should acquire the fundamental knowledge and principles in engineering geology and rock mechanics, and should be able to appreciate and to apply them in basic of rock engineering structures such as slope and excavation in rock mass.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. method
CO1	Identify and describe types of geologic materials, discontinuities and other geological elements related to rock mechanics.	PO1				C2, P2, A2	Q, T, A, F
CO2	Explain and relate effect of elements of geology with basic principles of rock mechanics.	PO1				C2, P2, A2	Q, T, A, F
CO3	Identify essential rock mass and material properties that are essential for rock engng. structures (foundation, slope & tunnel).	PO1, PO2				C3, P2, A3	Q, T, A, F
CO4	Distinguish relevant data on rock mass and material properties and prevailing geological environment in proposing stable & safe engineering structures.	PO1, PO2				C4, P2, A3	Q, T, A, F
CO5	Formulate basic design approach using elements of engineering geology and rock mechanics and with consideration on basic engineering code of practices.	PO1, PO2	CP1	CA2	KP1 & KP2	C4, C5, P3	A, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	18
	b. Revision	24
	c. Assessment Preparations	24
3.	Formal Assessment	
	a. Continuous Assessment (1 test (1.5 h) + 1 assign (2 h))	7
	b. Final Exam	5
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

- Lecture emphasize on appreciation on principles ad theories and followed by worked examples and applications of knowledge in solving typical problems and guided-design work in engineering geology and rock mechanics
- Formal lecture in class-room using various teaching tools (power-points, physical models, laboratory demonstration & course module
- Two-way discussion and Q&A in class-room on critical topics & issues, if required hands-on demonstration on physical model etc. in laboratory.
- Solving past year examinations, tests and structured assignments
- Informal discussion out of class-room.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1 - 3	Introduction: Engineering geology (examples of projects that require geological inputs), and its roles in construction activities. Process related to formation of earth surface and structures: volcanic, tectonic & gradation processes – introduction to concepts of seismic hazard & earthquake Rock types and brief on their related properties.
2	4 - 6	Formation and classification of igneous rocks Formation and classification of sedimentary rocks Formation and classification of metamorphic rocks

