Implementation of OBE in Teaching and Learning within FKAAS

Faculty of Civil and Environmental Engineering
What is OBE?

Outcome-Based Education is a method of curriculum design and teaching that focuses on what students can actually do after they are taught.
The motivation for OBE is...

There is a call for **QUALITY** and **ACCOUNTABILITY** in education!!

by who? **THE PEOPLE**

**KEY QUESTION IN OBE IS**

“**HOW TO MEASURE THE OUTCOMES?**”
Steps in OBE...

1. First, think of expected outcomes.
2. Design curriculum.
3. Teach with well-defined learning outcomes.
4. Assess students by learning outcomes.

Focus on how much and how well students have learnt.
Not just on completing the syllabus.
OBE’s 1-step ahead

Ongoing student-lecturer feedback

How to achieve the learning outcomes?
What is the progress of this student?
When and how to assess the students?

Continuous Quality Improvement (CQI)
the FLOW...
DEMANDS FROM
Industries, MOHE, Professional bodies, MQA, Society, Parents, Alumni, Students, Univ. & others

prepared by Dr David Yeoh - 05/2015
Programme Educational Objectives (PEO)

When / Who
3 - 5 years after graduation

How (examples)
Tracer study/ Surveys on employer & alumni, Industrial advisor committee/ stakeholders, publications, consultancy, projects, business and achievements

Programme Learning Outcomes (PLO)

Upon graduation
Exit survey, External Examiner report, Fundamental exam, CLO-PLO assessment

Course Learning Outcomes (CLO)

Upon completion of a course

C - Assignment, quiz, test, final exam etc
P - Lab/ field work, project etc
A - Lab/ field work, project etc
• FKAAS offers one Undergraduate degree programme – BFF (Bachelor of Civil Engineering with Honours)
<table>
<thead>
<tr>
<th>TAHUN</th>
<th>KOD KURSUS</th>
<th>SEMESTER I</th>
<th>KOD KURSUS</th>
<th>SEMESTER II</th>
<th>KOD KURSUS</th>
<th>SEMESTER III</th>
<th>KREDIT</th>
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<td>UVS 10103/ UVS 10102</td>
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<td>3/2</td>
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<td></td>
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<td>3/2</td>
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<td>*Pengajian Islam / Pengajian Moral/ Tamadun Islam dan Tamadun Asia</td>
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<td>UVA 10302</td>
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<td></td>
<td>UBV 20302</td>
<td>Technical Writing</td>
<td>2</td>
<td>BFC 24203</td>
<td>Matematik Kejuruteraan Awam IV</td>
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<td>BFC 20601</td>
<td>Makmal Bahan dan Bendalir</td>
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<td>BFC 20102</td>
<td>Kejuruteraan Pembinaan</td>
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<td>UQ &quot;Iss1&quot; Ko-Kurikulum II</td>
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<td>BFC 21103</td>
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<td>2</td>
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<td>BFC 21303</td>
<td>Geologi Kejuruteraan</td>
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<td>BFC 21403</td>
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<td>Latihan Industri</td>
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<td>BFC 20102</td>
<td>Kejuruteraan Pembinaan</td>
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<td>3</td>
<td>BFC 23204</td>
<td>Latihan Industri</td>
<td>4</td>
<td></td>
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</tr>
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</table>

**JUMLAH KREDIT KESELURUHAN:** 16
Programme Educational Objectives

Knowledgeable and technically competent
Effective communication and good leadership
Entrepreneurship skills and life-long learning
Ethical, problem solver through innovative and creative means

prepared by Dr David Yeoh - 05/2015
Assessment of PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Employer Survey on Graduates
   (indirect measurement)
   KPI: 50% employers feedbacks are on the scale of \( \geq 4 \) (good and excellent)

2. Graduate Survey
   (indirect measurement)
   KPI: 50% graduates are on the scale of \( \geq 4 \) (good and excellent)

3. Graduate Survey
   (direct measurement)
   KPI: Please refer to Appendix G for details
PEO Assessment – Graduate Survey

Programme Educational Objectives (PEO) Survey for UTHM Alumni

Personal Detail

NAME *

EMAIL *

CONTACT NUMBER *

YEAR GRADUATE DEGREE PROGRAMME *

Tracer Study for Alumni
Programme Educational Objectives (PEO) FKAAS

Have been promoted or offered to a better position *

○ YES

○ NO

Have been involved in research/ construction project proposal either as member or leader *

