

Engineering Accreditation Council



Engineering Programme Accreditation Manual

2007

2007

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DEFINITIONS

Acronyms

BEM	- Board of Engineers Malaysia
CQI	- Continual Quality Improvement
EAC	- Engineering Accreditation Council
EAU	- Engineering Accreditation Unit
IEM	- The Institution of Engineers, Malaysia
IHL	- Institution of Higher Learning – which includes public or private universities, and other institutions authorised by legislation (either directly or indirectly) to award engineering degrees.
JPA	- Jabatan Perkhidmatan Awam (Public Services Department)
MQA	- Malaysian Qualification Agency
OBE	- Outcome-Based Education is an approach that focuses on outcomes, i.e. the achievements of students that are measurable, proven, and can be improved.
SPM	- Sijil Pelajaran Malaysia (Malaysia Certificate of Education)
STPM	- Sijil Tinggi Persekolahan Malaysia (Malaysia Higher School Certificate of Education)

General

- Evaluation Panel - A panel of evaluators appointed by EAC to verify programme compliance with accreditation criteria.
- Accreditation Appeals Board - A Board to consider appeals from an Institution of Higher Learning on EAC decision.
- Graduate Engineer - A Person registered under Section 10(1) A Registration of Engineers (Amendment) Act 2002.
- Professional Engineer - A Person registered under Section 10(2). Registration of Engineers (Amendment) Act 2002.

Institutions of Higher Learning and Programme

Faculty	- The entity which includes schools and departments responsible for designing and conducting the programme to be accredited.
Programme	- The sequence of structured educational experience undertaken by the students leading to completion, on satisfactory assessment of performance.
Degree	- An engineering qualification in Malaysia normally titled Bachelor of Engineering.
Course	- Subject offered in the programme.
Stakeholders	- Parties having interests (direct or indirect) in the programme output, for example; employers, sponsors, lecturers, and students.
Academic Staff	- Staff responsible for teaching and learning activities in the programme leading to the award of an engineering degree.
Student	- Anyone undertaking an undergraduate programme.
Graduate	- Anyone who has been conferred a degree.
Support staff	- Staff responsible for supporting teaching, learning and administrative activities in the programme implementation.

- External Examiner - A person with high academic standing appointed by the IHL to assess academic quality and standard of the programme.
- Industry Advisory Committee - A body consisting of professionals from industries, government, professional organisation, regulatory, alumni etc., appointed by the IHL to ensure the programme's relevancy to the stakeholders' needs.

Accreditation

- | | |
|---|---|
| Approval | - Permission from the relevant authorities to conduct a new programme. |
| Accredited Programme | - An engineering programme whose graduates are acceptable for graduate registration with BEM and for admission to Graduate membership of IEM. |
| Full Accreditation | - This is given to a programme that fully satisfies the minimum standard for accreditation set by BEM, which is for a period of 5 years. |
| Declined Accreditation | - This is given to a programme that fails to meet the minimum standard for accreditation and has major shortcomings. In such a case, a further application is not normally considered within the next one year. |
| Cessation/
Termination of
Accreditation | - BEM reserves the right to cease/terminate the accreditation (if it is found that there is non compliance or breach of accreditation requirements after accreditation has been given). |

1.0 Introduction

The Board of Engineers Malaysia (BEM) registers graduates and professional engineers under the Registration of Engineers Act 1967 (Revised 2002). The prerequisite for registration as a graduate engineer is any qualification in engineering recognised by the Board.

BEM has a duty to ensure that the quality of engineering education/programme of its registered engineers attains the minimum standard comparable to global practice. Hence the necessity to accredit engineering programmes conducted in IHLs.

Engineering Accreditation Council (EAC) is the body delegated by BEM for accreditation of engineering degrees. EAC is made up by representatives of the Board of Engineers Malaysia (BEM), The Institution of Engineers, Malaysia (IEM), Malaysian Qualification Agency (MQA) and the Public Services Department (Jabatan Perkhidmatan Awam Malaysia (JPA)). The Terms of Reference of the EAC is outlined in **Appendix A** (Engineering Accreditation Council, Evaluation Panel and Accreditation Appeals Board).

This Manual outlines details for accreditation of an engineering programme in Malaysia. It serves to facilitate the Institutions of Higher Learning (IHLs) to meet the minimum standard stipulated for the accreditation of their existing engineering programmes or newly proposed programmes.

This Manual includes elements of outcomes in the engineering curriculum to ensure a Continual Quality Improvement (CQI) culture in the spirit of Outcome-Based Education (OBE).

2.0 Accreditation Objective

The objective of accreditation is to ensure that graduates of the accredited engineering programmes satisfy the minimum academic requirements for registration as a graduate engineer with the Board of Engineers Malaysia (BEM) and for admission to graduate membership of IEM.

In addition, the objective of accreditation is to ensure that Continual Quality Improvement (CQI) is being practiced by IHLs, and accreditation may also serve as a tool to benchmark engineering programmes offered by IHLs in Malaysia.

3.0 Programme Objectives

Programme Objectives are specific goals consistent with the mission and vision of the IHL, that are responsive to the expressed interest of programme stakeholders, describing the expected achievements of graduates in their career and professional life few years after graduation.

An engineering programme seeking accreditation shall respond to the following requirements:-

- (i) **Programme Objectives:** The programme shall have published Programme Objectives.
- (ii) **Processes and Results:** The programme shall have a clear linkage between Programme Objectives and Programme Outcomes (Section 4.0); the process of ongoing assessment and evaluation that demonstrates the achievement of Programme Objectives with documented results; and the evaluation results are used in the continual improvement of the programme.
- (iii) **Stakeholders Involvement:** The IHL/faculty shall provide *evidences of stakeholders' involvement with regards to (i) and (ii) above.*

Note - A programme being accredited for the first time, would not be required to provide evidence on the achievement of Programme Objectives. Their graduates are yet to start their career and reasonable time is expected before they acquire the targeted objectives.

Note : Please refer to Guidelines for Evaluation Panel for interpretation of requirements in this section.

4.0 Programme Outcomes

Programme Outcomes are statements that describe what students are expected to know and be able to perform or attain by the time of graduation. These relate to the skills, knowledge, and behaviour that students acquire through the programme.

Students of an engineering programme are expected to attain the following:

- (i) ability to acquire and apply knowledge of science and engineering fundamentals;
- (ii) acquired in-depth technical competence in a specific engineering discipline;
- (iii) ability to undertake problem identification, formulation and solution;
- (iv) ability to utilise systems approach to design and evaluate operational performance;
- (v) understanding of the principles of design for sustainable development;
- (vi) understanding of professional and ethical responsibilities and commitment to them;
- (vii) ability to communicate effectively, not only with engineers but also with the community at large;
- (viii) ability to function effectively as an individual and in a group with the capacity to be a leader or manager ;
- (ix) understanding of the social, cultural, global and environmental responsibilities of a professional engineer; and
- (x) recognising the need to undertake life-long learning, and possessing/acquiring the capacity to do so.

An Engineering programme for which accreditation is sought must respond to the following :-

- (i) **Programme Outcomes:** The IHL/faculty shall have published Programme Outcomes that have been formulated considering items (i) to (x) given above, and any added outcomes by that can contribute to the achievement of its stated Programme Objectives.
- (ii) **Processes and Results:** The Various Programme Outcomes shall be considered in designing the curriculum as described in Section 7.1 (Criterion 1 – Academic Curriculum). In addition to this, a process of measuring, assessing and evaluating the degree of achievement of the students shall be established. The results of this assessment process shall be applied for continual improvement of the programme.
- (iii) **Stakeholders Involvement:** The IHL/faculty shall provide evidences of stakeholders' involvement with regards to (i) and (ii) above.

5.0 Accreditation Policy

This section outlines the EAC's accreditation policy underlying the whole accreditation process. Accreditation will be considered upon a written request from the IHL.

5.1 The Accreditation Process

Accreditation of engineering programmes undertaken by the EAC at the request of the IHL is accorded to the engineering programmes.

The EAC's accreditation process will focus on outcomes and the IHL developed internal systems, which ensure that the graduates are adequately prepared to enter the engineering profession.

The process also involves determining the effectiveness of the quality assurance systems and procedures that ensure graduates are adequately prepared to enter the engineering practice.

5.2 The Accreditation Cycle

Accreditation is accorded to a programme for a maximum period of five years. The IHL shall apply for re-accreditation not less than six months before the expiry of the accreditation period.

Accreditation is accorded on a full programme cycle basis specifying the years following and including the year approval is given.

5.3 Programmes

An IHL may offer programme/s via various modes and at different locations, such as, full-time, franchised, twinning, part-time, distance learning, joint degree, multi_campus etc. For each of the programmes, the IHL shall apply for accreditation separately.

However, if any of the programmes at different locations and/or via different modes of delivery fails to get accreditation and the degree issued by the IHL does not differentiate with regards to the location and/or mode of delivery, EAC may take action to withdraw accreditation of all such programmes by that IHL.

A programme shall be evaluated based on the criteria stipulated in Section 7 of this Manual.

5.4 Application and Preparation for Accreditation Visit

The IHL should make an application for programme accreditation as per the requirement of Section 8 of the Manual to MQA. Appendix F shows the process flow chart on Application For Accreditation and Approval of Engineering Programmes.

If the documents submitted are found to be inadequate, the IHL shall be required to provide further information before an accreditation visit can be scheduled. The application will be deemed to have been withdrawn if further information is not submitted within a period of 3 months upon request.