Week	Lecture	Topic / Content
3	7 - 9	Rock mass classification – mass properties, discontinuities and determination. Effect of geological structures on construction in rock mass. Kinematic analysis using stereonet projection method & software to evaluate mode of failure in jointed rock mass.
4	10 - 12	Geology in tropical region – concept of weathering profile. Weathering process and effect on rock properties. Properties of weathered rock and construction and design of civil engineering structures.
5	13 - 15	Ground investigation methods – Planning, methods/techniques & procedure. Interpretation of aerial photograph & geological mapping. Concept and interpretation of geophysical method – seismic, resistivity & ground penetrating radar (GPR)
6	16 - 18	Excavation in rock mass - Principles and methods in excavation. Mechanism and selection of tools in excavation techniques. Various types of blasting, preparation & safety aspects.
7	19 - 21	Geology and Industry - The importance of geology to mineral extraction industry and quarry. Introduction and concept of quarry operation. Methods of extraction and processes. Selection of suitable site and rock quantity (reserve) & quality. (TEST 1 – 25 % of course work) – End of engineering geology
8		MID SEMESTER BREAK
9	22 - 24	Introduction to principles & theoretical aspects of Rock Mechanics in evaluating rock properties. Rock tests in laboratory & field, and differentiation between rock material and rock mass properties. Laboratory index/indirect tests & direct strength tests ; briefs on tests procedure, sample preparation and types of data and application to design & construction.
10	25 - 27	In situ/large-scale tests ; common types, cost & complexity. Factors affecting reliability of laboratory tests Discontinuities (small-scale & large-scale) in rock and their effect on laboratory test data.
11	28 - 30	Rock strength & deformability. Stress & strain; elastic constants of rock (E, ν and G). Stress in two dimensions. Stress and its resultant strains Linear elasticity: special cases of linear elasticity, state of stress in rock mass at depth, and stresses due to gravity.
12	31 - 33	State of stresses in rock mass. Initial stresses and stress concentrations in rock mass. Stress distribution around a single opening: Circular openings in solid homogeneous material, Stress around a circular tunnel and law of superposition. Deviation of stress from theoretical prediction.
13	34 - 36	Stability of rock slope. Modes of failure in rock and effect of discontinuities. Stability due to plane failure & gravity. Effect of groundwater on slope; Water pressure and its effect on stability of rock slope; Effect of water pressure in tension crack. Application of rock bolt to prevent rock sliding (guided example)
14	37 - 39	Stability of tunnels and underground excavation. Yield zone and analysis based on stress distribution, and its effect on tunnel stability. Effect of construction induced stresses. Effect of shape, size and depth of tunnel in tunnel design (ASSIGNMENT 1 - 25% of course work)
15	40 - 42	Stabilisation of rock mass. Principles of stabilisation based on inherent strength and mode of failure in rock mass. Methods of stabilisation: Principles of rock stabilization using Support, Reinforcement & Drainage system. Approach in assessing and selecting suitable of methods of stabilization based on modes of instability in rock mass
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Attewell, P.B. (1993), The role of engineering geology in the design of surface and underground structures, Comprehensive Rock Engineering, Hudson, J.D. (ed.), Pergamon Press, Oxford
2. Brady, B.H.G. and Brown, E.T. (1985), Rock Mechanics for Underground Mining, George Allen & Unwin, London.
3. Geotechnical Engineering Office (2000), Geotechnical Manual for Slope, 4th print, GEO Civil Engng. Dept., Govt. of the Hong Kong Special Administrative Region.
4. Hoek, E. & Bray, J.W. (1981), Rock Slope Engineering, 3rd ed. Inst. Mining & Metallurgy, London.
Hudson, J.A., (1989), Rock Mechanics Principles in Engineering Practice, CIRIA, Butterworths.
5. ISRM (1981), Rock Characterisation Testing and Monitoring, ISRM Suggested Methods, Commission 6. on testing methods, Int. Society of Rock Mechanics, Brown E.T. (ed.), Pergamon Press, Oxford.
7. Jaeger, J.C. & Cook, N.G.W., (1979), Fundamentals of Rock Mechanics, 3rd ed., Chapman & Hall, London.
8. McLean A.C. & Gribble C.D. (1980), Geology for Civil Engineers, George Allen & Unwin, ISBN 0 04 624002, London.
9. Stacey, T.R. & Page, C.H. (1986), Practical Handbook for Underground Rock Mechanics, Transtech Publ. ISBN 0878490566.
10. Stillborg, B., (1985), Professional Users Handbook for Rock Bolting, Transtech Publ. ISBN 0878490736.
11. Waltham, T. (2002). Foundations of Engineering Geology, 2nd ed., Spon Press, London & New York

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test	1	25	25	Week 6 - 7
2.	Assignment	1	25	25	Week 10 - 11
3.	Final Exam	1	50	50	16 - 18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Assoc. Prof. Mohd For Mohd Amin	mohdfor@utm.my	M50-02-26	38691
2.	Assoc. Prof. Dr. Edy Tonnizam Mohammad	edy@fka.utm.my	D03 223	31767
3.	Dr. Rini Asnida Abdullah	rini@utm.my	M47	

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SAB 4813
ADVANCED HIGHWAY ENGINEERING SAB 4813		
PRE-REQUISITE :		
EQUIVALENCE :		
LECTURE HOURS : 3 hours / week		

SYNOPSIS

This is one of the core subjects that will develop the knowledge and experience of the students in pavement design construction. This course comprises the following topics: Factors influencing thickness design, methods of pavement design: AASHTO, Asphalt Institute, Rigid pavement design, Interlocking block design, surface dressing design, construction of various pavement types, earthworks, cut slopes, embankments, surface drainage, subsurface drainage, erosion control, slope protection, culverts.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe the factors that influence the pavement design characteristic	PO1	C1,A4				A, T, F, Pr
CO2	Design flexible and rigid pavement, surface dressing and interlocking block pavement.	PO7	TS3			KP1	A, T, F, Pr
CO3	Explain construction of pavement layers	PO2	C2,A4	CP1			A, T, F, Pr
CO4	Analyze the wider scope of road and highway construction	PO2	C4, A4				A, T, F, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles

A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; PE: Peer Evaluation

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40
	b. Revision	20
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lecture
2. Individual assignment
3. Group project and presentation.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1, 2, 3	Factors influencing thickness design
2	4, 5, 6	Methods of flexible pavement design :AASHTO, Asphalt Institute, JKR 2006
3	7, 8, 9	Methods of flexible pavement design : JKR 2006, Road Note 31, ATJ 5/85
4	10, 11, 12	Introduction on rigid pavement concept and elements Intro
5	13, 14, 15	Methods of rigid pavement design :AASHTO
6		Methods of rigid pavement design :PCA
7	19, 20, 21	Methods in steel design for rigid pavement
8		MID SEMESTER BREAK
9	22, 23, 24	Interlocking block design, Surface dressing design
10	25, 26, 27	Review and Test 1
11	28, 29, 30	Construction of various pavement types
12	31, 32, 33	Earthworks, cut slopes and embankments
13	34, 35, 36	Surface and subsurface drainages
14	37, 38, 39	Erosion control, slope protection and culverts
15	40, 41, 42	Presentation Review and Test 2
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

1. Paul H. Wright (1996) Highway Engineering 6th Edition
2. Roger L. Brockenbrough & Kenneth J. (1996) Highway
3. David Croney et. Al (1997) Design and Performance Road Pavements, 3rd Edition
4. Roberts, Khandal, Brown, Lee and Kennedy (1996) Hot Mix Asphalt Materials, Mixture Design and Construction

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	2	5	20	Continuous
2.	Presentation	2	15	10	Week 14 & 15
3.	Test 1 & 2	2	10	30	Week 7 & 14
4.	Final Exam	1	40	40	Week 16 – 18
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :- Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject..

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1. Dr. Haryati Yaaacob	haryatiyacob@utm.my , Yaacob.h@gmail.com	M50 02 34 01	38666
2. Prof. Ir. Dr. Hasanan Md. Noor	hasanan@utm.my	M46-310	31704
3. Assoc. Prof Dr. Mohd Rosli Hainin	mrosli@utm.my , roslihainin@gmail.com	M46 156	31504
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5. Norhidayah Abdul Hassan	Norhidayah_utm@yahoo.com	Transportation Laboratory, DO2	31678
6. Ir. Dr. Maniruzzaman B. A. Aziz	mzaman@utm.my	C09 330	31727
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA <small>Faculty of Civil Engineering</small>	Revision	: 1
	Date of issue	: 1 st June 2003
	Last Amendment	: 1 st February 2013
	Edition	: 6
	Procedure No.	: FKA/PG/RK/SKAA 4823
TRANSPORTATION PLANNING SKAA 4823		
PRE-REQUISITE	: SAB 3842	
EQUIVALENCE	: SAM 5823	
LECTURE HOURS	: 3 hours / week	

SYNOPSIS

This elective course discusses the transportation planning processes which includes the methodology for transportation surveys and analyses – i.e. demographic and socio-economic studies, travel pattern and travel demand studies. The four-stage transportation modeling techniques, i.e. trip generation/attraction model, trip distribution model, modal split and traffic assignment model, is the main focus of the course. The course will also address the planning and design of public transportation systems such as public bus service and the methods to evaluate the economic viability of transportation alternatives and choices and the public consultation in transport planning process. This course also introduces the road safety, transport and the environmental and introduces the Intelligent Transportation Systems (ITS) conceptual framework.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Demonstrate and describe advanced knowledge in the transportation planning process	PO1	CP1	CA5	KP 2	L1	A, T, F
CO2	Design, analyze, synthesize and explain the collections of transportation-related data for the transportation planning processes	PO3	CP2	CA1	KP 3	L4	T, F
CO3	Measure, evaluate, synthesize and explain travel demand and supply and appraise transportation alternatives and choices. Explain the concepts of other transport planning elements.	PO2, PO4	CP4	CA 4	KP2	L4	T, Pr, F
CO4	Categorize and explain travel demand forecasting models for transportation planning purposes	P O 1 , PO4	CP2	CA5	KP2	L2	A, F

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	-
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40

No.	Teaching and Learning Activities	SLT* (hours)
	b. Revision	20
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

