OUTCOME-BASED EDUCATION (OBE)

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Faculty of Engineering & Science (LKCFES)

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Outlines

• What is OBE?
• Why do we need OBE?
• How does OBE work?
• What is CQI model?
• Who should care about OBE?
“Outcome-based education (OBE) means clearly focusing and organizing everything in an educational system around what is essential for all students to be able to do successfully at the end of their learning experiences. This means starting with a clear picture of what is important for all students to be able to do, then organizing curriculum (outcome), instruction (activity), and assessment to make sure this learning ultimately happens” (Spady, 1994:1).
Why do we need OBE?

Professional Body
- Washington Accord
- Board of Engineers Malaysia
- Engineering Accreditation Council

Qualification Body
- MQF
- MQA
- HES

Malaysian Qualifications Framework
Malaysian Qualifications Agency
High Education Sector
Why do we need OBE?

- Undergraduate curriculum needs to be transformed into adopting OBE in accordance with requirements from:
  - **Engineering Accreditation Council (EAC), Board of Engineers Malaysia (BEM)** (Malaysia is the signatory of **Washington Accord** in 2009)
  - Malaysian Qualifications Framework of **Malaysian Qualifications Agency (MQA)**
  - Sector of Higher Education, **Ministry of Education Malaysia**
Washington Accord

• An agreement between bodies accrediting professional engineering degree programs in each of the signatory countries.

• Recognizes the substantial equivalency of programs accredited by those bodies
  ➢ Recommends graduates of accredited programs in any of the signatory countries be recognized by the other countries as having met the academic requirements for entry to the practice of engineering.

• The signatories as of 2010:
  ➢ United States, United Kingdom, Canada, Australia, New Zealand, Ireland, Hong Kong, South Africa, Japan, Singapore, South Korea, Taiwan, Malaysia (2009), Turkey, Russia.
**Academic Requirements**

- Washington Accord covers undergraduate engineering degrees under **outcome-based education** approach.

- In Malaysia, all engineering degrees are accredited by Engineering Accreditation Council Malaysia (EAC) (http://www.eac.org.my/) consisting of:
  - the Board of Engineers (BEM),
  - the Institution of Engineers Malaysia (IEM),
  - Industry Employers,
  - Malaysian Qualification Agency (MQA) and
  - the Public Service Department (JPA).

- EAC signed for Malaysia.
## International Recognition Criteria

- Better than peers

<table>
<thead>
<tr>
<th>Washington Accord</th>
<th>Sydney Accord</th>
<th>Dublin Accord</th>
</tr>
</thead>
<tbody>
<tr>
<td>covers <em>Engineers</em> who deal with <strong>Complex Problems</strong> that have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models</td>
<td>covers <em>Technologists</em> who deal with <strong>Broadly-defined Problems</strong> that can be solved by well-proven analysis techniques</td>
<td>covers <em>Technicians</em> who deal with <strong>Well-defined Problems</strong> that can be solved in standardized ways</td>
</tr>
</tbody>
</table>
How does OBE work?

- What do you want the students to learn?
- Why do you want them to learn it?
- How can you best help students to learn it?
- How will you know what they have learnt?

OBE’s approach to these questions

- Define **learning outcomes** to explicate what a student is expected 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**
Characteristics of OBE

- It is centered around the needs of the students and the stakeholders.
- It is objective and outcome driven, where every stated objective and outcomes can be assessed and evaluated.
- Every learning outcome is intentional and therefore the outcomes must be assessed using suitable performance indicators.
- Teaching/Learning method may have to be integrated to include different delivery methods to complement the traditional lecturing method.
OBE vs. Traditional Education (TE)

- OBE’s instructional planning process is a **reverse** of that associated with TE planning.
- The **desired outcome** is **defined first**
  - All educational decisions are made based on how best to facilitate the desired outcomes.
- The curriculum, instructional materials, and assessments are created to support the intended outcome.

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- OBE emphasizes **active learners with critical thinking, reasoning, and actions**.
- TE leads to passive learners by rote, limited by rigid syllabi and textbooks.
Characteristics of OBE

It has

- Effective **Program Educational Objectives (PEO)**
- Effective **Program Outcomes (PO)**
- Effective and robust Assessment Planning and Practical Assessment Tools ⇒ **Performance Indicators**
- **Continuous Quality Improvement (CQI)**
OBE Framework

Professional Level

Programme Level

Course Level
UTAR Vision & Mission

Vision
To be a global university of educational excellence with transformative societal impact

Mission
We are committed to achieving the Vision through:

- Universal values in our beliefs
- Tenacity in overcoming challenges
- Agility in facing new frontiers
- Responsibility in pursuit of excellence
PEO:

**Program Educational Objectives address the graduates attainment within 3-5 years after their graduation**

A Mechanical Engineering programme is to produce:

PEO 1: Graduates competent in practising fundamental scientific and engineering principles in Mechanical engineering.

