The principle goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done -- men who are creative, inventive and discoverers. “Jean Piaget

“The only person who is educated is the one who has learned how to learn and change.” Carl Rogers

“Teachers are powerful people and keepers of the future. Help your students dream big!” Leslie Owen Wilson

Agenda

• All the planned learning experiences of a school or educational institution
• A series of experiences that will result in them learning what you intend them to learn.
• It includes consideration of aims, intended learning outcomes, syllabus, learning and teaching methods, and assessment.
"We must produce confident students with a sense of balance and proportion. While an individual may specialise in a certain area, his or her perspective should be enriched by other experiences as well."

"The MOHE will thus introduce a holistic programme that will cut across all disciplines and focus on communication and entrepreneurial skills. The programme, which is intended to build a balanced perspective in all students, will expose them to subjects beyond their area of specialisation. For example, students reading for degrees in the sciences such as medicine, engineering and chemistry will be exposed to courses covering literature and philosophy. Likewise, students in the humanities will be exposed to the rudiments of science and technology, and certainly, ICT."

Source: NATIONAL HIGHER EDUCATION ACTION PLAN 2007-2010
MOHE’s Attributes of Human Capital with First-Class Mentality*

Knowledge Attributes:
- Mastery of core subjects and ability to apply that knowledge
- Mastery of Bahasa Malaysia and English, and at least one other global language.
- A continuing passion for knowledge through lifelong learning.
- Excellent general knowledge and interest in current events.
- Appreciation of the arts, culture and sports.
- Sound analytical and problem-solving skills.
- Awareness of business and management principles, and technology.

Personal Attributes:
- Goal-oriented: proactive, self-starting, self-disciplined, confident, resilient, motivated, and fiercely competitive.
- Intellectually engaging: creative, innovative, and possessing critical thinking skills.
- Quick learner, adaptable, and flexible.
- Entrepreneurial.
- Ethically and morally upright.
- Spiritually grounded.
- Compassionate and caring (through volunteerism and social services).

Interpersonal Attributes:
- Able communicator and effective presenter.
- Able to relate and be comfortable with people at all levels.
- Able to develop and leverage on personal and professional networks to achieve goals.
- Natural leader.
- Team player.
Keperluan JKPT

• Memenuhi/mencapai PSPTN Teras Kedua – Menambahbaik Kualiti Pengajaran & Pembelajaran
• Di akhir pengajian di IPTA, pelajar perlu memenuhi attributes/kriteria tertentu. Yang telah dijanjikan kepada pelajar dalam Hasil Pembelajaran samada Program atau Kursus.
• Kurikulum pengajian perlu diasaskan kepada kelebaran dan kedalaman yang sesuai i.e. breadth and depth
• **Breadth** sesuatu program/kursus boleh dirangka melalui matriks Hasil Pembelajaran dan Kemahiran Insaniah
• **Depth** sesuatu program/kursus boleh dirangka melalui matriks Taksonomi
• **Contoh Matriks** ada disediakan, walau bagaimanapun terpulang kepada IPTA masing-masing untuk menyediakannya mengikut keperluan masing-masing, selagi boleh menyediakan perancangan dari segi kriteria pelajar, kelebaran dan kedalaman kurikulum.
Born & Raised in the state of Hang Jebat…
Early education at St. David’s, Science Malacca & SDAR (Seremban)
Teaching Certificate (1986) – MPTI
Served ITM – Jan 1987

Physics & Education expert
- Practiced OBE & Active Learning especially on his own since 1997.
- Vice-Chair Asian Physics Education Network (ASPEN), UNESCO
- Chair for ASPEN, Malaysia
- Nominated for Innovative Teaching & Learning National & International
- Keynote, Plenary and Invited Speaker in Conferences Nationally & Internationally

Can explain: provide thorough, supported, and justifiable accounts of phenomena, facts, and data.

Can interpret: tell meaningful stories; offer apt translations; provide a revealing historical or personal dimension to ideas and events; make it personal or accessible through images, anecdotes, analogies, and models.

Can apply: effectively use and adapt what we know in diverse contexts.

Have perspective: see and hear points of view through critical eyes and ears; see the big picture.

21st Century 3R's
What Is True Understanding

Can empathize: find value in what others might find odd, alien, or implausible; perceive sensitively on the basis of prior direct experience.

Have self-knowledge: perceive the personal style, prejudices, projections, and habits of mind that both shape and impede our own understanding; we are aware of what we do not understand and why understanding is so hard.