Lectures shall emphasise on theories, followed by worked examples and further applications to problems of interest in Transportation Planning. Students shall discuss amongst themselves and solve given exercises/problems in class in the related field through analyses, with the aid of existing tools including Trip Generation and Parking Generation manuals.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1 2 3	Introduction The profession of transportation planning Transportation systems & organizations Introduction to transportation planning process
2	4 5 6 7	Transportation Planning Studies Introduction to Transport Planning Studies, Types of Planning Studies and Types of Surveys, Survey Design, Data Collection Procedures
3	8 9	(Continued) Data Collection Procedures Issues in Survey Planning and Design, Data Reduction and Analysis, Training Interviewers and Protecting Respondents
4	10 11 12	Nature and Analysis of Transport Demand- Four Step Modeling Trip Generation- Introduction, Classification of Trips Factors affecting Trip Generation, Trip Productions vs Trip Attractions Regression Models with examples, Zonal Based vs HH-Based models,
5	13 14 15	Trip Distribution Introduction and Factors affecting Trip Distribution Gravity Model details with examples, Calibration and Limitations Other Models
6	16 17 18	Modal Split Modal Distribution Curves, Discrete Choice Models, Multinomial and Nested-Logit Models, Probit Models Other Models
7	19 20 21	Traffic Assignment General Principles and Assumptions of Route Choices, Assignment Techniques, All-or-Nothing Assignment, Capacity Restrained Assignment, Multiple Route Assignment
8		MID SEMESTER BREAK
9	22 23 24	Applications of Four-Steps Modeling Approach Traffic Impact Appraisal Site Planning and Site Analysis Traffic Projections, Capacity Analysis Signalization Analysis, Warrant Analysis, Operational Analysis

Week	Lecture	Topic / Content
10	25 26 27	Fundamentals of Public transport system Planning of public bus services Design of the bus service system
11	28 29 30	Other component in public transport – Rail transportation system
12	31 32 33	Various aspects of Transport Planning Transportation Safety Planning Transport and the Environment Introduction to Intelligent Transportation Systems (ITS)
13	34 35 36	Transportation Project Appraisal Introduction- Financial and Economic Analysis Steps Involved in Cost-Benefit Analysis Description of Costs and Benefits
14	37 38 39	Public Consultation Introduction to Transport Project Communications Public Involvement, Public Outreach, Media Relations etc., Communication Tools and Audiences, Current Practices and Emerging Trends
15	40 41 42	Transportation Systems Management Urban Transport Issues, Transport Supply and Demand Management Operative Objectives and Mechanisms of TSM, Expectations and Pre-requisites of TSM, Conflicts and Risks of TSM TSM in Local and Structure Plans
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- Nicholas J. Garber et.al (1999) Traffic and Highway Engineering, 2nd Edition.
- C.S. Papacostas et.al (2001) Transportation Engineering & Planning, 3rd Edition.
- James H. Banks (2010) Introduction to Transportation Engineering, 2nd Edition
- C A O'Flaherty (2010) Transportation Planning and Traffic Engineering.
- ParthaChakrabarty et. Al. (2010) Principles of Transportation Engineering
- Paul H. Wright and Karen K. Dixon (2012) Highway Engineering (7th Edition)
- Dr. L. R. Kadiyali (2012) Traffic Engineering and Transport Planning (7th Edition)
- C. Jotin Khisty et. Al. (2012) An Introduction to Transportation Engineering (3rd Edition)
- Graham Mallard & Stephan Glaister (2008) Transport Economics
- T.D. Ahuja (2011) Highway Engineering (Secod Edition)
- Roger P. Roess et al. (2011) Traffic Engineering (4th Edition)
- Hensher and Kenneth J. Button (2003) Handbook of Transport and the Environment (v-4)
- ITE (2010) Manual of Transportation Engineering Studies (2nd Edition)

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Test 1 and 2	2	10	20	
2.	Assignment	2	10	20	
3.	Project	1	20	20	
4.	Final Exam	1	40	40	
Overall Total				100%	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1. Assoc. Prof. Dr. Ishtiaque Ahmed	ishtiaque@utm.my	M46-310	31613
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA <small>Faculty of Civil Engineering</small>	Revision	: H
	Date of issue	: 1 st June 2003
	Last Amendment	: 26 th June 2013
	Edition	: 5
	Procedure No.	: FKA/PG/RK/SKAA 4843
ROAD MATERIAL AND PAVEMENT EVALUATION SKAA 4843 PRE-REQUISITE : EQUIVALENCE : LECTURE HOURS : 3 hours / week		