PEO 2: Graduates capable of communicating and managing effectively in diverse areas of Mechanical.

PEO 3: Graduates practising professional ethics, life-long learning, and sustainable development for the betterment of the profession and society.
<table>
<thead>
<tr>
<th>PEO</th>
<th>Domain</th>
<th>Assessment Indicators</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO 1</td>
<td>Technical Competence (Cognitive)</td>
<td>1) Work Domain 2) Functional Position 3) Monthly Wages</td>
<td>50%</td>
</tr>
<tr>
<td>PEO 2</td>
<td>Communication/Leadership (Affective)</td>
<td>1) Leadership 2) Communication Proficiency</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>PEO 3</td>
<td>Professionalism/Life Long Learning (Affective)</td>
<td>1) Professional Membership 2) Professional/Technical Development</td>
<td>50%</td>
</tr>
</tbody>
</table>
Program Outcomes the students should have achieved by graduation time; address Cognitive (C), Psychomotor (P), and Affective (A) to be attained by students.
Cognitive Skills

- **PO1**: Engineering Knowledge
- **PO2**: Problem Analysis
- **PO3**: Design/Development of Solutions
- **PO4**: Investigation

Affective Skills

- **PO6**: The Engineer and Society
- **PO7**: Environment and Sustainability
- **PO8**: Ethics
- **PO9**: Communication
- **PO10**: Individual and Team Work
- **PO11**: Life-long Learning
- **PO12**: Project Management and Finance

Psychomotor Skills

- **PO5**: Modern Tool Usage
Activities in classroom leading to experiential learning.

Encouraging students to think and solve problems methodically

Psychomotor Skills

Cognitive Skills

Affective Skills

Leading students to more interaction with peers, as well as self-confidence.
Learning Domains:

Cognitive

6. Creating
5. Evaluating
4. Analysing
3. Applying
2. Understanding
1. Remembering

Affective

5. Internalizes Values (Characterization)
4. Organization
3. Valuing
2. Responds to Phenomena
1. Receiving Phenomena

Psychomotor

7. Origination
6. Adaptation
5. Complex Overt Response (Expert)
4. Mechanism (Basic Proficiency)
3. Guided Response
2. Set
1. Perception (Awareness)
**Characteristics of OBE**

**CO:**

Course (learning) **Outcomes** that are expected from a certain subject; they are assessed and evaluated through various measurement tools

<table>
<thead>
<tr>
<th>Course Outcome (CO)</th>
<th>CO Descriptions</th>
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</thead>
<tbody>
<tr>
<td>CO1</td>
<td>Relate the knowledge of nanotechnology principles and industry applications.</td>
</tr>
<tr>
<td>CO2</td>
<td>Categorize the nanoscale paradigm in terms of properties at the quantum dimension.</td>
</tr>
<tr>
<td>CO3</td>
<td>Justify top-down and bottom-up approaches</td>
</tr>
<tr>
<td>CO4</td>
<td>Evaluate potential advanced materials in the field of nanotechnology</td>
</tr>
<tr>
<td>CO5</td>
<td>Synthesize nanomaterials by chemical approach</td>
</tr>
</tbody>
</table>
**Check linkage between CO-PO**

CO to PO Mapping

<table>
<thead>
<tr>
<th></th>
<th>PO 1</th>
<th>PO 2</th>
<th>PO 3</th>
<th>PO 4</th>
<th>PO 5</th>
<th>PO 6</th>
<th>PO 7</th>
<th>PO 8</th>
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<td></td>
<td></td>
<td></td>
<td>4. Mechanism(Basic Proficiency)</td>
</tr>
</tbody>
</table>

- **EXPLICITNESS**: ONLY **one CO** mapped to **one PO**.
- Cognitive skills could be typically assessed by mid-term text and final exam.
- Affective and Psychomotor skills could be assessed by practical/assignment/project etc. using appropriate rubric.
### Assessment vs. CO Mapping