Grant Wiggins and Jay McTighe. Understanding by Design; Chap 4.
1. Critical thinking and problem solving skills (P)
2. Communication skills (P)
3. Group working skills (A)
4. Ethics and professionalism (A)
5. Lifelong learning and information management (A)
6. Entrepreneurship skills (P)
7. Leadership skills (A)
Malaysia Qualification Agency's (MQA)
Areas of Benchmarks
HEP's accountability & Employer's Demand
Learning Outcomes

At the end of the 2-days workshop, participants will confidently be able to:

1. Explain the meaning of curriculum and curriculum design.
2. Explain and discuss the concepts of Program Educational Objectives and Program Outcomes.
3. Explain, with examples, the concept of Learning Outcomes
4. Apply the concept of Learning Outcomes to the different levels of curriculum design.
5. Enhance a set of Program Educational Objectives (PEO’s)
   • employability attributes
6. Enhance a set of Program Outcomes (PO’s).
7. Justify and agree on the PEO’s and PO’s.
Learning Outcomes
At the end of day this session, participants will confidently be able to:

7. Develop the PO’s-PEO’s matrix and the PO’s-MOHE-SS-matrix.
8. Develop the Course-PO-PEO-LO matrix.
9. Develop the Learning Taxonomy matrix
10. Generate the % of courses vs. Depth of taxonomy for the Cognitive, Psychomotor and Affective Domains respectively.
11. Develop the Course-KI matrix.
12. Produce the SLT table for a course.

An outcome is:
➢ The result or consequence of a performance (in terms of success and failure).
➢ The way a thing turns out; a consequence

✔ The outcome of my discussion with Che Aminah is…
✔ Upon the completion of an DIA program at UiTM, bumiputra graduates will be able to ……
✔ This workshop will produce….
What is a Program/Course/Lesson Outcome??

A statement of what students will be able to do when they have completed the program/course/lesson and it involves graduate's skills and knowledge that arise from the educational activities of the program/course/lesson which lead to the achievement of the Program Objectives

An outcome has three major components:

- A description of what the students will be able to do
- The conditions under which the students will perform the task.
- The criteria for evaluating students' performance.

An outcome at the course level

At the end of this activity, you will be able to agree on at least 5 attributes of your graduates for the program you are developing.
Outcomes:
PEOs, POS, COS

Why Am I Here With You Today
Facilitate OBE-compliant Documents
Develop Program Educational Objectives (PEOs)
Develop Program Outcomes (POs)
Develop PO-PEO matrix
Develop PO-PEO-LO-KI matrix
Develop COS
Develop SLTs
Develop Course-PO-PEO-MOME LO-TAXONOMY-KI
Outcome Based Education

Institutional Attributes

- General (not measurable)

Program level (Still general)

- General (not measurable)

Course Level (Specific but not measurable)

Lesson Level (Very specific & MUST be measurable)

**Vision & Mission**

- Stakeholders: students, faculty, alumni, employers of program graduates, and funding sources

**Program Educational Objectives**

**Program Outcomes**

- PO-LOKI

**Course Structure** (select courses to address POs)

- Course Outcomes (COs)

- Course syllabus (selection of content) + delivery methods

**Assessment** (Measuring the achievement of COs & POs)

- Evaluation (Continuous Quality Improvement-CQI)
UiTM’s VISION (2006)
➢ To establish UiTM as a premiere university of outstanding scholarship and academic excellence capable of providing leadership to Bumiputera’s dynamic involvement in all professional fields of world-class standards in order to produce globally

UiTM’s PHILOSOPHY (2006)
➢ A believe that every individual has the ability to attain excellence through the transfer of knowledge and the assimilation of moral values so as to become professional graduates capable of developing knowledge, self, society and the nation.

UiTM’s MISSION (2006)
➢ To enhance the knowledge and expertise of Bumiputera’s in all fields of study through professional programmes, research work and community service based on moral values and professional ethics
UiTM: Produce the Human Capital

Knowledgeable

Skillful

Creative

Critical

Analytical

Scientific

Competitive

Proactive

Sensitive

Excellent Persona

Independent

High morals

Ethical

Religious-conscious

Mentally strong

OBE Aligns the
Vision
The Outcomes
The Content
The Learning Activities
The Assessment
Outcome Based Education

OBE is a method of curriculum design and teaching that focuses on what students can actually do after they are taught. OBE addresses the key questions as:

- Why do you want them to learn it? – Vision, Mission, PEOs, POs
- What do you want the students to learn? – course structure, syllabus
- How can you best help students learn it? – Learning Activities
- How will you know what they have learnt? - Assessment
Towers (1996) listed four points to the OBE system that are necessary to make it work:

a) What the student **is to learn must be clearly identified**.

b) The student’s progress is based on demonstrated achievement.

c) **Multiple instructional and assessment strategies** need to be available to meet the needs of each student.

d) **Adequate time and assistance need to be provided** so that each student can reach the maximum potential.

The desired outcome is selected first and the curriculum, instructional materials and assessments are created to support the intended outcome (Spady 1988; 1993).

**All curriculum and teaching decisions are made based on how best to facilitate the desired final outcome.**
OBE is able to measure—‘what the students are capable of doing’

OBE goes beyond ‘structured tasks’ (e.g. memorization)

OBE demands that students demonstrate his/her skills through more challenging tasks like writing project proposals and completing the projects, analyzing case studies and giving case presentations etc. Such exercises require students to practice and demonstrate their ability to think, question, research, make decisions and give presentations.