5.5 Accreditation Evaluation

Accreditation evaluations are conducted to verify that the programme under evaluation is in compliance with the appropriate accreditation criteria in this Manual.

The evaluation exercise shall be conducted by an Evaluation Panel appointed by EAC (refer to Appendix A).

5.6 Accreditation Decision

Upon completion of the accreditation exercise, EAC through the recommendation by the Evaluation Panel may decide on one of the following:

- (i) To accord full accreditation for five years.
- (ii) To accord less than five years accreditation.
- (iii) To decline accreditation. In such a case, a further application will normally not be considered within the next one year.

A programme that has minor shortcoming(s) is accorded less than five years accreditation, the IHL shall take appropriate actions to remedy the shortcoming(s), and submit evidence of such corrective action(s). If this is adjudged satisfactory, the remaining period of the accreditation may be accorded by the EAC. A further visit will be scheduled to verify the results of the remedial action(s), unless deemed unnecessary. Failure to address the shortcoming(s) may result in non-accreditation of the programme at the end of the 2-year period.

The EAC may defer its decision on accreditation under certain circumstances to allow the IHL to fulfil condition(s) that may be imposed by the EAC.

EAC's decision shall be sent to the IHL, through MQA, with copies to BEM, IEM, MQA, and JPA. The accreditation shall be accorded to a specific programme, location and mode.

5.7 Revisions to an Accredited Programme

The IHL shall advise the EAC of any changes made to an accredited programme. Failure to do so may cause the EAC to withdraw the accreditation. The EAC may then direct the IHL to apply for re-accreditation of the revised programme.

5.8 The Approval to Conduct a Programme

The IHL intending to conduct a new programme shall obtain approval from the relevant authorities.

The IHL should submit the complete set of documents as specified in Section 8 of this Manual to the EAC through MQA for programme evaluation. The recommendation from EAC shall be forwarded to the relevant authorities.

When the documents are considered to be inadequate, the IHL shall be required to provide further information before an evaluation is carried out. If the required information is not provided within a period of 3 months, it shall be deemed that the IHL no longer intends to conduct the programme.

5.9 Publication of Accreditation Status

EAC shall regularly update the list of accredited programmes.

5.10 Appeal Procedures

An IHL may appeal against a decision made by EAC. The **notice** of appeal must be made in writing to the Accreditation Appeals Board within **2 weeks** upon receiving the decision, stating the basis of the appeal. Appeal **documents** are to be submitted within **4 weeks** after the above notice of appeal.

The Appeals Board shall consist of the President of BEM, President of IEM and CEO of LAN or their nominated representatives. The President of BEM or his nominated representative shall be the Chairman of the Appeals Board.

If necessary, the Appeals Board may appoint a Special Committee, comprising members who are experienced in the accreditation process, to consider an appeal. Any expenses incurred shall be borne by the IHL.

The decision of the Appeals Board shall be forwarded to the IHL within 3 months from the receipt of the complete documents. The decision of the Appeals Board shall be final.

5.11 Confidentiality

Documents or other information obtained by the Evaluation Panel, EAC staff, and EAC members in connection with the accreditation exercise shall be treated as confidential.

5.12 Expenses

The IHL shall bear all the costs incurred for carrying out activities related to the approval and accreditation of a programme.

5.13 Conflict of Interest

Members of EAC, Evaluation Panels, Appeals Board and EAC staff are expected to be constantly aware of any conflict of interest. Members shall declare their interest or withdraw from any situation or activity that may constitute a conflict of interest.

6.0 Accreditation Procedure

This section describes EAC's accreditation procedures from the process of application to the notification of accreditation result.

6.1 Application for Accreditation

The IHL should make an application for programme accreditation as per the requirement of Section 8 of the Manual to MQA. Appendix F shows the process flow chart on Application For Accreditation and Approval of Engineering Programmes.

For a new programme, the IHL should apply for accreditation at least **6 months** before the final examination of the first intake of students.

For a current accredited programme, the IHL should apply for re-accreditation at least **6 months** before the expiry date of the accreditation.

The IHL applying for accreditation shall ensure that complete information is forwarded to EAC through MQA. If the information submitted is found to be inadequate, the IHL shall be required to provide further information before an accreditation visit can be scheduled. The application will be deemed to have been withdrawn, if the requested information is not submitted within a period of **3 months**.

6.2 Appointment of Evaluation Panel

Once the document submitted is complete, an Evaluation Panel shall be appointed as per Appendix A of this Manual. Members of the Evaluation Panel are selected on the basis of their expertise and standing in a particular discipline of engineering. Representatives from both the industry and academia are appointed because of the perspective and experience that each area of endeavour can bring to the assessment of a programme, and to the maintenance of high professional standards. The EAC needs to ensure that not only high standards of academic teaching and achievement are being met, but also that the skills taught and quality of graduates, are relevant to the practices and continued development of engineering.

The Evaluation Panel needs to be aware of EAC policies on accreditation as outlined in Section 5 of this Manual. The Evaluation Panel will assess all the accreditation criteria set forth in this Manual. The assessment includes the auditing and confirmation of documents submitted by the IHL.

The Guidelines for Evaluation Panel (Guidelines on Evaluation Panel Report) are useful tools for ensuring that every important aspect of a degree programme and its delivery are assessed and reported on.

6.3 Scheduling of a Visit

A visit is arranged and coordinated by the EAC Secretariat on an appropriate date suitable to both the Evaluation Panel and the IHL. The visit should be held promptly after the appointment of the Evaluation Panel. It is important that as far as possible, the agreed dates of visit are adhered to.

6.4 Pre-Accreditation Visit Meeting

The Evaluation Panel should meet at least **once** before the actual accreditation visit takes place, in order to study and discuss documents, and systematically identify shortcomings. The Panel should strategically plan and/or request supplementary input from the IHL to fill the gaps. Any further information required should be communicated to the IHL through EAC. The Pre-Accreditation Visit Meeting is in addition to the meeting on Day -1 (Guidelines For Evaluation Panel).

6.5 Accreditation Visit

The accreditation visit will normally be scheduled for a period of two days. The overall conduct of the visit shall be managed by EAC. A typical schedule of the

visit is given in item 3 of Guidelines For Evaluation Panel of this Manual. The visit shall include but not be limited to the following:

- (a) Opening meeting with the programme administrators.
- (b) Meeting with staff members.
- (c) Meeting with students.
- (d) Meeting with external stakeholders such as alumni, employers, and industry advisor.
- (e) Visiting and checking of facilities.
- (f) Checking the relevant documents.
- (g) Exit meeting with the programme administrators.

Meetings with all stakeholders are important, as this would give an indication of their involvement in the CQI process of the programme.

6.6 Report and Recommendation

The report, prepared in accordance to Appendix D, from the Evaluation Panel shall be submitted to the EAC within 4 weeks after the visit.

7.0 Qualifying Requirements and Accreditation Criteria

An engineering programme shall be assessed by EAC to enable graduates of the programme to register as graduate engineers with the BEM and to be admitted as graduate members of IEM. The assessment involves a review of qualifying requirements of the IHL and an evaluation based on the following criteria, apart from programme objectives (3.0) and programme outcomes (4.0):

Criterion 1	-	Academic Curriculum
Criterion 2	-	Students
Criterion 3	-	Academic and Support staff
Criterion 4	-	Facilities
Criterion 5	-	Quality Management Systems

The assessment process will involve two parts:

- (i) Initial assessment of qualifying requirements.
- (ii) Detailed assessment of the programme based on the accreditation criteria.

The qualifying requirements are meant to screen out programmes that do not meet the core requirements of the assessment criteria. Failure to meet any one of the qualifying requirements will disqualify the programme from further assessment.

There are 8 components of the qualifying requirements and each programme is expected to have all the components. These components are:

- 1 A minimum of 120 credit hours of which 80 credit hours must be core engineering courses offered over a period of four years
- 2 Final year project (minimum 6 credit hours)
- 3 Industrial training (minimum of 2 months)
- 4 Full-time academic staff (minimum of 8)
- 5 Staff : student ratio 1:25 or better
- 6 External examiner's report (minimum of two reports over four years)
- 7 Programme Objectives
- 8 Programme Outcomes

If the programme has met all the qualifying requirements, a detailed assessment of the programme based on the accreditation criteria as explained in the following sections will be carried out.

Guidelines For Evaluation Panel of this Manual provides some interpretation to this section.

7.1 Criterion 1: Academic Curriculum

The academic curriculum and curricular design shall strongly reflect the philosophy and approach adopted in the programme structure, and the choice of the teaching-learning (delivery) and assessment methods. The curricular approach, the educational content and the teaching-learning and assessment methods shall be appropriate to, consistent with, and support the attainment or achievement of the Programme Outcomes.

A balanced curriculum shall include all technical and non-technical attributes listed in the Programme Outcomes, and shall have the balance between the essential elements forming the core of the programme and additional specialist or optional studies (electives). The curriculum shall integrate theory with practice through adequate exposure to laboratory work and professional engineering practice.

Guidelines on academic programme outlined in this Manual provide essential elements and features, which combined together will render a programme acceptable for accreditation by EAC.

All engineering programmes need to cover the broad areas of their respective disciplines. Appendix B of this Manual provides examples of courses that underpin the broad areas of the respective programmes. Appropriate breadth and depth of the content shall be ensured for all courses. The course structure and sequence of content shall be appropriate. Adequate time shall be allocated for each component of the content/course. Evidence shall be present to show that the contents are being updated to keep up with the scientific, technological and knowledge development in the field, and to meet the needs of society. IHLs shall have mechanisms for regularly identifying topics of contemporary importance at local, national and global levels and topics that may not be adequately addressed in the curriculum.