○ YES

○ NO

Are you a Professional Engineer (PE)? *

○ YES

○ NO

Have published papers in conference/ journal *

○ YES

○ NO

Have held leadership positions for a taskforce or project within an organization *

○ YES

○ NO

Have been involved in civil engineering design/ construction projects *

○ YES

○ NO

Have been involved in research and/ or development projects related to civil engineering *

○ YES

○ NO

THANK YOU

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5/19/2015

UNIVERSITI TUN HUSSIEONN MALAYSIA (UTHM)
Assessment of PEO

Data extracted from OBE Annual Report 2012

Figure 21. Graduates attainment of PEO based on employers survey

preparaed by Dr David Yeoh - 05/2015
Assessment of PEO

Data extracted from OBE Annual Report 2012

Figure 22. Strong graduates attributes as identified through employer survey

prepared by Dr David Yeoh – 05/2015
Assessment of PEO

Data extracted from OBE Annual Report 2012

Employability of UTHM graduates – what employers say?

Figure 24. Marketability of civil engineering graduates based on employer survey
Assessment of PEO

Summary PEO achievement for year 2012 extracted from OBE Annual Report 2012

Table 17: Summary of PEO attainment based on Employer Survey and indirect measure of Graduate Survey

<table>
<thead>
<tr>
<th>PEO</th>
<th>1. Employer Survey</th>
<th>2. Graduate Survey (Indirect)</th>
<th>Attainment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score ≥ 4 (%)</td>
<td>KPI = 50%</td>
<td>Score ≥ 4 (%)</td>
</tr>
<tr>
<td>1</td>
<td>85.1</td>
<td>Pass</td>
<td>94.2</td>
</tr>
<tr>
<td>2</td>
<td>79.5</td>
<td>Pass</td>
<td>90.4</td>
</tr>
<tr>
<td>3</td>
<td>84.8</td>
<td>Pass</td>
<td>80.7</td>
</tr>
<tr>
<td>4</td>
<td>54.6</td>
<td>Pass</td>
<td>94.2</td>
</tr>
</tbody>
</table>
PLO

PROGRAMME LEARNING OUTCOMES

1. Knowledge
2. Technical Expertise
3. Communication
4. Creative Thinking & Problem Solving
5. Teamwork
6. Life-long Learning & Professional Development
7. Entrepreneurship
8. Professional Ethics
9. Leadership Responsibility
10. Design Solutions
11. Problem Analysis
12. Environment / Sustainability
13. Engineer & Society

9 PLOs

prepared by Dr David Yeoh - 05/2015
Mapping PEO to PLO

<table>
<thead>
<tr>
<th>No</th>
<th>PEO</th>
<th>PLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledgeable and technically competent in civil engineering discipline in-line with the industry requirement.</td>
<td>1,2, 10</td>
</tr>
<tr>
<td>2</td>
<td>Effective in communication and demonstrate good leadership quality in an organization.</td>
<td>3,5,9, 13</td>
</tr>
<tr>
<td>3</td>
<td>Capable to solve civil engineering problems innovatively, creatively and ethically through sustainable approach.</td>
<td>4,8, 11, 12</td>
</tr>
<tr>
<td>4</td>
<td>Able to demonstrate entrepreneurship skills and recognize the need of lifelong learning for successful career advancement.</td>
<td>6,7</td>
</tr>
</tbody>
</table>
NUMBER OF COURSES VERSUS PLO

Number of courses

PLO-1: 32
PLO-2: 29
PLO-3: 13
PLO-4: 11
PLO-5: 26
PLO-6: 16
PLO-7: 3
PLO-8: 7
PLO-9: 13
PLO-10: 9
PLO-11: 4
PLO-12: 8
PLO-13: 3
# Mapping of PLO to Taxonomy Domain (example)