OBE involves students in a complete course of learning, developing their skills in designing to completing a whole process (Spady, 1994a, 1995).

OBE also identifies higher levels of thinking (e.g. creativity, ability to analyze and synthesize information, ability to plan and organize tasks). Such skills are emphasized especially when students are assigned to organize and work as a community or entrepreneurial service teams to propose solutions to problems and market their solutions.
1. Clarity of focus about outcomes
   - Always have the significant, culminating exit outcomes as the focus.
   - Let the students know what they are aiming for.

2. Designing backwards
   - Design curriculum backward by using the major outcomes as the focus and linking all planning, teaching and assessment decisions directly to these outcomes.

3. Consistent, high expectations of success
   - Set the expectation that OBE is for ALL learners.
   - Expect students to succeed by providing them encouragement to engage deeply with the issues they are learning and to achieve the high challenging standard set (Spady, 1994b).

4. Expanded opportunity
   - Develop curriculum to give scope to every learner to learn in his/her own pace.
   - Cater for individual needs and differences, for example, expansion of available time and resources so that all students succeed in reaching the exit outcomes.
MQF for Diploma
Degree & Masters

MQF Framework for University Preparatory level-Outcomes

Foundation or University Preparatory Course

Foundation Courses or University Preparatory Courses such as Sijil Tinggi Persekolahan Malaysia (STPM), Matriculation and Foundation Certificates are not in the MQF as they are the entry qualifications to universities. Nonetheless, MQF determines standards for these certificates to ensure comparability and standardisation of student abilities. Generally, these are conferred on students who are able to:

(i) show knowledge and comprehension in the field of study that is continued from secondary school as indicated in advanced text books;
(ii) use knowledge and comprehension to identify and use data in respond to concrete and complex problems;
(iii) communicate and clarify understanding and skills to peers and supervisors; and
(iv) demonstrate skills for purposes of pursuing higher education.
**MQF Framework for Preparatory level-Outcomes**

**Knowledge & Comprehension**
- basic concepts of the relevant academic disciplines that enable students to enter Arts or Science based university courses

**Intellectual Skills**
- skills of the different approaches to solving problems

**Psychomotor Skills**
- basic laboratory skills, project work, group work and field activities.

**Generic Skills**
- communicate accurately, effective use of ICT
- Some exercise of personal responsibility

---

**MQF Framework for Diploma level-Outcomes**

Diploma level education balances theory and practice or practical, and stresses on the instillation of values, ethics and attitudes to enable students to:

(i) use knowledge, comprehension and practical skills at work;
(ii) assess and decide, taking into account social, scientific and ethical issues with moderate autonomy;
(iii) be confident and entrepreneurial in pursuing their own careers;
(iv) be responsible members of society;
(v) possess study skills in adapting to ideas, processes and new procedures for career development;
(vi) acquire team and interpersonal skills that are appropriate to employment; and
(vii) communicate effectively and to transmit information, ideas, problems and resolutions cogently to experts and non-experts.
**MQF Framework for Diploma level-Outcomes**

**Knowledge & Comprehension**
- breadth, depth and complexity of knowledge for complex skills (degree of emphasis on breadth as against depth of knowledge may vary between qualifications granted at this level)

**Intellectual Skills**
- substantial degree of judgment for problem solving

**Psychomotor Skills**
- perform a broad range of complex technical operations

**Generic Skills**
- Communication & participation in teams  
- Exercise responsibility and substantial autonomy for own continuing learning Some exercise of personal responsibility  
- work related attitudes and ethics shown in exercise of responsibility and substantial autonomy for own output in work and responsibility for the work of others

---

**MQF – Bachelors degree (Hons.)**

A Bachelor's degree prepares students for general employment, entry into postgraduate programme and research as well as highly skilled careers. It enables the individuals to pair responsibilities, which require great autonomy in professional decision-making. The bachelors degree is conferred on individuals who are able to:

(i) demonstrate knowledge and comprehension on fundamental principles of a field of study, acquired from advanced textbooks;

(ii) use the knowledge and comprehension through methods that indicate professionalism in employment;

(iii) argue and solve problems in their field of study;

(iv) show techniques and capabilities to search and use data to make decisions having considered social, scientific and relevant ethical issues;

(v) communicate effectively and convey information, ideas, problems and solutions to experts and non-experts;

(vi) apply team and interpersonal skills which are suitable to employment; and

(vii) possess independent study skills to continue further study with a high degree of autonomy.
MQF Framework for Degree level-Outcomes

Knowledge & Comprehension
- systematic and coherent body of complex knowledge, some of it at the boundaries of an academic discipline
- major studies in which significant literature is available. Course content is taken to a significant depth and progressively developed to a high level which provides a basis for postgraduate study and professional careers.