Other contributing components to the curriculum such as a variety of teaching-learning (delivery) modes, assessment and evaluation methods shall be designed, planned and incorporated within the curriculum to enable students to effectively develop the range of intellectual and practical skills, as well as positive attitudes as required in the Programme Outcomes. The assessment to evaluate the degree of the achievement of the Programme Outcomes by the students shall be done both at the programme as well as at course levels. The teaching-learning methods shall enable students to take full responsibility for their own learning and prepare them for life long learning. The programme shall demonstrate the relationship between the courses and the Programme Outcomes.

IHLs need to consult the industry in keeping Programme Objectives, Programme Outcomes, and content up-to-date. However, they should not lose sight of the need to provide an education in engineering, which will form a sound basis for a career that is likely to see rapid changes in technology. As a general rule, it will be appropriate for the programme structure to be designed to give a progressive shift of emphasis from engineering science and principles in the early stages towards more integrated studies in the final year, in a way that will impart knowledge of applications of fundamentals and provide a focus for a professional approach.

The emphasis on particular elements or features of the programme must remain flexible, but it will be required in the accreditation process to confirm that minimum levels of understanding and standards of achievement are attained in the basic courses relevant to the fields of engineering.

The academic programme component must consist of a minimum total of **120 credit hours** (not including credits for remedial courses) made up as follows:

- (a) A **minimum of 80 credit hours** shall be **engineering courses** consisting of engineering sciences and engineering design/projects appropriate to the student's field of study.
- (b) The **remaining credit hours** shall include sufficient content of **general education component** (such as mathematics, computing, languages, general studies, co-curriculum, management, law, accountancy, economics, social sciences, etc.) that complements the technical contents of the curriculum.

The essential elements and features are identified for convenience under several headings, without implying that each is to be treated as a separate or isolated component. In general, the syllabus and curriculum content must be adequate in quality and quantity in terms of coverage and depth. Emphasis on the curriculum shall be placed on the understanding and acquisition of basic principles and skills of a discipline, rather than detail memorisation of facts. The curriculum shall also provide students with ample opportunities for analytical, critical, constructive, and creative thinking, and evidence-based decision making. The curriculum shall include sufficient elements for training students in rational thinking and research methods.

The curriculum content should cover the following:

- (i) Engineering mathematics, science, engineering principles, skills and tools (computing, experimentation) appropriate to the discipline of study;
- (ii) engineering applications - design and projects;
- (iii) integrated exposure to professional engineering practice, including management and professional ethics;
- (iv) laboratory work to complement the science, computing and engineering theory;
- (v) industrial training - exposure to professional engineering practice in an engineering-practice environment;
- (vi) exposure to engineering practice;
- (vii) relevant tutorial classes to complement the lectures; and
- (viii) final year project.

Typical core contents for selected engineering disciplines are shown in **Appendix B** of this Manual.

Credit hours

For a 14-week semester (not including examination or mid-term break), one credit hour is defined as:

- one hour per week of lecture.
- two hours per week of laboratory or workshop.
- two hours per week of supervised and compulsory tutorial session subject to a maximum of one credit hour for each course in that semester.
- three hours per week of activities involving other modes of delivery such as problem-based learning, e-learning modules, discovery learning, and coursework projects.
- three hours per week of activities involving final year project.

For industrial training, the following guideline shall be followed:

- industrial training shall be for a minimum of two months continuous training. **One** credit hour is allocated for every two weeks of training subject to a maximum of **six** credit hours. The training shall be adequately

structured, supervised and recorded in log books/report. The industrial training must be conducted before the final semester.

For final year project, the following guideline shall be followed:

- a final year project is subjected to a minimum of six credits hours and a maximum of twelve credit hours.

IHLs may use their version of the credit hours however they must provide the equivalency according to the EAC's definition of credit hours.

Notes:

🚧Tutorial

Tutorial should be part and parcel of the programme so as to complement the lectures. A tutorial session should preferably not exceed 30 students at any one time.

🚧Laboratory Work

Students should receive sufficient laboratory work to complement engineering theory that is learnt through lectures. The laboratory should help students develop competence in executing experimental work. Students should work in groups, preferably not more than five in a group.

Throughout the programme, there should be adequate provision for laboratory or similar investigative work, which will develop in the young engineer the confidence to deal with new and unusual engineering problems.

🚧Industrial Training

Exposure to professional engineering practice is a key element in differentiating an engineering degree from an applied science degree. Although the status of Corporate or Professional Engineer requires a substantial period of experiential formation in industry after the completion of an accredited academic programme, it is clearly inadequate, over the first few critical years, for the student's perceptions of engineering to develop in complete isolation from the realities of practice.

Familiarity with all common engineering processes is essential and exposure at a practical level to a wide variety of processes is required at a level appropriate to

the young professional. Whilst it is clearly desirable for students to get a feel for the skills involved, the central aim is to achieve appreciation, not to acquire craft skills. Clearly, many of the latest processes and large scale or costly operations can only be the subject of observation or demonstration, and visits to engineering works may be helpful in many such cases.

Industrial training is a key component of learning in an integrated academic curriculum. Due to its importance, the programme shall have a minimum of 2-months continuous industrial training for each student.

✚Exposure to Engineering Practice

Exposure to engineering practice shall also be integrated throughout the curriculum as it is a key. In addition, exposure to professional engineering practice may also be obtained through a combination of the following:

- (i) lectures/talks by guest lecturers from industry;
- (ii) academic staff with industrial experience;
- (iii) courses on professional ethics and conduct;
- (iv) industry visits;
- (v) an industry-based final year project; and
- (vi) regular use of a logbook in which industrial experiences are recorded.

It is considered that there is no real substitute for first-hand experience in an engineering-practice environment, outside the IHLs. The EAC advocates that all engineering academic staff acquire some exposure to such experience, in addition to the other elements suggested, and make efforts to assist all students gain placements of suitable quality.

✚Final Year Project

The final year project can provide one of the best means of introducing a real professional approach to engineering studies. For this reason, the use of projects as a vehicle for teaching and for integration of core areas is strongly encouraged throughout the programme.

It is a requirement of the programme to include a significant project in its later stages. The final year project is required to seek individual analysis and judgement, capable of being assessed independently from the work of others. The student is expected to develop techniques in literature review and information processing.

It is recommended that final year projects should also provide opportunities to utilise appropriate modern technology in some aspect of the work, emphasising the need for engineers to make use of computers and multimedia technology in everyday practice.

7.2 Criterion 2: Students

The quality and performance of students, in relation to the Programme Outcomes is of utmost importance in the evaluation of an engineering programme.

Students intending to pursue engineering programmes shall have a good understanding of mathematics and physical sciences. The normal entry qualification is STPM (with good principal passes in mathematics and physical sciences) or its equivalent.

IHLs shall ensure that students, who do not meet the above criteria, undertake suitable remedial programmes in order to attain the equivalent entry qualification. IHLs must put in place the mechanism for credit transfer/credit exemption to allow alternative educational pathways. A maximum of 30% of the total credit hours is allowed for credit transfer/credit exemption. A programme shall have clear policies on credit transfer/credit exemption.

The programme shall provide the necessary teaching-learning environment to support the achievement of the Programme Objectives and Programme Outcomes. The teaching-learning environment shall be conducive to ensure that students are always enthusiastic and motivated. IHLs shall provide necessary counselling services to students regarding academic, career, financial, and health matters.

Students shall not be over burdened with workload that may be beyond their ability to cope with. Adequate opportunities, such as involvement in co curricular activities such as student clubs, sporting and campus activities, shall be provided for students to develop their character apart from academic development.

7.3 Criterion 3: Academic and Support staff

A viable engineering programme is expected to have a minimum of 8 full-time academic staff relevant to the particular engineering discipline. IHLs may engage part-time staff with acceptable professional qualification in the related engineering fields. The full-time equivalent of part-time staff shall not exceed 40%.

Academic staff shall have postgraduate degrees (Masters level or higher). However, a staff member with good first degree and wide industrial/specialist experience with acceptable professional qualifications may be considered.

It must be demonstrated that the academic staff have the competencies to cover all areas of the programme, and are implementing the outcome-based approach to education. The overall competence of the academic staff may be judged by such factors as education, diversity of background, engineering experience, teaching experience, ability to communicate, enthusiasm for developing more effective programmes, level of scholarship, participation in professional societies and attainment of Professional Engineer status. The IHL should ensure its staff gain the necessary industrial experience required to achieve professional status.

The full-time equivalent academic staff to student ratio shall ideally be 1:15 or better to ensure effective teaching, student-staff interaction, student advising and counselling, IHL service and research activities, professional development and interaction with industries.

There shall also be sufficient, qualified and experienced technical and administrative staff to provide adequate support to the educational programme. It is recommended that each technical staff shall be in charge of not more than two laboratories.

7.4 Criterion 4: Facilities

The quality of the environment in which the programme is delivered is regarded as paramount in providing the educational experience necessary to accomplish the Programme Outcomes.

There must be adequate teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories and workshops, and associate equipment to cater for multi-delivery modes.