<table>
<thead>
<tr>
<th>Assessment Name</th>
<th>Coursework 1</th>
<th>Coursework 2</th>
<th>Coursework 3</th>
<th>Coursework 4</th>
<th>Coursework 5</th>
<th>Final Exam 1</th>
<th>Final Exam 2</th>
<th>Final Exam 3</th>
<th>Final Exam 4</th>
<th>Final Exam 5</th>
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<tbody>
<tr>
<td>Question Description</td>
<td>P</td>
<td>Q</td>
<td>T</td>
<td>A-1</td>
<td>A-2</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q5</td>
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<td>Group 1</td>
<td>Group 1</td>
<td>Group 1</td>
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<td>Require Answer</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

- **EXPLICITNESS:** ONLY *one AQ* mapped to *one CO*
- All course outcomes should be assessed using appropriate assessment.
- The assessments should be designed/set to assess whether students achieve the course outcomes.
- The assessments also should be designed/set to assess the three learning domains.
Continuous Quality Improvement (CQI)

- **Assessment and evaluation processes** provide critical information to lecturers and administrators on the effectiveness of the design, delivery, and direction of an educational program.

- Improvements based on **feedback from evaluations** will close the system loop and the process will **continue year after year**.
OBE Framework: Course Level

Trimester

P
Planning

D
Implementing

C
Evaluating

A
Improving

Course Level

Course Planning
- Syllabus: Course Outcomes
- Teaching Plan
- Assessment Plan

Lecture + Assessment
- Coursework Moderation
- Final Exam Moderation
- Attendance
- Course Attribute Matrix

CO Achievement
- Student Results
- Student Survey

Course Revision
- Course Report

Documents

Time Frame

WEEK 0

WEEK 1 - 14

WEEK 15-18

WEEK 19-20
OBE Framework: Programme Level

Programme Level
- Planning
- Implementing
- Evaluating
- Improving

Course Level
- Planning
- Implementing
- Evaluating
- Improving

Time Frame
- Trimester 1
- Trimester 2
- Trimester 3
OBE Framework: Overall

Planning
- PEO Planning

Implementing
- Programme Planning
- Lecture + Assessment

Evaluating
- Course Planning
- PO Achievement
- CO Achievement
- Alumni Survey

Improving
- APMR
- APMR*
- Course Revision

*APMR: Annual Programme Monitoring Report
# OBE Framework

<table>
<thead>
<tr>
<th>Level</th>
<th>Outcomes</th>
<th>Assessment (Performance Indicator)</th>
<th>Monitoring Cycle</th>
<th>Revision Cycle</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>PEO (Programme Educational Objectives)</td>
<td>Alumni Survey Employer Survey</td>
<td>Annually</td>
<td>Every 4 Years</td>
<td>Alumni Employer IAP EE EAC Staff</td>
</tr>
<tr>
<td>Programme</td>
<td>PO (Programme Outcomes)</td>
<td>FYP Survey PO Attainment</td>
<td>Annually</td>
<td>Every 4 Years</td>
<td>IAP Employer EE Staff Student</td>
</tr>
<tr>
<td>Course</td>
<td>CO (Course Outcomes)</td>
<td>Final Exam Coursework CO Attainment</td>
<td>Every Trimester</td>
<td>Annually</td>
<td>IAP EE Staff Student</td>
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</tbody>
</table>
Maintain Programme
(PO, PEO, PO-PEO Mapping)

Maintain Course
(CO, CO-PO Mapping)

Maintain Assessment
(AQ, AQ-CO Mapping)

Maintain Result
(Coursework & Exam Result)

Summary Report
(Check Completeness of Mapping)

Status Controller

View Reports

View Dashboard
EOBE2: PEO

Programme Details

Campus : Sungai Long
Faculty : LEE KONG CHIAN FACULTY OF ENGINEERING AND SCIENCE
Level : B - Bachelor
Trimester : 201605
Programme : BACHELOR OF ENGINEERING (HONS) MECHANICAL ENGINEERING
Passing Threshold : 50
Total PEO : 3
Total PO : 12
PO-PEO Mapping : COMPLETE
Created :
Modified :

Programme Educational Objective (PEO)

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>PEO1</td>
<td>Technical Competence</td>
</tr>
<tr>
<td>PEO2</td>
<td>Communication/ Leadership</td>
</tr>
<tr>
<td>PEO3</td>
<td>Professionalism/Life Long learning</td>
</tr>
</tbody>
</table>
# EOBE2: PO-PEO Mapping