Intellectual Skills
- analytical techniques and problem solving skills that can be applied in many types of employment, including in a professional

Psychomotor Skills
- Practical/technical skills relevant to the discipline

Generic Skills
- communicate effectively.
- interpersonal and team skills appropriate for employment
- prepared to undertake research, comprehend and evaluate new information and concepts from a range of sources, weigh evidence, arguments and assumptions, to reach sound judgments,
- have developed a foundation for self-directed and life long learning
- exercise of substantial personal responsibility and decision-making in complex and unpredictable circumstances.
- Observation of professional ethics
MQF – Masters Degree

Masters

A Masters Degree provides for the furtherance of knowledge, skills and abilities obtained at the Bachelors level. The entrance to masters is usually based on proven capabilities to pursue postgraduate studies in the selected fields. A masters degree is conferred on students who are able to:

(i) demonstrate continuing and additional knowledge and comprehension above that of the bachelors degree and have capabilities to develop or use ideas, usually in the context of research;
(ii) use the knowledge and comprehension to solve problems related to the field of study in new situations and multi-disciplinary contexts;
(iii) integrate knowledge and manage complex matters;
(iv) evaluate and make decision in the situations without or with limited information by considering social responsibilities and related ethics;
(v) deliver clearly the conclusion, knowledge and the rationale to experts and non-experts; and
(vi) demonstrate study skills to continuously progress on their own with a high degree of autonomy to do so.

MQF – Doctoral

Doctoral

A Doctoral Degree provides for the further enhancement of knowledge, skills and abilities obtained at the masters level. It generally provides the graduate with the abilities to conduct independent research and is conferred on students who are able to:

(i) show a systematic comprehension and in depth understanding of a discipline and mastery of skills and research methods related to the field of study;
(ii) show capabilities to generate, design, implement and adopt the integral part of research process with scholarly strength;
(iii) contribute to the original research that has broadened the boundary of knowledge through an in-depth dissertation, which has been presented and defended according to the international standards including writing in internationally refereed publications;
(iv) make critical analysis, evaluation and synthesis of new and complex ideas;
(v) communicate with peers, scholarly communities and society at large concerning the field of expertise; and
(vi) promote the technological, social and cultural progress in a knowledge based society in the academic and professional contexts.
Domains of Learning

Cognitive Skills (psychomotor)
Affective (attitudes, feelings)
**Psychomotor Domain** (doing, skills)

**Affective Domain** (feeling, attitudes)

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor, 1956.
Course Outcomes: Upon completion of this course, students will be able to:

1. **State, write and explain** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Knowledge) **(PO1)**

2. **Verbally, visually (pictures & graphs) and algebraically relate and discuss** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Comprehension) **(PO1, PO6)**

3. **Verify, assess & employ** the concepts, laws and theories in electrostatics, electricity, magnetism, light, introductory atomic physics and modern physics to solve qualitative & quantitative problems visually, algebraically and occasionally, numerically. (C-Application) **(PO1)**

4. **Analyze, summarize and discuss** solution to real world problems associated with electrostatics, electricity, magnetism, introductory atomic physics and modern physics. **(for 3rd year course only) (PO1, 6, 8)**

5. **Observe, formulate, plan, conduct, and report** scientific investigations in areas of electrostatics and electricity. **(PO2, 3, 6)**

6. **Verbally justify and convince peers** and the facilitator, their rationale for the choice of methods, their ability to use and manipulate equipments, the need to transform raw scores into tabular and graphical forms and their ability to explain and interpret results of their investigation in areas of electrostatics and electricity. **(PO2, 3, 7)**

7. **Collaborate, motivate and truthful** with team members and with facilitators in both the labs and in the classroom. **(PO5, 8)**
**Writing Course Outcomes**

**COURSE: FSG500-Philosophy of Science**

1. **Identify** their learning preferences, attitudes towards science and conceptual understanding in their field of study.
2. **Define** truth, beliefs and knowledge and justify their own belief about science knowledge in chemistry or physics through conceptual inventories.
3. **Apply** the philosophical approach in analyzing and justifying the scientific methods, principles, laws and theories about the natural world.
4. **Identify** their science reasoning skills.
5. **Argue and justify** their opinion on issues in philosophy of science.
6. **Critically write** an original 3000 words position paper in favor or against issues on science that concern ethics and morality.

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

1. Draw the electric force exerted by one point charge onto another and describe the motion of charges in the presence of other point charges.
2. Describe the cause of motion between point charges.
3. Describe and produce a model of the force in terms of the strength and direction that are acting on and by a point charge and on and by many point charges.
At the end of this activity students will be able to:

4. Describe and draw the electric field patterns created by point charges surrounding a point charge.
5. Describe and draw the electric field patterns surrounding two like point charges and two unlike point charges.
6. Measure the strength of an electric field produced by a point charge at various localities and produce a mathematical model of the strength.