Sufficient and appropriate experimental facilities must be available for students to gain substantial experience in understanding and operating engineering equipment and of designing and conducting experiments. The equipment must be reasonably representative of modern engineering practice. Where practical work is undertaken at another institution, or in industry, arrangements must be such as to provide reasonable accessibility and opportunity for learning.

IHL must ensure that all facilities are maintained and adhered to best practices in safety, health and environment where appropriate.

For programmes offered wholly or partly in distance mode, or at multiple or remote locations, facilities must be sufficient to support students learning, equivalent to those provided for on-campus students.

Support facilities such as hostels, sport and recreational centres, health centres, student centres, and transport must be adequate to facilitate students' life on campus and to enhance character building.

7.5 Criterion 5: Quality Management Systems

The IHL and the faculty must ensure that there exists a quality management system to oversee and monitor the overall achievement of the programme objectives. These include the controlling, managing, directing, organising and supervising of the overall management system of the IHL. It must have adequate arrangements for planning, development, delivery and review of engineering programmes together with the academic and professional development of its staff.

7.5.1 Institutional Support, Operating Environment, and Financial Resources

The IHL must regard quality engineering education as a significant and long-term component of its activity. This would most commonly be reflected from the IHL's vision and mission statements and strategic plans. In addition, institutional support may be reflected from the constructive leadership, adequate policies and mechanisms for attracting, appointing, retaining and rewarding well-qualified staff and providing for their ongoing professional development; and for providing and updating infrastructure and support services. It must ensure that creative leadership is available to the IHL through the appointment of highly qualified and experienced senior staff in sufficient numbers.

The development of academic staff, in particular, through opportunities in further education, industrial exposure, as well as research and development, is of utmost importance for the sustainability and quality improvement of the programme. Opportunities for the development of support staff should also be provided. The IHL shall provide sound policies, adequate funding and infrastructure for this purpose.

Financial resources must be adequate to assure the overall quality and continuity of the engineering programme. The IHL must have sufficient financial resources to acquire, maintain, and operate facilities and equipment appropriate for the engineering programme.

7.5.2 Programme Quality Management and Planning

The IHL's processes for programme planning, curriculum development, and regular curriculum and content review must involve all academic staff. The processes include reviewing Programme Objectives and Programme Outcomes, tracking the contributions of individual courses to the Programme Outcomes, tracking performance assessment processes, reviewing the comments from External Examiners, reviewing feedback and inputs from stakeholders including students and alumni. The process of continual quality improvement shall be implemented with full accountability. For a new programme, the processes surrounding the decision to introduce the programme should be established.

Programme(s) via various modes and at different locations, such as, full-time, franchised, twinning, part-time, distance learning, joint degree and multi campus may be conducted. The IHL awarding the degree shall be responsible for ensuring the quality and management of these programmes.

7.5.3 External Assessment and Advisory System

IHLs shall have an external examiner for each programme to independently review the overall academic standard as shown in Appendix E (External Examiner's Report) of this Manual.

The external examiner is a person of high academic standing in the engineering discipline. The external examiner is expected to carry out the overall assessment of the programme including staff as well as all courses and laboratory work undertaken by the students. Assessment is to be made at least twice during the 5-year accreditation cycle, preferably once during the initial period of the accreditation cycle and another before the next accreditation visit.

The IHL shall have an industry advisory system for participation by professional engineers, and employers of engineers for the purpose of planning and continuous improvement of the programme quality. These industry advisors shall be expected to provide inputs and recommendation on an on-going basis through participation in discussion and forums.

The external examiner's **report** and feedbacks from industry advisors shall be used for continuous quality improvement.

7.5.4 Quality Assurance

A quality management system must be in place to assure the achievement of programme outcomes. The IHL shall maintain its quality management system, based on an established quality assurance standard, for example, ISO 9001 Quality Management System, or other quality assurance systems and benchmarking. The quality assurance processes should include among others but not limited to:

- (a) student admission;
- (b) teaching and learning;
- (c) assessment and evaluation;
 - examination regulations and criteria for pass/fail;
 - preparation and moderation processes;
 - level of assessment; and
 - assessment processes including final year project/industrial training.

8.0 Accreditation Documents

8.1 Introduction

The IHL applying for accreditation must submit documents that provide accurate information and sufficient evidence for the purpose of evaluation. It should not be necessary to develop extensive documentation specifically for accreditation evaluation, since the purpose of accreditation is to evaluate the systems already in place.

For each programme to be accredited, unless otherwise stated, the IHL shall submit the following documents:

- i. Self Assessment Report (as noted in Section 8.2 of this Manual) - Hardcopy
- ii. Supporting Material Document (as noted in Section 8.3 of this Manual) – Digital Format
- iii. Appendix C (Checklist of Documents for Accreditation/Approval of New programme and Relevant Information)

Institutional Documents and Additional Documentation (as noted in Section 8.4) to be made available during the visit.

8.2 Self Assessment Report – Hardcopy

A Self Assessment Report is an account of the IHL's plan, implementation, assessment and evaluation of the programme conducted. It is a reflection on the processes with results obtained used in continual quality improvement at all level of the programmes activities. This appropriately bound document ranging between 50 – 100 pages with all pages numbered and a table of contents, shall provide the information and description about the programme to enable the Evaluation Panel to objectively assess the programme for the purpose of accreditation or approval. The emphasis shall be on qualitative description of each aspect and criterion, and how these meet the standards and expectation as set out in this Manual. In other words, this summary document is a form of self assessment of IHL's programme.

The general structure of the self assessment report shall follow the guidelines as described in Sections 8.2.1 to 8.2.9 in conjunction with Appendix C of this Manual. Appendix G provide some of the prescribed format for the information.

The submission must be comprehensive, easily readable, free standing, and provide a coherent overview with the text addressing each major point in a definitive manner. It must be concise but of sufficient depth and detail in conjunction with the supporting information to appropriately represent the program. It will not be sufficient to merely provide a collection of disparate items, or point to a web site, and leave the EAC to find the relevant information. The IHL is advised to provide accurate information as required by the accreditation Manual, since the Evaluation Panel will verify the information during the visit.

8.2.1 General Information

- (i) Provide general information on the IHL and on the specific programme .
- (ii) Provide detailed information on programme history of accreditation (year of accreditation, conditions imposed and actions taken).
- (iii) Describe any self initiated changes made to the programme and state the year the changes were introduced.

8.2.2 Programme Objectives

- (i) State the vision and mission of the IHL and/or faculty.
- (ii) Describe the Programme Objectives and state where they are published.
- (iii) Describe how the Programme Objectives are consistent with the vision and mission of the IHL and/or faculty and stakeholders' requirements.
- (iv) Describe the processes used to establish and review the Programme Objectives, and the extent to which the programme's various stakeholders are involved in these processes.
- (v) Describe how the IHL ensures achievement of the Programme Objectives.
- (vi) Describe the ongoing evaluation of the level of achievement of these objectives, and the extent to which the programme's various stakeholders are involved in these processes.
- (vii) Describe how the results obtained from evaluation are being used to improve the effectiveness of the programme.

8.2.3 Programme Outcomes

- (i) List down the Programme Outcomes and state where are they published.
- (ii) Describe how the Programme Outcomes relate to the Programme Objectives.
- (iii) Describe how the Programme Outcomes encompass the outcome requirements of Section 4.0 of this Manual.

- (iv) Describe the processes used to establish and review the Programme Outcomes, and the extent to which the programme's various stakeholders are involved in these processes.
- (v) Describe the data gathered and explain the result of the assessment.
- (vi) Explain how the assessment results are applied to further develop and improve the programme.
- (vii) Describe the materials, including student work and other tangible materials that demonstrate achievement of the Programme Outcomes.

8.2.4 Academic Curriculum

- (i) Discuss the programme structure and course contents to show how they are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the Programme Outcomes.
- (ii) Describe Discuss the programme delivery and assessment methods and how these are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the Programme Outcomes.
- (iii) The information required in items (i) and (ii) should include but not limited to the following:
 - ⊖ A matrix linking courses to Programme Outcomes to identify and track the contribution of each course to the Programme Outcomes.
 - Distribution of the engineering courses according to areas specific to each programme.
 - Distribution of the related non-engineering (general education) courses.
 - Distribution of the courses offered according to semester.

Samples of the table format are available in Appendix G.

8.2.5 Students

- (i) Discuss students performance in relation to Programme Outcomes.
- (ii) Discuss the requirement and process for admission of students to the programme.
- (iii) Discuss the policies and processes for the credit transfer/exemption.
- (iv) Discuss the student workload.
- (v) Discuss students activities and involvement in student organisations that provide experience in management and governance, representation in education and related matters and social activities.
- (vi) The information required in items (i) to (v) should include but not limited to the following:
 - The distribution of students enrolment for all academic years for the past four years (Table 6 in Appendix G).
 - The entry qualification of final year students of the current semester (Table 7 in Appendix G).

8.2.6 Academic and Support Staff

- (i) Discuss the strength and competencies of the academic staff in covering all areas of the programme, and in implementing the outcome-based approach to education.
- (ii) Discuss how the overall staff workload enables effective teaching, student-staff interaction, student advising and counselling, IHL service and research activities, professional development and interaction with industries.
- (iii) Discuss the sufficiency and competency of technical and administrative staff in providing adequate support to the educational programme.
- (iv) The information required in items (i) to (iii) should include but not limited to the following:
 - A breakdown in terms of numbers of academic staff (full-time, part-time and inter-programme) by year for the past four year (Table 8 in Appendix G).
 - An analysis of all academic staff (Table 9 in Appendix G).
 - A summary of the academic qualifications of academic staff (Table 10 in Appendix G).
 - A summary of the professional qualifications and membership in professional bodies/societies of academic staff (Table 11 in Appendix G).
 - A summary of the post held by full time academic staff (Table 12 in Appendix G).
 - A summary of the academic staff teaching workload for the current semester (Table 13 in Appendix G).