SYNOPSIS

This is one of the core subjects that will expand the knowledge of the students in exposing the student to the various technique of road maintenance. The course consists of the following topics: Properties classifications and test of principle materials used in highway construction and maintenance. Concrete pavement mixture. Types and causes of pavement failures. Assessment of pavement service life and maintenance options. Road surface characteristics, skid resistance, surface texture and methods of measurement, Pendulum, SCRIM, VSDIM, Staddograph etc. Pavement evaluation methods, Benkleman’s beam approach, deflectograph, falling weight evaluation

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom’s Taxonomy	Assessm. Methods
1.	Categorize and evaluate different types of material	PO1	CP1	CA1	KP4	C4,A4	A, T, F, Pr
2.	Analyze the laboratory testing	PO1, PO7	CP2, CP3	CA1	KP4, KP5	C4,P5,A4 TS1-TS3 LS1-LS2	A, T, F, Pr
3.	Identify types of pavement failures	PO1	CP4	CA1	KP4	C1,A4	A, T, F, Pr
4.	Plan appropriate techniques of maintenance	PO1	-	CA1	-	C5,A4	A, T, F, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Lecture & Tutorial	42
2.	Independent Study - self learning - information search - library search - reading - group discussion	56
3.	Assignment & Quiz - self learning - group discussion - reports	10

No.	Teaching and Learning Activities	SLT* (hours)
4.	Presentation - preparation - group discussion	6
5.	Test (2)	3
6.	Exam (1x)	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lectures/Site Visit
2. Assignment/Project/Presentation
3. Quiz
4. Tests/Examinations

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Properties classification and test of principle materials used in highway construction (aggregate, bitumen and polymer)
2	2	Properties classification and test of principle materials used in highway construction (modified bitumen and concrete) – continue
3	3	Bituminous Mixture i.e. Marshall and Superpave Mixture Design
4	4	Concrete Pavement Design i.e. Reinforced Concrete Pavement
5	5	Group presentation
6	6	Test 1
7	MID SEMESTER BREAK	
8	8	Types and causes of pavement failures
9	9	Types of pavement evaluation
10	10	Types of pavement evaluation - continue
11	11	Types of pavement maintenance and rehabilitatio
12	12	Road surface characteristics (Skid resistance)
13	13	Surface texture and methods of measurement
14	14	Review and Test 2
16-18	REVISION WEEK AND FINAL EXAMINATION	

REFERENCES

1. C.A. O’Flaherty (1998) Highway Engineering, Vol 2, 3rd Edition.
2. Ken Atkinson (1997) Highway Maintenance Handbook, 2nd Edition.
3. David Croney et. Al (1997) Design and Performance of Road Pavements, 3rd Edition.
5. Roberts, Khandal, Brown, Lee and Kennedy (1996) Hot Mix Asphalt Mterials, Mixture Design and onstruction.
6. Patrick G. Lavin (2004) Asphalt Pavements.
7. Papagiannakis and Masad (2007) Pavement Design and Materials.

DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Essay or report writing	5	10	50	
2.	Presentation (individual)	1	10	10	
3.	Group competition and teamwork	1	40	40	
				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Students must attend not less than 80% of fieldwork hours as required for the course. The student will be prohibited from attending any fieldwork upon failure to comply the above requirement. Zero mark will be given to the subject.

ACADEMIC STAFF

Lecturers	E-Mail	Room No.	Phone No.
1.			
2.			

 UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : G
	Date of issue : 1 st June 2003
	Last Amendment : 6 th February 2013
	Edition : 4
	Procedure No. : FKA/PG/RK/SKAA 4923
ADVANCE WATER & WASTE WATER TREATMENT SKAA 4923 PRE-REQUISITE : SAB 2922 (Wastewater Treatment) EQUIVALENCE : SAM 5923 LECTURE HOURS : 2 hours / week	

SYNOPSIS

This course is an extension of the water and wastewater treatment course (SAM 3913). It covers two different aspects of treatment namely, advanced treatment processes and effluent reuse. In advanced treatment processes, students are exposed to different physico-chemical unit processes i.e. air stripping and aeration, chemical precipitation, ion exchange, chemical oxidation, adsorption and membrane filtration. It also covers the advance topic of aerobic biological treatment process, anaerobic treatment process, and nutrients removal. Effluent reuse and the applications of the advanced processes are also discussed. The emphasis is on theoretical background, conceptual design and applications of the treatment processes

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Describe orally and in written form the theoretical concept of unit processes in advanced water and wastewater treatment and sludge treatment.	PO1			KP1	C1	Q, T, F
CO2	Provide conceptual design calculation of each unit process.	PO3	CP2		KP2	C4, P4	A, T, F
CO3	Develop appropriate processes in treating water and wastewater to achieve the required water quality standard.	PO1, PO2, PO3	CP2		KP5	C5, P4	A, T, F
CO4	Present the output of their project in clear, effective and convincing manner orally and / or in the form of report.	PO5		CA1		P4, A4, CS1	P, Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	
	ii. Student-centered learning activities – Active Learning, Project Based Learning	16

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	34
	b. Revision	10
	c. Assessment Preparations	12
3.	Formal Assessment	
	a. Continuous Assessment	3
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Basic Design philosophies and the use of code of practice will be demonstrated.
2. Students will be required to write reports and/or discussed and on-going or completed steel design project.
3. Students are required to go through the given tutorials, homeworks and informal co-operative learning.
4. Students will require to prepare a technical project in group, or technical visits for project assignment.

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Overview of water and wastewater treatment processes
	2	
	3	
2	4	Introduction to chemical precipitation Chemical precipitation application – water softening
	5	
	6	
3	7	Chemical precipitation application – heavy metal removals Introduction to ion exchange and inorganic adsorption Homework 1
	8	
	9	
4	10	Ion exchange analysis and design calculation Quiz 1
	11	
	12	
5	13	Introduction to activated carbon and organic adsorption Activated carbon analysis and design
	14	
	15	
6	16	Chemical oxidation TEST #1
	17	
	18	
7	19	Membrane Process Homework 2
	20	
	21	
8	22	Overview of Biological Processes Review of Activated Sludge Processes
	23	
	24	
9		SEMESTER BREAK
10	25	Extended aeration and sequential batch reactor Anaerobic wastewater treatment Quiz 2
	26	
	27	

11	28 29 30	Anaerobic wastewater treatment Nitrogen & Phosphorus removal
12	31 32 33	Wastewater reclamation Sludge Treatment Homework 3
13	34 35 36	Future trend and direction of wastewater treatment technology TEST#2
14	37 38 39	Project Presentation
15	40 41 42	Project presentation
16-18		REVISION WEEK AND FINAL EXAMINATION

REFERENCES

- Eckenfelder, W.W., Int'l Ed., 2000. *Industrial Water Pollution Control*, McGraw-Hill.
- Sawyer, C.N and McCarty, P.L. (1985) *Chemistry for Environmental Engineering*. McGraw Hill.
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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments	4	1.25	5	
2.	Project	1	10	10	
3.	Quizzes	2	2.5	5	
5.	Test	2	20	40	
6.	Final Exam	1	40	40	
Overall Total				100	

ATTENDANCE

The student should adhere to the rules of attendance as stated in the University Academic Regulation :-
Student must attend not less than 80% of lecture hours as required for the subject. The student will be prohibited from attending any lecture and assessment activities upon failure to comply the above requirement. Zero mark will be given to the subject.