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

Draw the electric force exerted by one point charge onto another and describe the motion of charges in the presence of other point charges.
At the end of this activity students will be able to:

Describe and draw the electric field patterns created by point charges surrounding a point charge.

Activity

Using the Electric Field Hockey PHET simulation and choose the hockey putt be the negatively charged particle feeling the force, move a negative charge near it to “see” the force exerted on the putt. Then draw the force diagram based on your observation. Using a ruler, measure the length of each force line. Now compare the force diagram for each of the electrons to your predicted diagram. How different are they? Explain the similarity and differences you observed in terms of the direction and length of the force line.
Paradigm Shift - The Evolution

Traditional

Electrostatic forces
like charges repel

+ +

opposite charges attract

+ -

Magnetic forces
like poles repel

N S  N S

opposite poles attract

N S  N S

SCL - Simulation

Copyright DrJJ, ASERG, FSG UiTM, June 2009
Reflection

“The goal of intellectual education is not how to repeat or retain ready-made truths… . It is in learning to master the truth by oneself at the risk of losing a lot of time and going thru all the roundabout ways that are inherent in real activity.”

(Jean Piaget, Swiss cognitive psychologist, 1896-1980)
How Does MQF Affect Teaching-Learning?

**Teacher - centered**
- Course Objective is the Learning Target
- Student Independent Learning Not Calculated
- Contact hours Reflects Credit value

**Student - centered**
- Learning Outcomes is the Learning Target
- Mapping of learning outcomes necessary
- Student independent Learning Time Calculated
- Total SLT reflects Credit value
Lecturer-Centred to Student-Centred
(incorporating SLT)

<table>
<thead>
<tr>
<th>Academic Activity (some examples)</th>
<th>Face</th>
<th>Student Self-Learning*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Lecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2 Tutorial</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3 Laboratory/Practical</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>4 Assignment - 2000 words</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>5 Presentation</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>4</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

* Using the Proposed student independent learning in relation (Slide 17)

Credit = the measurement of students’ academic load

Student Learning Time (SLT)

Achievement of Learning Outcomes

Teaching/Learning + Assessment

e.g. 4 800 notional SLT = 120 credits

Total SLT  ➔  40  ➔  Credit

Credit = the agreed-upon value used to measure a student workload in terms of learning time required to complete course units resulting in learning outcomes (UNESCO, 2004)
Factors In Calculating Credit

Face to Face / Guided Learning Time
+ Student Self Learning Time
+ Total Assessment Time

Student Categories & 130 credit Bachelors

<table>
<thead>
<tr>
<th></th>
<th>Least Diligent</th>
<th>Diligent</th>
<th>Very Diligent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of weeks in a semester (A)</td>
<td>1/7</td>
<td>1/7</td>
</tr>
<tr>
<td>2</td>
<td>Recommended SLT per week (B)</td>
<td>40</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>Recommended total SLT per semester (C)</td>
<td>680</td>
<td>816</td>
</tr>
<tr>
<td>4</td>
<td>Recommended credit per semester (D)</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>(C ÷ 40)</td>
<td>(20/4)</td>
<td>(23/4)</td>
</tr>
<tr>
<td>5</td>
<td>Total graduating credit for programme (E)</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>6</td>
<td>Number of semesters (long semester) (F)</td>
<td>7.6</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>(E ÷ D)</td>
<td>(76/4)</td>
<td>(65/4)</td>
</tr>
<tr>
<td>7</td>
<td>Number of academic year (2 long semesters 1 year)</td>
<td>3.8</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>(F ÷ 2)</td>
<td>(3.8)</td>
<td>(3.3)</td>
</tr>
</tbody>
</table>
**Proposed student independent learning time**

<table>
<thead>
<tr>
<th>Item</th>
<th>Duration (hours) or requirements</th>
<th>Proposed Student Self Learning Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Tutorial</td>
<td>1</td>
<td>1-2</td>
</tr>
<tr>
<td>Tutorial (involving case studies)</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Laboratory (including report writing)</td>
<td>3</td>
<td>2-3</td>
</tr>
<tr>
<td>Undergraduate Final Year Project/Dissertation</td>
<td>6 - 10 credits</td>
<td>200 - 400</td>
</tr>
<tr>
<td>Studio Work</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Presentation</td>
<td>1</td>
<td>3-4</td>
</tr>
<tr>
<td>Coursework/Assignment</td>
<td>2000 words</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Creative Writing (or a project that last a whole semester)</td>
<td>100 – 150 pages</td>
<td>8-10</td>
</tr>
<tr>
<td>Examination</td>
<td>3</td>
<td>10 – 20*</td>
</tr>
</tbody>
</table>

*Proposed by MQA, depending on the field of study and the intensity of the examination.