- An analysis of all support staff (Table 14 in Appendix G).
- A summary of the post held by support staff (Table 15 in Appendix G).
- The staff : student ratio by year for all academic years for the past four years (Table 16 in Appendix G).
- A listing of lecturers/invited speakers from industry/public bodies and their level of involvement.

8.2.7 Facilities

- (i) Discuss the adequacy of teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories and workshops, and associated equipment to cater for multi-delivery modes.
- (ii) For programmes offered wholly or partly in distance mode, or at multiple or remote locations, describe how the facilities provided are equivalent to those provided for on-campus students.
- (iii) Describe the adequacy of support facilities such as hostels, sport and recreational centres, health centres, student centres, and transport in facilitating students' life on campus and enhancing character building.
- (iv) The information required in items (i) to (iii) should be provided in the supporting document:
 - A summary in tabulated form the lecture facilities (give number, capacity, and audio video facilities available).
 - A summary in tabulated form the laboratories (list down the equipment available in each laboratory).
 - A summary in tabulated form the workshops (list down the equipment/machinery available in each workshop).

- A summary in tabulated form the computer laboratories (list down the hardware and software available).
- A summary in tabulated form the other supporting facilities such as the library (list down the titles of books/journals/magazines/standards of relevance to the programme).
- A summary in tabulated form recreational facilities.
- A summary in tabulated form information on recent improvements and planned improvements in these facilities.

8.2.8 Quality Management Systems

- (i) Outline the organisational structure of the IHL as well as the structure within the faculty/department/programme. Discuss the level and adequacy of institutional support, operating environment, financial resources, constructive leadership, policies and mechanisms for attracting, appointing, retaining and rewarding well-qualified staff and provision of professional development; and provision of infrastructure and support services to achieve **Programme Objectives** and assure continuity of the programme. All relevant policies are to be made available during the visit.
- (ii) Discuss the mechanism for programme planning; curriculum development; curriculum and content review; responding to feedback and inputs from stakeholders including industry advisors, students and alumni; tracking the contributions of individual courses to the Programme Outcomes; tracking performance through assessment; responding to External Examiners comments; reviewing of Programme Objectives and Programme Outcomes; and continual quality improvement. Where these are discussed elsewhere in the report, specify their locations. For a new programme, IHL also need to discuss the processes surrounding the decision to introduce the programme.
- (iii) Summarise responses to the external examiner report.
- (iv) Discuss how the IHLs quality management system provides quality assurance and benchmarking.
- (v) The information required in items (i) to (iv) should be provided in the supporting document:

- Evidence on the participation of academic staff, support staff and students in the continual quality improvement process.
- Evidence on the development of academic staff through opportunities in further education, industrial exposure, as well as research and development.
- Policies, internal processes and practices that are in place at all levels within the IHL relating to the five criteria as stated in Section 7 of this Manual.
- Evidence of the on-going participation of the industry advisors in discussion and forums, professional practice exposure, and collaborative projects.

8.2.9 Other Relevant Information

Include any additional information, which supports the continuing progress and visibility of the programme, such as major research accomplishments.

8.3 Supporting Material Document – Digital Format

This document is to provide supporting material for the programme in digital format (softcopy) as follows:

8.3.1 Supporting Information

Provide additional information on the IHL, faculty/school/department, and programme not provided in the self assessment report.

8.3.2 Academic and Laboratory Support Staff

Provide no more than a two-page CV for each staff member.

8.3.3 Programme Structure and Contents

Provide evidence of the use of tutorials and non-conventional delivery methods such as Problem Based Learning (PBL) techniques alongside traditional lectures.

Provide a summary of the industrial training schemes, and the list of companies involved.

Provide an evidence of activities relevant to industry exposure.

8.3.4 Equipment, Software, Title of Books and Journals

Provide a listing of all equipment and software used by the programme including recent additions and planned additions, as well as the supporting title of books, and journals for the programme.

8.3.5 External Examiner and Advisory Board

Provide the external examiner reports and reports/minutes from advisory board meetings.

8.4 Institutional Documents and Additional Documentation to be Made Available During the Visit

The following items, which are evidences to support the information requested in Sections 8.2 and 8.3 above shall be made available during the visit:

8.4.1 IHL Documents

Provide the Handbook, Calendar supplement, or other official publication relating to the faculty/school/department, and containing the statement of programme details; IHL prospectus; and any other documents that relate to the faculty/school/department, and programme.

8.4.2 Documents Related to Programme Objectives and Outcomes

Provide all relevant documents and evidences related to Programme Objectives and Programme Outcomes (one copy) as follows:-

- (i) course files – for every course offered by the programme, provide the course information to include the targeted course learning outcomes, a matrix linking course outcomes to programme outcomes, course synopsis/syllabus, and a list of references (texts used). Final examination papers complete with answer scheme and graded examination papers with low, medium and high grades are also to be provided. Any information with regard to other learning activities and assessment measures such as projects, quizzes, tutorial questions, assignments, class projects, copies of the course notes (optional), and any other materials used for the course are also to be included. For laboratory courses, provide a copy of the syllabus, experiment instruction sheets, as well as supporting information.

- (ii) objectives and outcomes assessment instruments – supporting documentation for objectives and outcomes assessment including sample questionnaires, portfolios, survey forms, video recordings, etc.
- (iii) all evidences related to CQI of the programme.
- (iv) any other relevant documents.

8.4.3 Final Project Reports

For sample students, provide a copy of the final project report, instruction sheets, and grade sheets or other evaluations for the project.

Provide the listing of final project titles for the past few years.

8.4.4 Industrial Training Reports

For sample students, provide a copy of the training report, guidelines for the training, reviews by the industry sponsors as well as the faculty mentors.

8.4.5 Laboratory Reports

For sample students, provide a copy of the laboratory reports, instruction sheets, and grade sheets or other evaluations for the project laboratory report.

8.4.6 Quality Assurance Records

Provide minutes and records of action and improvement for meetings of the programme teaching team, Industry Advisory Committee, staff-student consultation forums.

8.4.7 Other Documentation

Provide any other documentation that might help the Evaluation Panel in the assessment of the programme.

9.0 Approval Procedure for a New Engineering Programme

9.1 EAC's Initial Evaluation

The evaluation procedure at this stage shall comprise the following steps:

(a) Application for Approval to Conduct a New Degree Programme

The IHL intending to conduct a new programme shall obtain approval from the relevant authorities.

The IHL should submit the complete set of documents (refer to Section 8 and Appendix C) through MQA for initial evaluation by the EAC. The recommendation from the EAC will be forwarded to the relevant authorities.

When the documents are considered to be inadequate, the IHL shall be required to provide further information before an evaluation is carried out. If the required information is not provided within a specified period, it shall be deemed that the IHL no longer intends to conduct the programme.

(b) Initial Evaluation

The EAC shall appoint an Evaluation Panel to evaluate the proposed programme.

The evaluation shall cover the following areas:

- (i) general awareness of current development in engineering education and engineering practice;
- (ii) the stated Programme Objectives and Programme Outcomes;
- (iii) involvement of stakeholders;

- (iv) the course content;
- (v) the quality of staff, the educational culture;
- (vi) the teaching facilities;
- (vii) the library/resource centre;
- (viii) the IHL's quality systems and processes;
- (ix) the assessment procedure and examination rules; and
- (x) other related activities.

The evaluation may include a visit to the IHL by the Evaluation Panel.

9.2 Report and Recommendation

The report from the Evaluation Panel shall be submitted to EAC within 4 weeks after the appointment/visit.

9.3 EAC's Decision

Based on the evaluation, EAC may decide on one of the following:

- to recommend approval of the programme to be conducted
- to recommend conditional approval for the programme to be conducted with the provision that the IHL takes certain actions to rectify all the shortcomings indicated in the report within a specified period as determined by EAC
- not to recommend approval.

The recommendation from EAC is specific to the programme, location and mode of study. Where the same programme is offered by the IHL at different locations and/or via different modes of delivery, the IHL shall make a separate application for each of the programmes.

APPENDIX A**ENGINEERING ACCREDITATION COUNCIL, EVALUATION PANEL
AND ACCREDITATION APPEALS BOARD****1.0 ENGINEERING ACCREDITATION COUNCIL**

The Engineering Accreditation Council (EAC), representing BEM, IEM, LAN and JPA, shall be an independent body for the accreditation of engineering programmes.

The policy on the accreditation of engineering programmes is laid down by EAC and is subject to changes as deemed necessary by EAC. Implementation of the policy is the responsibility of the EAC.

Members of EAC shall be appointed by BEM as follows:

- a) A Chairman (nominated by BEM).
- b) A Deputy Chairman (nominated by IEM).
- c) 15 members representing each of major branches (e.g. Civil, Mechanical, Electrical, Chemical and Electronics) and each of the constituent organisations nominated by BEM, IEM, MQA and JPA.
 - (i) 5 members nominated by BEM
 - (ii) 5 members nominated by IEM
 - (iii) 1 member nominated by JPA
 - (iv) 1 member nominated by MQA
 - (v) 3 members from the major employers of engineers in Malaysia
- d) Ex-Officio: Registrar of BEM
Secretary of BEM

The EAC shall comprise persons from academic institutions and industries, with a minimum of 50% from the industries. In appointing the members of EAC, BEM shall maintain a reasonable spread of expertise across various branches of engineering.