## Programme Details

<table>
<thead>
<tr>
<th>Campus</th>
<th>Sungai Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>LEE KONG CHIAN FACULTY OF ENGINEERING AND SCIENCE</td>
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<tr>
<td>Level</td>
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</tr>
<tr>
<td>Trimester</td>
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<td>Total PEO</td>
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<td>Total PO</td>
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<td>PO-PEO Mapping</td>
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</table>

## PEO to PO Mapping

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<th>PEO</th>
<th>PO 1</th>
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<th>PO 5</th>
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<th>PO 10</th>
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<th>PO 12</th>
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</table>
# EOBE2: Course

## Course Details

<table>
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<th>Sungai Long</th>
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<tbody>
<tr>
<td>Faculty</td>
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<td>Level</td>
<td>B - Bachelor</td>
</tr>
<tr>
<td>Trimester</td>
<td>201605</td>
</tr>
<tr>
<td>Programme</td>
<td>BACHELOR OF ENGINEERING (HONS) MECHANICAL ENGINEERING</td>
</tr>
<tr>
<td>Course Name</td>
<td>UEMT4123 - INTRODUCTION TO NANOTECHNOLOGY: MATERIALS AND FABRICATIONS</td>
</tr>
<tr>
<td>Passing Threshold</td>
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<tr>
<td>PO Attainment</td>
<td>Weightage by the Contribution (%) to Final</td>
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<tr>
<td>Total CO</td>
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<tr>
<td>CO-PO Mapping</td>
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<td>CO-AQ Mapping</td>
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<tr>
<td>Created by</td>
<td></td>
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<tr>
<td>Modified by</td>
<td>2017-02-22 09:13:58 (Chen Kah Pin)</td>
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## Assessment Weightage

<table>
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<tr>
<th>Assessment</th>
<th>Weightage</th>
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<tr>
<td>Final Exam</td>
<td>60 %</td>
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<tr>
<td>Continuous Assessment</td>
<td></td>
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<tr>
<td>Coursework</td>
<td>40 %</td>
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<tr>
<td>Practical</td>
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## EOBE2: Assessment

### Assessment

**Final Exam**

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Full Marks</th>
<th>Group</th>
<th>% to Final (60%)</th>
<th>Answer &quot;X&quot;</th>
<th>out of &quot;Y&quot; Questions</th>
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<tbody>
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**Coursework**

<table>
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<tr>
<th>No.</th>
<th>Assessment Method</th>
<th>Full Marks</th>
<th>Group</th>
<th>% to Final (40%)</th>
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<th>out of &quot;Y&quot; Questions</th>
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EOBE2: Data Entry

Continuous Assessment

- Last Downloaded: 2017-01-23 13:30
- By Low Bee Eng

Final Exam

- Last Downloaded: 2017-01-23 13:30
- By Low Bee Eng

Choose File: No file chosen

Last Uploaded: 2017-01-13 16:27
By Low Bee Eng

Choose File: No file chosen

Last Uploaded: 2017-01-13 16:27
By Low Bee Eng

Level: B - Bachelor
Trimester: 2016/10
Programme: BACHELOR OF ENGINEERING (HONS) MECHANICAL ENGINEERING
Course Name: UEHE4253 - PROJECT MANAGEMENT
Passing Threshold: 50
Assessment Method: Equal Weightage
Total CG: 5
CO-PO Mapping: COMPLETE
CO-AQ Mapping: COMPLETE
Created by: 2017-01-20 16:09:01 (Low Bee Eng)
Modified by: 2017-01-20 16:09:01 (Low Bee Eng)
EOBE2: Reports

PO achievement at course level (by trimester)

AVERAGE OF PO ACHIEVEMENT

POID:

- Faculty: LKC FES - LEE KONG CHIAN UNIVERSITY OF ENGINEERING AND SCIENCE
- Level: B
- Trimester: 201605
- Programme: ME - BACHELOR OF ENGINEERING (HONS) MECHANICAL ENGINEERING
EOBE2: Reports

CO achievement at course level (by trimester)

Average of COPerformance

AVERAGE OF CO ACHIEVEMENT

<table>
<thead>
<tr>
<th>COID</th>
<th>CO1</th>
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Faculty: KONG CHIAN FACULTY OF ENGINEERING AND SCIENCE
Level: B
Trimester: 201605
Programme Name: ME - B.ELOR OF ENGINEERING (HONS) MECHANICAL ENGINEERING
Course: UEMT41 - INTRODUCTION TO NANOTECHNOLOGY: MATERIALS AND FABRICATIONS