<table>
<thead>
<tr>
<th>Key Idea</th>
<th>Description</th>
<th>Primary domain type</th>
<th>PLO in EAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Engineering Knowledge (K)</strong></td>
<td>Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex civil engineering problems.</td>
<td>Cognitive</td>
<td>1</td>
</tr>
<tr>
<td>2. <strong>Practical / Technical Skills / Modern Tool Usage (PS)</strong></td>
<td>Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex civil engineering activities, with an understanding of the limitations.</td>
<td>Psychomotor</td>
<td>5</td>
</tr>
<tr>
<td>5. <strong>Individual and Team Work (TW)</strong></td>
<td>Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings</td>
<td>Affective</td>
<td>10</td>
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</tbody>
</table>
Assessment of PROGRAMME LEARNING OUTCOMES (PLO)

1. CLO-PLO Assessment (compulsory pass)  
   (continuous direct measurement in every semester)  
   KPI: Achievement in each course ≥ 50%

2. Fundamental Civil Engineering Examination (FCEE)  
   (one-off direct measurement)  
   KPI: Achievement in each PLO ≥ 50%

3. Exit Survey  
   (indirect measurement on self perception)  
   KPI: 80% of the respondents feedbacks are on the scale of ≥ 4 (good and excellent)

Figure 27. Assessments used to triangulate the attainment of PLO

2 out of 3 to pass CLO-PLO must pass
Assessment PLO - FCEE

Figure 2: PLO attainment in the FCEE for year 2013

Prepared by Dr. David Yeo - 05/2015
### Assessment of PROGRAMME LEARNING OUTCOMES (PLO)

Summary PLO achievement for year 2014 extracted from OBE Annual Report 2014

<table>
<thead>
<tr>
<th>PLO</th>
<th>CLO ≥ 60%</th>
<th>Exit Survey ≥ 80%</th>
<th>FCEE ≥ 50%</th>
<th>Achievement of PLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70.25%</td>
<td>85.1%</td>
<td>47.9%</td>
<td>Achieve</td>
</tr>
<tr>
<td>2</td>
<td>71.75%</td>
<td>90.3%</td>
<td>48.1%</td>
<td>Achieve</td>
</tr>
<tr>
<td>3</td>
<td>77.5%</td>
<td>82.0%</td>
<td>59.5%</td>
<td>Achieve</td>
</tr>
<tr>
<td>4</td>
<td>69.65%</td>
<td>86.2%</td>
<td>27.1%</td>
<td>Achieve</td>
</tr>
<tr>
<td>5</td>
<td>78.15%</td>
<td>86.3%</td>
<td>42.8%</td>
<td>Achieve</td>
</tr>
<tr>
<td>6</td>
<td>75.25%</td>
<td>88.0%</td>
<td>53.2%</td>
<td>Achieve</td>
</tr>
<tr>
<td>7</td>
<td>80.75%</td>
<td>89.1%</td>
<td>31.5%</td>
<td>Achieve</td>
</tr>
<tr>
<td>8</td>
<td>71.35%</td>
<td>90.3%</td>
<td>30.9%</td>
<td>Achieve</td>
</tr>
<tr>
<td>9</td>
<td>74.5%</td>
<td>89.9%</td>
<td>62.2%</td>
<td>Achieve</td>
</tr>
</tbody>
</table>
COGNITIVE DOMAIN (THINKING, KNOWLEDGE)

1. Comprehension
   - Definition: Grasps the meaning of material (lowest level of understanding).
   - Sample Verbs: describe, discuss, explain, locate, paraphrase, give example, translate

2. Knowledge
   - Definition: Remembers previously learned material.
   - Sample Verbs: define, identify, label, list, name, recall, state

3. Application
   - Definition: Uses learning in new and concrete situations (higher level of understanding).
   - Sample Verbs: apply, carry out, demonstrate, illustrate, prepare, solve, use

4. Analysis
   - Definition: Understands both the content and structure of material.
   - Sample Verbs: analyze, categorize, compare, contrast, differentiate, discriminate, outline

5. Synthesis
   - Definition: Formulates new structures from existing knowledge and skills.
   - Sample Verbs: combine, construct, design, develop, generate, plan, propose

6. Evaluation
   - Definition: Judges the value of material for a given purpose.
   - Sample Verbs: assess, conclude, evaluate, interpret, justify, select, support

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956
# Psychomotor Domain (Doing, Skills)