The final decision on the membership of the EAC is with the BEM.

All members shall be professional engineers, unless not available within the constituent organisation.

Terms of reference shall be to:

- ◆ formulate and update the accreditation policies and criteria.
- ◆ approve detailed guidelines and operating procedures for accreditation.
- ◆ oversee all operational arrangements, and appoint members of the Evaluation Panel.
- ◆ receive evaluation report on engineering programmes, and decide whether accreditation should be granted or otherwise.
- ◆ establish and maintain a list of local and foreign accredited engineering programmes.
- ◆ respond to any complaints or appeals concerning the accreditation process and to any proposals for change.
- ◆ oversee the development and operation of accreditation and mutual recognition of programmes with other countries.
- ◆ keep the Board informed of the activities of EAC. Where necessary make recommendations to the Board.
- ◆ foster the dissemination of developments and best practices in engineering education.
- ◆ advise the Board on public statements or representations that should be made in relation to engineering education.
- ◆ hold consultation meetings with IHLs as and when necessary.
- ◆ hold meetings at least 6 times per year.

2.0 EVALUATION FOR APPROVAL TO CONDUCT A NEW PROGRAMME

The EAC shall appoint an evaluator to assess the application. The person should have extensive academic experience and/or industrial experience.

3.0 EVALUATION PANEL FOR ACCREDITATION

The Evaluation Panel shall be appointed by EAC and normally consists of:

- a Chairperson; and
- two members, typically chosen for their broad experience in engineering and their ability to evaluate the generic programme outcomes and quality systems. The Evaluation Panel should include at least one member with extensive academic experience, and one member with extensive industry experience. All members must be chosen from related field to the programme being evaluated.

All members of the Evaluation Panel shall be professional engineers.

4.0 ACCREDITATION APPEALS BOARD

The Accreditation Appeals Board shall consist of the President of BEM, President of IEM and Chief Executive Officer of LAN or their nominated representatives. The President of BEM or his nominated representative shall be the Chairman of the Accreditation Appeals Board.

If necessary, the Accreditation Appeals Board may appoint a Special Committee, members of which must be experienced in accreditation process, to consider an appeal. Any expenses incurred shall be borne by the IHL making the appeal.

The decision of the Accreditation Appeals Board shall be final.

APPENDIX B**CORE ENGINEERING CONTENT FOR SELECTED ENGINEERING DISCIPLINES
AND INNOVATIVE PROGRAMMES****(a) Engineering Sciences, Principles, and Applications**

An accredited programme is expected to cover the broad areas of the respective disciplines at an appropriate level. The following are examples of underpinning courses that may be introduced for the respective disciplines:

CIVIL	MECHANICAL	ELECTRICAL	CHEMICAL	ELECTRONICS
Strength of Materials	Materials	Circuits and Signals	Chemical Thermodynamics	Circuits and Signals
Structural Analysis and Design	Statics and Dynamics	Electromagnetic Fields and Waves	Material and Energy Balance	Electromagnetic Fields and Waves
Fluid Mechanics/ Hydraulics	Fluid Mechanics	Instrumentation and Control	Chemical Kinetics & Reactor Design	Instrumentation and Control
Soil Mechanics/ Geotechnical Engineering	Thermodynamics and Heat Transfer	Digital and Analog Electronics	Momentum Transfer	Digital and Analog Electronics
Civil Engineering Materials	Mechanical Design	Machines and Drives	Heat Transfer	Microprocessor System
Statics and Dynamics	Instrumentation and Control	Power Electronics	Mass Transfer	Programming Techniques
Construction Engineering	Vibrations	Power Station and High Voltage Engineering	Separation Process	Introduction to Electrical Power System
Surveying	Solid Mechanics	Communications System	Process Design	Computer Architecture
Water Resources and Hydrology	Manufacturing/ Production/	Power System Analysis	Process Control & Instrumentation	Communications System

Highway and Transportation	Electrical Power and Machines	Electronic Drives and Applications	Safety and Environmental Protection	Electronic System Analysis and Design
Environmental Studies	Electronics and Microprocessors	Electrical Energy Utilization	Environmental Studies	Multimedia Technology and Applications
	Computer Aided Engineering		Plant and Equipment Design	
			Viability – Legal Framework, Economics, Operability and Reliability	

(b) Mathematics, Statistics and Computing

These courses should be studied to a level necessary to underpin the engineering courses of the programme and with a bias towards application. The use of numerical methods of solution is encouraged, with an appreciation of the power and limitations of the computer for modelling engineering situations. Wherever practicable, it is preferred that mathematics, statistics and computing are taught in the context of their application to engineering problems and it follows that some mathematical techniques may be learnt within other subjects of the course. In addition to the use of computers as tools for calculation, analysis and data processing, programme should introduce their application in such area as:-

Civil	Mechanical	Electrical	Chemical	Electronics
Computer aided analysis and design	Computer aided design and manufacture	Mathematical applications	Computer analysis and design	Mathematical applications
Economics analysis for decision making	Economics analysis for decision making	Statistical and Numerical techniques	Economics analysis for decision making	Statistical and Numerical techniques
Data bases and information systems	Data bases and information systems	Computer Applications	Numerical methods and optimization	Computer Applications
Operational research	Operational research		Operational research	
Business and management systems	On-line control of operations and processes		Databases and Information Systems	
Statistical and Numerical techniques				

(c) Engineering Applications

Emphasis on Engineering Applications in degree programmes aims to ensure that all engineering graduates have a sound understanding of up-to-date industrial practice, in particular:

Civil Engineering:

- to appreciate the characteristic and structural behaviour of materials in a variety of user environments
- to be able to analyse and design structural components from these materials
- to appreciate the range of manufacturing methods currently available and the skills which they require in people
- to appreciate the cost aspects of material selection, manufacturing methods, operation and maintenance in their interaction with design and product marketing
- to understand the whole process of industrial decision-making in design, manufacturing and use and how it must be influenced not only by technical

ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Mechanical Engineering:

- to appreciate the characteristic behaviour of materials in a variety of user environments
- to appreciate the range of manufacturing methods currently available and the skills which they require in people
- to appreciate the cost aspects of material selection, manufacturing methods, operation and maintenance in their interaction with design and product marketing
- to understand the whole process of industrial decision-making in design, manufacturing and use and how it must be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Electrical and Electronic Engineering:

- to appreciate the characteristic behaviour of materials in electrical and electronic systems
- to be able to analyse and design electrical and electronic systems from devices/components made of various materials
- to appreciate cost effectiveness of component/device equipment selection, manufacturing process and integration process
- to appreciate the range of manufacturing methods currently available and the skills which they require in people.
- to understand the whole process of industrial decision making in design, manufacturing and use and how it must be influenced not only by technical ideas but also by the practical constraints of financial and human resources and by the business and social environment of engineering.

Chemical Engineering

- to appreciate the characteristic and structural behaviour of materials in a variety of user environments
- to be able to adopt these materials in process design and analysis
- to understand the general sequence of processing steps for any given type of chemical process
- to calculate and analyse the material and energy flows for a given chemical process
- to understand the selection or estimation of process operating conditions, selection of process equipment, maintenance and process troubleshooting
- to analyse the various types of unit operations and processing steps and to decide their relative advantages or disadvantages on the basis of environment, economics, safety and operability.

- to understand the various process control schemes for the purpose of maintaining production quality, ensuring process safety and preventing waste.

(d) Evaluating an Innovative Programme

It is a challenge for an accreditation process to promote innovation, experimentation and dissemination of good practice, while maintaining standards that can be objectively certified nationally and internationally. Innovation by its nature challenges existing wisdom, but not every programme that departs from existing norms can be said to be innovative or desirable. **All fundamentals required in the programme must be maintained.**

The EAC accreditation system encourages innovation by minimising prescriptiveness in how the required outcomes are attained. Programme evaluation will always focus on the intent of the criteria and on the demonstrated capability of graduates to enter engineering practice at a professional level. Clearly however, a programme which departs radically from the methods normally thought necessary – for example, by employing only a fraction of the normal complement of staff – may expect a searching examination of method as well as outcomes. The EAC and the Evaluation Panel are expected to be receptive to new approaches, and to use the best judgement available to evaluate the substance and merit of the programme.

Continuing innovation and development can be expected to lead to restatement of the criteria and policy of accreditation.

APPENDIX C**ENGINEERING ACCREDITATION COUNCIL****Checklist of Documents for Accreditation*/Approval of New Programme** and Relevant Information**

Please tick:

Accreditation	<input type="checkbox"/>
Approval of New Programme	<input type="checkbox"/>

* For programme applying for accreditation only, please fill in the table for qualifying requirements below:

	Qualifying Requirements for Programme Applying for Accreditation	Yes/No
1	Minimum 120 credit hours of which 80 credit hours must be engineering subjects	
2	Final year project	
3	Industrial training	
4	Minimum of 8 full-time academic staff	
5	Staff:student ratio of 1:25 or better (ideally it should be 1:15 or better)	
6	External examiner's report	
7	Programme Objectives	
8	Programme Outcomes	

Failure to meet any one of the qualifying requirements will mean that the programme shall not be assessed for accreditation, and the process shall stop here and no submission to the EAC can be made by the IHL. IHL are advised to ensure all requirements are fulfilled by the programme before re-applying for accreditation.