---

**Learning Outcomes and Student Learning Time**

(A subject with 6 learning outcomes and 1.5 credit hours)

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Lecture</th>
<th>Tute</th>
<th>Self - learning</th>
<th>Total SLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 explain the types of contracts;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2 distinguish between offer, acceptance and an invitation to treat;</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3 differentiate the types considerations;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4 describe the principles concerning termination and breach of contract;</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>5 Summarise principles of damages;</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6 Examine, analyse, compile, apply and justify the principles of contract in given scenario.</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>- Assessment (1 coursework and one 3-hour examinations)</td>
<td>0</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>63</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Module Academic Load & Credits

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th>SLT (in hours)</th>
<th>SLT (in hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Lectures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a Attending Lectures</td>
<td>24</td>
<td>a 1 continuous assessment (1 hour + 3 hours preparation*)</td>
</tr>
<tr>
<td>b Pre and Post preparation*</td>
<td>30</td>
<td>b 1 presentation (1 hour + 5 hours preparation*)</td>
</tr>
<tr>
<td><strong>2 Tutorial</strong></td>
<td>18</td>
<td>c 1 Final Examination (3 hour + 10 hours preparation*)</td>
</tr>
<tr>
<td>a Attending tutorial</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>b Preparation for tutorial*</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><strong>3 Laboratory</strong></td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>a Practical</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>b Preparation and Report writing*</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

* See Proposed student independent learning in relation (Slide 17)

---

### Credits per semester

<table>
<thead>
<tr>
<th>Modules</th>
<th>Face to Face Learning</th>
<th>Independent Learning</th>
<th>Lab Hours</th>
<th>Evaluation</th>
<th>Total SLT</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Genetics</td>
<td>42 (2+1)</td>
<td>42</td>
<td>26</td>
<td>16</td>
<td>126</td>
<td>3</td>
</tr>
<tr>
<td>2 Biochemistry</td>
<td>42 (2+1)</td>
<td>42</td>
<td>26</td>
<td>16</td>
<td>126</td>
<td>3</td>
</tr>
<tr>
<td>3 Cell Biology</td>
<td>42 (2+1)</td>
<td>42</td>
<td>12</td>
<td>16</td>
<td>112</td>
<td>3</td>
</tr>
<tr>
<td>4 ICT</td>
<td>28 (1+1)</td>
<td>28</td>
<td>14</td>
<td>10</td>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>5 English</td>
<td>42 (2+1)</td>
<td>63</td>
<td>14</td>
<td>7</td>
<td>127</td>
<td>3</td>
</tr>
<tr>
<td>6 Moral/Islamic Studies</td>
<td>28 (1+1)</td>
<td>42</td>
<td>0</td>
<td>10</td>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>7 Anatomy</td>
<td>70 (3+2)</td>
<td>42</td>
<td>0</td>
<td>16</td>
<td>128</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>294</td>
<td>301</td>
<td>92</td>
<td>91</td>
<td>778</td>
<td>19</td>
</tr>
</tbody>
</table>

**PHY407 FSG500**
Course Outcome
Towards Lifelong Learning

Course: PHY407

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

1. **State, write and explain** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Knowledge) (PO1)

2. **Verbally, visually (pictures & graphs) and algebraically relate and discuss** the concepts, laws and theories in electrostatics, electricity, magnetism, introductory atomic physics and modern physics. (C-Comprehension) (PO1, PO6)

3. **Verify, assess & employ** the concepts, laws and theories in electrostatics, electricity, magnetism, light, introductory atomic physics and modern physics to solve qualitative & quantitative problems visually, algebraically and occasionally, numerically. (C-Application) (PO1)
COURSE: PHY407: Course Outcomes: cont…

4. **Analyze, summarize and discuss** solution to real world problems associated with electrostatics, electricity, magnetism, introductory atomic physics and modern physics. *(for 3rd year course only) (PO1, 6, 8)*

5. **Observe, formulate, plan, conduct, and report** scientific investigations in areas of electrostatics and electricity. *(PO2, 3, 6)*

6. **Verbally justify and convince peers** and the **facilitator**, their rationale for the choice of methods, their ability to use and manipulate equipments, the need to transform raw scores into tabular and graphical forms and their ability to explain and interpret results of their investigation in areas of electrostatics and electricity. *(PO2, 3, 7)*

7. **Collaborate, motivate and truthful** with team members and with facilitators in both the labs and in the classroom. *(PO5, 8)*

COURSE: FSG500-Philosophy of Science

1. **Identify** their learning preferences, attitudes towards science and conceptual understanding in their field of study.

2. **Define** truth, beliefs and knowledge and justify their own belief about science knowledge in chemistry or physics through conceptual inventories.

3. **Apply** the philosophical approach in analyzing and justifying the scientific methods, principles, laws and theories about the natural world.

4. **Identify** their science reasoning skills.

5. **Argue and justify** their opinion on issues in philosophy of science.