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	Lecturers	E-Mail	Room No.	Phone No.
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 UTM UNIVERSITI TEKNOLOGI MALAYSIA Faculty of Civil Engineering	Revision	: 1
	Date of issue	: 1 st June 2003
	Last Amendment	: 5 th February 2013
	Edition	: 6
	Procedure No.	: FKA/PG/RK/SKAA 4973
INDUSTRIAL & HAZARDOUS WASTE TREATMENT SKAA 4973 PRE-REQUISITE : SAM 3913 (Water and Wastewater Treatment) EQUIVALENCE : SAM 5973 LECTURE HOURS : 3 hours / week		

SYNOPSIS

This course introduces students to issues of industrial and hazardous wastes management. The course includes discussion on the concept of hazardous waste, sources, quantities and characteristics (physical and chemical properties). The key elements in waste management such as storage, collection, transport, treatment and disposal of hazardous wastes are also addressed. Waste minimisation, one of the main strategies is also introduced. At the end of the course, students should be able to apply the knowledge by associating environmental problems that arise with poor management, treatment and disposal of industrial waste. The students should be able to work in a team to solve waste management issues

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
CO1	Apply the understanding of waste management and treatment processes for pollution control and reduction.	PO1, PO2			KP1	C3, P2, A1	A, T, F
CO2	Develop and analyse the treatment processes for industrial wastewater.	PO1, PO2, PO3	CP2		KP2	C5, A4	A, T, F
CO3	Use the knowledge of waste minimisation to select appropriate technology for sustainable development.	PO2, PO3	CP3		KP5	C4, P4, A5	T, P, F
CO4	Work effectively in a team to solve waste management issues.	PO7		CA1		A3, TS1, TS2	P, Pr
CO5	Assume responsibility for self development and life-long learning.	PO8				P5, A4, LL1	A, P

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	10

2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	38
	b. Revision	15
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lectures and classroom instructions.
2. Co-operative learning.
3. Individual assessment and/or site visit.
4. Written report and presentation of group project.

WEEKLY SCHEDULE

Week	Lecture	Topic / Content
1	1	Definition and problem magnitude of hazardous waste
	2	DOE-designated hazardous wastes
	3	Industrial waste sources and characteristics
2	4	Awareness and health perspective
	5	Policy and legislation
	6	Storage and transportation of waste
3	7	Cradle-to-Grave concept
	8	Manifest system
	9	Waste tracking system
4	10	Pollution prevention
	11	Waste minimisation concept
	12	Waste auditing
5	13	Cleaner technology
	14	Waste treatment methods
	15	Chemical treatment processes
6	16	Test 1
	17	Neutralisation and precipitation
	18	Oxidation and reduction
7	19	Chemical oxidation
	20	Carbon adsorption
	21	Activated carbon analysis
8		MID SEMESTER BREAK
9	22	Solidification and stabilisation (S&S)
	23	Application of S&S
	24	Membrane technology
10	25	Reverse osmosis
	26	Electrodialysis
	27	Biological treatment

11	28 29 30	Aerobic process Anaerobic process Landfarming and land treatment
12	31 32 33	Test 2 Thermal processes Incineration
13	34 35 36	Waste disposal Secure landfill Landfill stability
14	37 38 39	Contamination transport through landfill barriers Risk assessment Site remediation
15	40 41 42	Bioremediation Technologies Project Presentation Project Presentation
16-18		REVISION WEEK AND FINAL EXAMINATION

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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Assignments/Quizzes	2	5	10	
2.	Project/Presentation	1	15	15	
3.	Test	2	15	30	
4.	Final Exam	1	45	45	
Overall Total				100	

ATTENDANCE

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ACADEMIC STAFF

	Lecturers	E-Mail	Room No.	Phone No.
1.	Prof. Dr. Mohd. Razman Salim	mohdrazman@utm.my	M46-155	31506
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 <b style="font-size: 24px; margin-left: 10px;">UTM <small>UNIVERSITI TEKNOLOGI MALAYSIA</small> <small>Faculty of Civil Engineering</small>	Revision : H Date of issue : 1 st June 2003 Last Amendment : 25 th February 2011 Edition : 5 Procedure No. : FKA/PG/RK/SKAA 4983
WATER QUALITY MANAGEMENT SKAA 4983 PRE-REQUISITE : - EQUIVALENCE : SAM 5983 LECTURE HOURS : 3 hours / week	

SYNOPSIS

This course is designed to expose students to the various aspects of water quality management for river catchments, reservoirs and lakes. It will emphasize on some key issues in monitoring and assessment of water quality and the impact of water pollution to the environment. The students will find a wide range of material covered and its quantitative nature through project and field works. At the end of the course, students should be able to apply the knowledge through proper sampling and monitoring methods of river water quality. The students should be able to work in a team to plan mitigating and control measures for water pollution.