** For Approval of New Programme, please fill in this Appendix where applicable.

INTRODUCTION**A GENERAL INFORMATION**

		To be filled in by the IHL where applicable	Checked by EAU
1	Name of IHL		
2	Address of IHL		
3	Name of Faculty/School/Department		
4	Name and phone No. of Staff to be Contacted		
5	Programme for Accreditation		
6	EAC Reference Number		
7	Degree to be Awarded and Abbreviation:		
8	IHL Awarding the Degree: (if different from A1)		
9	Mode of Study [Full-Time/Twinning/Part-Time/Others (please specify)]		
10	Duration of Programme (in years)		
11	Medium of Instruction of Programme Evaluated		
12	Language Available for Reference Materials		
		Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by EAC Secretariat
13	IHL academic session		
14	URL address IHL website		

B PROGRAMME ACCREDITATION HISTORY

		To be filled in by the IHL where applicable	Checked by EAU
1	Year Programme Introduced		
2	Year of Last Accreditation for this Programme		
3	Conditions (if any) from Previous Accreditation		
4	Action taken on the Conditions above		
5	Major Changes (Self Initiated), Reasons and Year of Changes		

C PROGRAMME OBJECTIVES

	Evidence quoted should be made available as per requirement in Section J or K	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	State the vision and mission of the IHL and/or faculty		
2	Describe the Programme Objectives and state where they are published		
3	Describe how the Programme Objectives are consistent with the vision and mission of the IHL and/or faculty and stakeholders' requirements		
4	Describe the processes used to establish and review the Programme Objectives, and the extent to which the programme's various stakeholders are involved in these processes		
5	Describe how the IHL ensures achievement of the Programme Objectives		
6	Describe the ongoing evaluation of the level of achievement of these objectives, and the extent to which the programme's various		

	stakeholders are involved in these processes		
7	Describe how the results obtained from evaluation are being used to improve the effectiveness of the programme		

D PROGRAMME OUTCOMES

	Evidence quoted should be made available as per requirement in Section J or K	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	List down the Programme Outcomes and state where are they published		
2	Describe how the Programme Outcomes relate to the Programme Objectives		
3	Describe how the Programme Outcomes encompass the outcome requirements of Section 4.0 of this Manual		
4	Describe the processes used to establish and review the Programme Outcomes, and the extent to which the programme's various stakeholders are involved in these processes		
5	Describe the data gathered and explain the result of the assessment		
6	Explain how the assessment results are applied to further develop and improve the programme		
7	Describe the materials, including student work and other tangible materials that demonstrate achievement of the Programme Outcomes		

E CRITERION 1: ACADEMIC CURRICULUM

	Evidence quoted should be made available as per requirement in Section J or K For item 1 & 2, refer to 8.2.4 (iii) for further information/presentation format to be included	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	Discuss the programme structure and course contents to show how they are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the Programme Outcomes.		
2	Discuss the programme delivery and assessment methods and how these are appropriate to, consistent with, and support the development of the range of intellectual and practical skills and attainment or achievement of the Programme Outcomes		

F CRITERION 2: STUDENTS

	Evidence quoted should be made available as per requirement in Section J or K For item 1 to 5, refer to 8.2.5 (vi) for further information/presentation format to be included	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	Discuss students performance in relation to Programme Outcomes	Replace with (i) – (v) in 8.2.5 from manual	
2	Discuss the requirement and process for admission of students to the programme		
3	Discuss the policies and processes for the credit transfer/exemption		
4	Discuss the student workload		

5	Discuss students activities and involvement in student organisations that provide experience in management and governance, representation in education and related matters and social activities		
---	--	--	--

G CRITERION 3: ACADEMIC AND SUPPORT STAFF

	Evidence quoted should be made available as per requirement in Section J or K For item 1 to 3, refer to 8.2.6 (iv) for further information/presentation format to be included	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	Discuss the strength and competencies of the academic staff in covering all areas of the programme, and in implementing the outcome-based approach to education		
2	Discuss how the overall staff workload enables effective teaching, student-staff interaction, student advising and counselling, IHL service and research activities, professional development and interaction with industries		
3	Discuss the sufficiency and competency of technical and administrative staff in providing adequate support to the educational programme		

H CRITERION 4: FACILITIES

	Evidence quoted should be made available as per requirement in Section J or K For item 1 to 3, refer to 8.2.7 (iv) for further information/presentation format to be included	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	Discuss the adequacy of teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories and workshops, and associated equipment to cater for multi-delivery modes		
2	For programmes offered wholly or partly in distance mode, or at multiple or remote locations, describe how the facilities provided are equivalent to those provided for on-campus students		
3	Describe the adequacy of support facilities such as hostels, sport and recreational centres, health centres, student centres, and transport in facilitating students' life on campus and enhancing character building		

I CRITERION 5: QUALITY MANAGEMENT SYSTEMS

	Evidence quoted should be made available as per requirement in Section J or K	Indicate the location of these items in the documents submitted and/or in the documents to be made available during the visit	Checked by Evaluation Panel
1	Outline the organisational structure of the IHL as well as the structure within the faculty/department/programme. Discuss the level and adequacy of		

	<p>institutional support, operating environment, financial resources, constructive leadership, policies and mechanisms for attracting, appointing, retaining and rewarding well-qualified staff and provision of professional development; and provision of infrastructure and support services to achieve Programme Objectives and assure continuity of the programme.</p>		
2	<p>Discuss the mechanism for programme planning; curriculum development; curriculum and content review; responding to feedback and inputs from stakeholders including industry advisors, students and alumni; tracking the contributions of individual courses to the Programme Outcomes; tracking performance through assessment; responding to External Examiners comments; reviewing of Programme Objectives and Programme Outcomes; and continual quality improvement. Where these are discussed elsewhere in the report, specify their locations. For a new programme, IHL also need to discuss the processes surrounding the decision to introduce the programme.</p>		
3	<p>Summarise responses to the external examiner report.</p>		
4	<p>Discuss how the IHLs quality management system provides quality assurance and benchmarking.</p>		

J SUPPORTING DOCUMENTS

		To be provided in digital format	Checked by Evaluation Panel
1	Evidence of stakeholders involvement in all the processes above		
2	Other relevant evidences available to support claims made (e.g. minutes of meetings of relevant committees, survey forms)		
3	Relevant evidences available to support claims made for programme outcomes (eg. learning and assessment tools such as student portfolios, survey forms)		
4	List of final year project titles for the past five years		
5	Summary of the industrial training schemes and list of companies involved.		
6	Evidence on the participation of academic staff, support staff and students in the continual quality improvement process.		
7	Evidence on the development of academic staff through opportunities in further education, industrial exposure, as well as research and development.		
8	Policies, internal processes and practices that are in place at all levels within the IHL relating to the five criteria as stated in Section 7 of this Manual.		
9	Evidence of the on-going participation of the industry advisors in discussion and forums, professional practice exposure, and collaborative projects.		

K INSTITUTIONAL DOCUMENTS AND ADDITIONAL DOCUMENTATION

		To be made available during the visit	Checked by Evaluation Panel
1	Handbook, Calendar Supplement, or other Official Publication Relating to the Engineering Faculty, and Containing the Statement of Programme Details		
2	IHL Prospectus		
3	Additional Information on the IHL, Faculty of Engineering, And Programme not Provided in the Hard Copy Document or CD		
4	Any other Official Documents that Relate to the Engineering Faculty in other forms		
5	Course files – detailed description of the content (syllabus), targeted learning outcomes, course information distributed to students, learning activities, assessment methods, learning modes, texts used, prerequisites, graded examination papers with low, medium and high grades, tutorial assignments, class projects, a copy of the text book, and any other materials used for the course. For laboratory courses, provide a copy of the syllabus, experiment instruction sheets, graded student laboratory work with low, medium and high grades, as well as supporting information		
6	Copy of the final year project report, instruction sheets, and grade sheets or other evaluations for the project for sample students for the past five year		

7	Evidence of the use of tutorials and non-conventional delivery methods such as Problem Based Learning (PBL) techniques alongside traditional lectures		
8	Copy of the training report, guidelines for the training, reviews by the industry sponsors as well as the faculty mentors for sample students for the past year		
9	List of activities and evidence relevant to industry exposure.		
10	Any supporting documentation for objectives and outcomes assessment including sample questionnaires, portfolios, survey forms, video recordings, etc.		
11	All evidences related to CQI of the programme		
12	Describe the procedures used for credit transfer/credit exemption and provide evidence of implementation of such procedures.		
13	Acceptance of transfer students and provide evidence that the processes and procedures are working		
14	Relevant policies on Institutional Support, Operating Environment and Financial Resources		
15	Any other relevant documents		

APPENDIX D

ENGINEERING ACCREDITATION COUNCIL

Evaluation Panel Report

Name of IHL:

Programme for Accreditation:

General Remarks

A QUALIFYING REQUIREMENTS

1	Minimum 120 credit hours of which 80 credit hours must be engineering subjects	
2	Final year project	
3	Industrial training	
4	Minimum of 8 full-time academic staff	
5	Staff:student ratio is 1:25 or better (ideally it should be 1:15)	
6	External examiner's report	
7	Programme Objectives	
8	Programme Outcomes	

B ASSESSMENT

* Delete where applicable

B1 ASSESSMENT OF PROGRAMME OBJECTIVES AND PROGRAMME OUTCOMES**1 PROGRAMME OBJECTIVES**

Comments/Remarks on Programme Objectives: The Evaluation Panel shall comment on the appropriateness of the Programme Objectives as well as the Processes and Results, and Stakeholders involvement as required by Section 3.0 of the Manual.