6. **Critically write** an original 3000 words position paper in favor or against issues on science that concern ethics and morality.
The 3 Domains of Educational Goals

- Cognitive (Head)
- Affective (Heart)
- Psychomotor (Hand)

These domains represent the different aspects of learning and development, with cognitive skills focusing on knowledge and comprehension, affective skills on values and ethics, and psychomotor skills on practical skills and creativity.
**Course outcomes**

**DOMAINS**

- Cognitive
  - Knowledge
    - Comprehension
      - Definition: Understands the meaning of material (deeper level of understanding).
      - Sample Verbs: define, identify, list, name, recall, state.
  - Application
    - Definition: Uses the meaning of material (deeper level of understanding).
    - Sample Verbs: apply, carry out, demonstrate, explain, list, locate, paraphrase, give examples, translate.
  - Analysis
    - Definition: Uses the meaning of material to organize and solve problems (higher level of understanding).
    - Sample Verbs: analyze, compare, contrast, differentiate, evaluate, identify, justify, predict, solve.
  - Synthesis
    - Definition: Comprehends the synthesis of existing knowledge and skills (higher level of understanding).
    - Sample Verbs: combine, construct, design, develop, generate, solve, propose.
  - Evaluation
    - Definition: Juges the value of material for a given purpose.
    - Sample Verbs: assess, analyze, interpret, justify, select, report.

- Affective
  - Valuing
  - Responding
  - Receiving

- Psychomotor / skills
  - Naturalisation
  - Articulation
  - Precision
  - Manipulation
  - Imitation

**Cognitive Domain**

(thinking, knowledge)

INVOLVES KNOWLEDGE AND THE DEVELOPMENT OF INTELLECTUAL SKILLS

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

#### Categories in the Cognitive Domain  
(Taxonomy of Educational Objectives, Bloom, 1956)

<table>
<thead>
<tr>
<th>Level 1 – Knowledge</th>
<th>Level 2 – Comprehension</th>
<th>Level 3 – Application</th>
<th>Level 4 – Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.</td>
<td>The ability to grasp the meaning of material. This may be shown by translating material from one form to another, by interpreting material (explaining or summarising), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.</td>
<td>The ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws and theories. Learning outcomes in this area require a higher level of understanding than those under ‘Comprehension’.</td>
<td>The ability to break down material into its component parts so that its organisational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organisational principles involved. Learning outcomes here represent a higher intellectual level than ‘Comprehension’ and ‘Application’ because they require an understanding of both the content and the structural form of the material.</td>
</tr>
<tr>
<td>Defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states.</td>
<td>Converts, defends, distinguishes, estimates, explains, extends, generalises, gives examples, infers, paraphrases, predicts, rewrites, summarises.</td>
<td>Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.</td>
<td>Breaks down, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides</td>
</tr>
</tbody>
</table>
| Eg.  
- List the six levels in the cognitive domain of Bloom’s taxonomy.  
- Define...  
- State the main principles of Theory X. | Eg.  
- Describe three main features of ...  
- Explain the 3 main components of a learning outcome.  
- Summarise the main causes of the American war in Iraq. | E.g.:  
- Construct measurable learning outcomes that include lower and higher order cognitive skills for a one-semester course. | E.g.:  
- Analyse authentic data from various sources and prepare... |
### Bloom’s Taxonomy

<table>
<thead>
<tr>
<th>Level 6 – Evaluation</th>
<th>Level 5 – Synthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to judge the value of material. The judgements are to be based on definite criteria. These may be internal criteria (organisational) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all the other categories, plus conscious value judgements based on clearly defined criteria.</td>
<td>The ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviours, with major emphasis on the formulation of new patterns or structures.</td>
</tr>
<tr>
<td>E.g.</td>
<td>Categorises, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organises, plans, rearranges, revises, rewrites, summarises, tells, writes.</td>
</tr>
<tr>
<td>E.g.</td>
<td>E.g: Analyse authentic data from various sources and prepare a recommendation report for a specified audience.</td>
</tr>
<tr>
<td></td>
<td>E.g: Evaluate the strengths and weaknesses of the cognitive domain of Bloom’s taxonomy in relation to the National Educational Philosophy.</td>
</tr>
</tbody>
</table>