## Perception
**Definition:**
Senses cues that guide motor activity.

**Sample Verbs:**
- detect
- hear
- listen
- observe
- perceive
- recognize
- see
- sense
- smell
- taste
- view
- watch

## Set
**Definition:**
Imitates and practices skills, often in discrete steps.

**Sample Verbs:**
- copy
- duplicate
- imitate
- manipulate with guidance
- operate under supervision
- practice
- repeat
- try

## Guided Response
**Definition:**
Performs acts with increasing efficiency, confidence, and proficiency.

**Sample Verbs:**
- complete with confidence
- conduct
- demonstrate
- execute
- improve efficiency
- increase speed
- make
- pace
- produce
- show dexterity

## Mechanism
**Definition:**
Performs automatically.

**Sample Verbs:**
- act habitually
- advance with assurance
- control
- direct
- excel
- guide
- maintain efficiency
- manage
- master
- organize
- perfect
- perform automatically
- proceed

## Complete Overt Response
**Definition:**
Adapts skill sets to meet a problem situation.

**Sample Verbs:**
- adapts
- reorphanizes
- alters
- revises
- changes

## Adaptation
**Definition:**
Organizes

**Sample Verbs:**
- designs
- originates
- combines
- composes
- constructs

---

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956
AFFECTIVE DOMAIN (FEELING, ATTITUDE)

**Receiving**
Definition: Selectively attends to stimuli.

Sample Verbs:
- accept
- acknowledge
- be aware
- listen
- notice
- pay attention
- tolerate

**Responding**
Definition: Responds to stimuli.

Sample Verbs:
- agree to
- answer freely
- assist
- care for
- communicate
- comply
- conform
- consent
- contribute
- cooperate
- follow
- obey
- participate willingly
- read voluntarily
- respond
- visit
- volunteer

**Valuing**
Definition: Attaches value or worth to something.

Sample Verbs:
- adopt
- assume responsibility
- behave according to
- choose
- commit
- desire
- exhibit loyalty
- express
- initiate
- prefer
- seek
- show concern
- show continual desire to
- use resources to

**Organization**
Definition: Conceptualizes the value and resolves conflict between it and other values.

Sample Verbs:
- adapt
- adjust
- arrange
- balance
- classify
- conceptualize
- formulate
- group
- organize
- rank
- theorize

**Internalizing**
Definition: Integrates the value into a value system that controls behavior.

Sample Verbs:
- act upon
- advocate
- defend
- exemplify
- influence
- justify behavior
- maintain
- serve
- support

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956

prepared by Dr David Yeoh - 05/2015
**MATLAMAT (GOALS):**

To provide the knowledge and understanding of steel and timber structures designs according to the recognized code of practices.

**HASIL PEMBELAJARAN (LEARNING OUTCOMES):**

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

1. Design steel and timber structure elements according to BS EN 1993 and BS EN 1995. [PLO10 C5]
2. Manipulate structural design processes to complete the assigned project. [PLO9 P4]
3. Organize the design works report in group effectively which comprise of ideas and problem solving. [PLO5 A4]

**SINOPSIS (SYNOPSIS):**

The application of steel and timber structures in Civil engineering is widely used especially for the purposes of rapid construction, higher strength to weight ratio, ease modification, aesthetic value, etc.
Syllabus example

<table>
<thead>
<tr>
<th>Category of Activities</th>
<th>Activities</th>
<th>Total Hours/ Sem</th>
</tr>
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<td>Tutorial / Practical</td>
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<td>Self learning activities</td>
<td>Preparation for assignments / projects</td>
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<td>Independent study / revisions</td>
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<td>Take final examination</td>
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Syllabus example – CLO matrix

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<th>LO-3</th>
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<th>LO-5</th>
<th>LO-6</th>
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<th>LO-9</th>
<th>LO-10</th>
<th>LO-11</th>
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<th>LO-13</th>
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<th>Assessment</th>
<th>KPI</th>
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<td>Quiz, Test, Project Report</td>
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<td>State concrete mix in accordance with DOE and ACI methods</td>
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<td>Exercise and Discussion</td>
<td>Project Report</td>
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<td>3</td>
<td>Practice in a team to complete the assigned project within the allocated time</td>
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<td>Group discussion and presentation</td>
<td>Project Report / Presentation</td>
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- each Course mapped to 3 PLOs
- each PLO mapped to a Taxonomy level
## Managing the Assessment