COURSE LEARNING OUTCOMES

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

	Course Learning Outcomes, CO	PO*	CP*	CA*	KP*	Bloom's Taxonomy	Assessm. Methods
	CO1 Identify water quality problems and create awareness of current water quality related issues.				KP1, KP5, KP7	C2	Pr, F
CO2	PO1 Demonstrate and apply proper sampling and monitoring methods of river water quality.	PO2	CP3	CA1	KP1, KP2, KP5, KP6	C3	T, F, A, Pr
CO3	Analyse and plan mitigating and control measures for water pollution according to the stipulated requirements.	PO2	CP3, CP4	CA4	KP1, KP4, KP5, KP6, KP7	C4	F, Pr
CO4	Communicate effectively in written and oral presentation.	PO5		CA1	KP1, KP7	CS2, CS3	Pr

*Note : PO: Program Outcomes; CP: Complex Problems; CA: Complex Activities; KP: Knowledge Profiles
 A: Assignment; Pr: Project; Q: Quiz; HW: Homework; P: Presentation; T: Test; F: Final Exam; R: Report

STUDENT LEARNING TIME

No.	Teaching and Learning Activities	SLT* (hours)
1.	Face-to-Face Learning	
	a. Lecturer-Centered Learning	
	i. Lecture	42
	b. Student-Centered Learning (SCL)	
	i. Laboratory / Tutorial	-
	ii. Student-centered learning activities – Active Learning, Project Based Learning	24

No.	Teaching and Learning Activities	SLT* (hours)
2.	Self-Directed Learning	
	a. Non-face-to-face learning or student-centered learning (SCL) such as manual, assignment, module, e-Learning, etc.	40
	b. Revision	-
	c. Assessment Preparations	10
3.	Formal Assessment	
	a. Continuous Assessment	2
	b. Final Exam	3
Total Student Learning Time* (SLT)		120

TEACHING METHODOLOGY

1. Lecture and Discussion
2. Active learning
3. Field work and site visits
4. Independent Study
5. Group Project Presentation

WEEKLYSCHEDULE

Week	Lecture	Topic / Content
1	1	Introduction
	2	Dynamics of the water cycle
	3	Hydrologic cycle of watershed and river basin
2	4	Water Pollution sources
	5	Classification of pollutants
	6	Stream and effluent water quality standards
3	7	River water quality monitoring: –
	8	types of monitoring and assessment
	9	Water quality monitoring – parameter selection
4	10	Water quality monitoring – stations and frequency selection
	11	Analysis of water quality parameters
	12	Field work at UTM river
5	13	Water pollution : prevention & control strategies
	14	Effect of pollution on riverine ecosystems
	15	Effect of pollution on estuarine and marine ecosystems
6	16	Characterization of reservoirs and lakes
	17	Physical and chemical properties of lakes
	18	Physical and chemical properties of lakes
7	19	Lake ecosystems
	20	Morphometric and hydrological changes of lakes
	21	Eutrophication
8		MID SEMESTER BREAK
9	22	Eutrophication : trophic state and index
	23	Eutrophication : factors affecting eutrophication
	24	Thermal stratification in tropical lakes
10	25	Thermal stratification in temperate lakes
	26	Effect of thermal stratification on nutrient distribution
	27	Effect of thermal stratification on metal and heavy metal distribution
11	28	Effect of global warming on lakes
	29	Wetlands : types and functions
	30	Role of wetlands in water quality management Site visit to wetland (location depending on weather forecast and tide table)

Week	Lecture	Topic / Content
12	31	Test 1
	32	Role of wetlands in water quality management
	33	Land use and water quality
13	34	The economic impact of water pollution
	35	River basin management strategies
	36	River basin management strategies
14	37	River basin management strategies
	38	River rehabilitation
	39	River rehabilitation – case study
15	40	River rehabilitation – case study
	41	Project presentation
	42	Project presentation
16-18		REVISION WEEK AND FINAL EXAMINATION

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DISTRIBUTION OF MARKS

No.	Assessment	Number	% each	% total	Weeks
1.	Project	1		30	
2	Assignment (Field Work)	1		10	
3.	Test 1	1		10	
4.	Final Exam	1		50	
Overall Total				100	

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