### Psychomotor Domain

**Psychomotor Domain**

- **(doing, skills)**

<table>
<thead>
<tr>
<th>lower order</th>
<th>higher order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td>Mechanism</td>
</tr>
<tr>
<td>Definition:</td>
<td>Definition:</td>
</tr>
<tr>
<td>Stimulus cues that guide motor activity.</td>
<td>Perform with increasing efficiency, confidence, and proficiency.</td>
</tr>
<tr>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
</tr>
<tr>
<td>• detect</td>
<td>• complete with confidence</td>
</tr>
<tr>
<td>• hear</td>
<td>• conduct</td>
</tr>
<tr>
<td>• observe</td>
<td>• demonstrate</td>
</tr>
<tr>
<td>• recognise</td>
<td>• execute</td>
</tr>
<tr>
<td>• sense</td>
<td>• improve efficiency</td>
</tr>
<tr>
<td>• respond</td>
<td>• increase speed</td>
</tr>
<tr>
<td>• react</td>
<td>• make</td>
</tr>
<tr>
<td>• act</td>
<td>• public</td>
</tr>
<tr>
<td>• think</td>
<td>• produce</td>
</tr>
<tr>
<td>• react</td>
<td>• show dexterity</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Complete Overt Response</td>
</tr>
<tr>
<td>Definition:</td>
<td>Definition:</td>
</tr>
<tr>
<td>Generates new patterns for specific situations.</td>
<td>Analyse and use to solve a problem situation.</td>
</tr>
<tr>
<td>Sample Verbs:</td>
<td>Sample Verbs:</td>
</tr>
<tr>
<td>• designs</td>
<td>• adapts</td>
</tr>
<tr>
<td>• constructs</td>
<td>• organizes</td>
</tr>
<tr>
<td>• composes</td>
<td>• generates</td>
</tr>
<tr>
<td>• constructs</td>
<td>• solves</td>
</tr>
</tbody>
</table>

Based on "Taxonomy of Educational Objectives", B.S. Bloom; Editor: 1956
**Course outcome** for Thermodynamics: (address PO1)

- Write energy balance representing the first law of thermodynamics and use it in both closed and open systems.

**Lesson outcomes:** Upon completion of this unit, students will be able to:

1. **State** the conservation of energy principle and **name all** the forms of energy entering & leaving a system and energy changes within the system.
2. **Discuss** the energy exchange process and **write** mathematical expressions representing the **energy balance** in units of kJ, for a general system undergoing any process.
3. **Rewrite** the energy balance in the **unit-mass basis** and **unit-time basis** (or **rate-form basis**) for a general system undergoing any process.
## Action Plan

<table>
<thead>
<tr>
<th>Action</th>
<th>Lead Agency</th>
<th>Deliverable</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design holistic programmes; students in the pure sciences will be exposed to humanities subjects and vice versa. Run in tandem with programmes on culture and diversity.</td>
<td>T&amp;L Taskforce</td>
<td>Balanced and well-rounded education</td>
<td>2008:Q4</td>
</tr>
<tr>
<td>Exchange programme for top students to spend one semester in select foreign universities.</td>
<td>T&amp;L Taskforce</td>
<td>Student-exchange programmes.</td>
<td>2008:Q3</td>
</tr>
<tr>
<td>Implement programme to enlist industry leaders to play an active role in curriculum design as well as in teaching.</td>
<td>T&amp;L Taskforce</td>
<td>Latest and most relevant developments in the industry</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Embed career skills development into teaching and learning of core curriculum. Career skills to include soft skills, IT awareness, and entrepreneurship.</td>
<td>MOHE HEI Industry HEI</td>
<td>Critical thinking, communication skills, English proficiency and IT skills</td>
<td>2008:Q2 (Pilot)</td>
</tr>
</tbody>
</table>

## Action Plan

<table>
<thead>
<tr>
<th>Action</th>
<th>Lead Agency</th>
<th>Deliverable</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide compulsory in-service training in pedagogy for all HEI teaching staff. Teaching KPIs used in their evaluation.</td>
<td>MOHE HEI</td>
<td>Sufficient programmes and active participation</td>
<td>2008-2009</td>
</tr>
<tr>
<td>Roll out lecturer credentialing programme for all existing HEI teaching staff.</td>
<td>HBI</td>
<td>Active centres at HEI</td>
<td>2008:Q1</td>
</tr>
<tr>
<td>Establish multi-purpose centres serving the triple objectives of pedagogical development, curriculum development and evaluation.</td>
<td>HB HEI</td>
<td>Insightful research</td>
<td>2008:Q2</td>
</tr>
<tr>
<td>Implement measures to make research into teaching methods a priority.</td>
<td>AKeP</td>
<td>Methodology and research</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Promote innovative teacher-training methods, training and research through AKeP.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Education, we see, is not merely gaining knowledge or skills helpful toward productive work, though certainly that is a part of it. Rather it is a replenishment and an expansion of the natural thirst of the mind and soul. Learning is a gradual process of growth, each step building upon the other. It is a process whereby the learner organizes and integrates not only facts but attitudes and values. The Lord has told us that we must open our minds and our hearts to learn. There is a Chinese proverb: Wisdom is as the moon rises, perceptible not in progress but in result. As our knowledge is converted to wisdom, the door to opportunity is unlocked.

Barbara W. Winder

The great aim of education is not knowledge, but action.
Herbert Spencer

The one real goal of education is to leave a person asking questions.
Max Beerbohm

Source: MPTN

<table>
<thead>
<tr>
<th></th>
<th>Diploma</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>20%-30%</td>
<td>40%-60%</td>
</tr>
<tr>
<td>Skills</td>
<td>45%-60%</td>
<td>15%-45%</td>
</tr>
<tr>
<td>Affective</td>
<td>15%-25%</td>
<td>15%-25%</td>
</tr>
</tbody>
</table>