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<thead>
<tr>
<th>CLO</th>
<th>DOMAIN</th>
<th>Assessment name</th>
<th>Assessment method</th>
<th>Marks (%)</th>
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<td>CLO 1</td>
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<td>Quiz + Assignment + Test</td>
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<td>Project (C)</td>
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<tr>
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<td>Project (P)</td>
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<tr>
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<td>AFFECTIVE</td>
<td>Project (A)</td>
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100
Managing assessment in TCIS

### Course Co-ordinator Module

**Session:** 20142015/1  
**Programme:** Degree

#### Course List

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<th>No.</th>
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<th>Sem</th>
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<th>Course Name</th>
<th>Submitted / No. Of Section</th>
<th>No. Of Student</th>
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<td>413</td>
<td>4000266 - PROF. MADYA DR. DAVID YEOH ENG CHUAN</td>
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### OBE Matrix

#### Assessment List

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**TOTAL:** 100.00

Prepared by Dr David Yeoh - 05/2015
Key in assessment in SAS
## COURSE ASSESSMENT

### COURSE DETAILS
- **Course Code / Section**: BFC43003 / 2
- **Course Name**: REKABENTUK STRUKTUR KELULI DAN KAYU / STRUCTURAL STEEL AND TIMBER DESIGN
- **Semester / Session**: 2 / 20142015
- **Course Level**: NORMAL
- **Passing Grade**: D
- **No. Of Students**: 65
- **Course Co-ordinator**: [00892] DR NURAZUWA BINTI MD NOOR

### ASSESSMENT LIST

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<td>✔️</td>
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At the end...grade analysis

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<tr>
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<td>HG</td>
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**JUMLAH : 414**

---

**Graf Analisa Gred (Data SMP)**

- **A+**: 0
- **A**: 5
- **A-**: 4
- **B+**: 5
- **B**: 19
- **B-**: 38
- **C+**: 50
- **C**: 4
- **C-**: 82
- **D+**: 0
- **D**: 93
- **D-**: 0
- **E**: 33
- **HL**: 0
- **HG**: 0
- **TS**: 0

*prepared by Dr David Yeoh - 05/2015*
At the end... CLO-PLO analysis

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<th>Sesi/Semester</th>
<th>Kursus</th>
<th>Seksyen</th>
<th>Pilihan OBE</th>
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<th>CLO 2</th>
<th>CLO 3</th>
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![Diagram showing CLO achievement](image_url)

prepared by Dr David Yeoh - 05/2015
**TABLE OF SPECIFICATION (TOS) FOR FINAL EXAM**

**COURSE CODE:** BFC4033/43003  
**NAME OF COURSE:** STEEL AND TIMBER STRUCTURE DESIGN  
**SEMESTER:** 1  
**SESSION:** 2014/2015  

**CLO (Cognitive):**

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<th>COMPREHENSION</th>
<th>APPLICATION</th>
<th>ANALYSIS</th>
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<td>2</td>
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<td>(b) Design of tensile plate</td>
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<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td></td>
<td>(c) Design of tensile member and gusset connection</td>
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<td>3</td>
<td>3</td>
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<tr>
<td></td>
<td>(d) Identify truss tension members</td>
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<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Q2</td>
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<td>(b) Estimate size</td>
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<td>(c) Design welding connection</td>
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**TOTAL MARKS**

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Note: This form can be modified by your own requirement

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**Final exam – preparing a TOS**
Student Learning Time (SLT)

According to MQF, 1 credit = 40 notional hours

Notional hours is simply defined as total hours (lectures, tutorial, practical, student-centred learning activities, self-study, and assessment both formal and informal) required by an average level student to master the stipulated learning outcomes.
### Implementation in UTHM

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<th>Meeting hours/week</th>
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<td>1</td>
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</table>

For courses pre-dominantly based on skill, co-curriculum, final year project and integrated design

<table>
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<tr>
<th>Credit hour</th>
<th>Types of delivery</th>
<th>Meeting hours/week</th>
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<td>Lecture</td>
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<td>1</td>
<td>Tutorial</td>
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<td>1</td>
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### Jadual 1.2: Contoh pengiraan jam pembelajaran pelajar

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**Equivalent to lecture hours**

**Equivalent to total hours for formal assessment**

Prepared by Dr David Yeoh - 05/2015
The end