1.1 Programme Objectives:

--

1.2 Processes and Result:

--

1.3 Stakeholders Involvement:

--

2 PROGRAMME OUTCOMES

Comments/Remarks on Programme Outcomes: The Evaluation Panel shall comment on the appropriateness of the Programme Outcomes as well as the Processes and Results as required by Section 4.0 of the Manual.

2.1 Programme Outcomes:

--

2.2 Process and Result:

--

2.3 Stakeholders Involvement:

--

Overall Comments/Remarks: *Poor/Satisfactory/Good

--

B2 ASSESSMENT CRITERIA**1 CRITERION 1 : ACADEMIC CURRICULUM****1.1 Credit Hours**

(a) Total number of credit hours

--

(b) Number of credit hours for engineering subjects

--

(c) Number of credit hours for related non-engineering subjects

--

1.2 The Curriculum

(a) Programme Structure, Course Contents, and Balanced Curriculum

--

(b) Programme Delivery and Assessment Methods

--

(c) Laboratory

--

(d) Final Year Project

--

(e) Industrial Training

--

(f) Exposure to Professional Practice

--

Comments/Remarks/Recommendations: *Poor/Satisfactory/Good

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

2 CRITERION 2 : STUDENT**2.1 Student Admission**

(a) Entry requirements (Academic)

(b) Transfer policy/Selection Procedures/Appropriateness of arrangements for Exemptions from part of the course

2.2 Student Development

(a) Student counselling

(b) Workload

(c) Enthusiasm and motivation

(d) Co-curricular activities

(e) Observed attainment of the Programme Outcomes by the students

Comments/Remarks/Recommendations: *Poor/Satisfactory/Good

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

3 CRITERION 3 : ACADEMIC AND SUPPORT STAFF**3.1 Academic Staff**

(a) Academic qualifications

(b) Professional qualification, experience & development

(c) Research/publication/consultancy

(d) Industrial involvement

(e) Teaching load/contact hours

(f) Motivation and enthusiasm

(g) Use of lecturers from industry/public bodies

(h) Awareness of the Outcome-Based approach to education

3.2 Support Staff (Laboratory and Administration)

(a) Qualification and experience

(b) Adequacy of support staff

3.3 Development of Staff

(a) Staff development

(b) Staff assessment

(c) Academic staff:student ratio

Comments/Remarks/Recommendations: *Poor/Satisfactory/Good

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

4 CRITERION 4 : FACILITIES

(a) Lecture rooms - quantity provided and quality of A/V

(b) Laboratory/workshop - student laboratory and equipment

(c) IT/computer laboratory - adequacy of software and computers

(d) Library/resource centre - quality and quantity of books, journals, and multimedia

(e) Recreation facilities

Comments/Remarks/Recommendations: *Poor/Satisfactory/Good

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

5 CRITERION 5 : QUALITY MANAGEMENT SYSTEMS**5.1 Institutional Support, Operating Environment, and Financial Resources**

(a) Sufficient to assure quality and continuity of the programme

(b) Sufficient to attract and retain a well-qualified academic and support staff

(c) Sufficient to acquire, maintain, and operate facilities and equipment

5.2 Programme Quality Management and Planning

(a) System for programme planning, curriculum development, and regular review of curriculum and content

5.3 External Assessment's Report and Advisory System

- (a) External examiners report and how these are being used for quality improvement

- (b) Advisory panel from industries and other relevant stakeholders

5.4 Quality Assurance

- (a) System for student admission and teaching and learning

- (b) System of assessment and evaluation of examinations, projects, industrial training, etc including preparation and moderation of examination papers

Comments/Remarks/Recommendations: *Poor/Satisfactory/Good

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

EVALUATION PANEL ASSESSMENT REPORT SUMMARY**Overall Comments/Remarks:**

i) Strength

ii) Weakness

iii) Concern

iv) Opportunities for improvement

v) Other comments/remarks

Date of Visit:

Programme Title:

Faculty:

Full Accreditation (5 years)

Condition(s) to meet/Recommendation for further improvement

Accreditation (1 year/2 years/3 years/4 years)

Conditions to meet /Recommendation for further improvement

Declined Accreditation

Comments:

—

Prepared and submitted by Evaluation Panel:

- (i) Chairman: _____ Signature: _____
- (ii) Member: _____ Signature: _____
- (iii) Member: _____ Signature: _____
- (iv) Member: _____ Signature: _____

Date: _____

ACTION BY ENGINEERING ACCREDITATION COUNCIL (EAC)

Date Received by the EAC: _____

Comments by the EAC:

(i) _____

(ii) _____

(iii) _____

(iv) _____

Recommendation by EAC

Concurs with Evaluation Panel

* Yes/No

If not agreeable with Evaluation Panel's recommendation, EAC recommendations are:

(i) Full Accreditation (5 years)

Condition(s) to meet/Recommendation for further improvement

(ii) Accreditation (1 year/2 years/3 years/4 years)

(iii) Decline Accreditation

Reasons

(iv)

Condition(s) to meet

Reasons

ACTION BY SECRETARIAT

(i) Date of transmission of decision to IEM

(ii) Date of Transmission of decision to BEM

(iii) Date of Transmission of decision to MQA

(iv) Date of Transmission of decision to JPA

(v) Date of issue of Accreditation Certificate

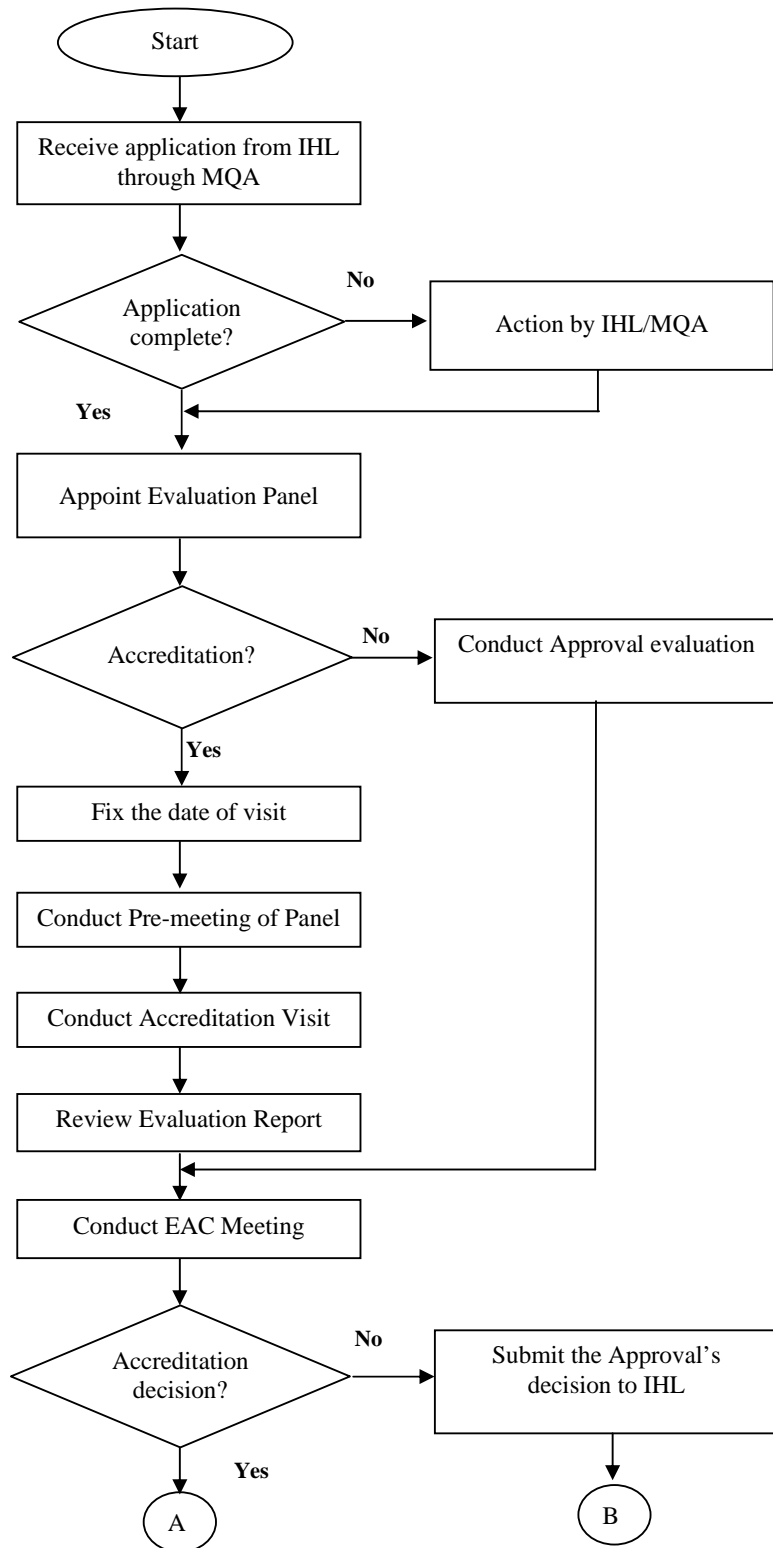
APPENDIX E**EXTERNAL EXAMINER'S REPORT**

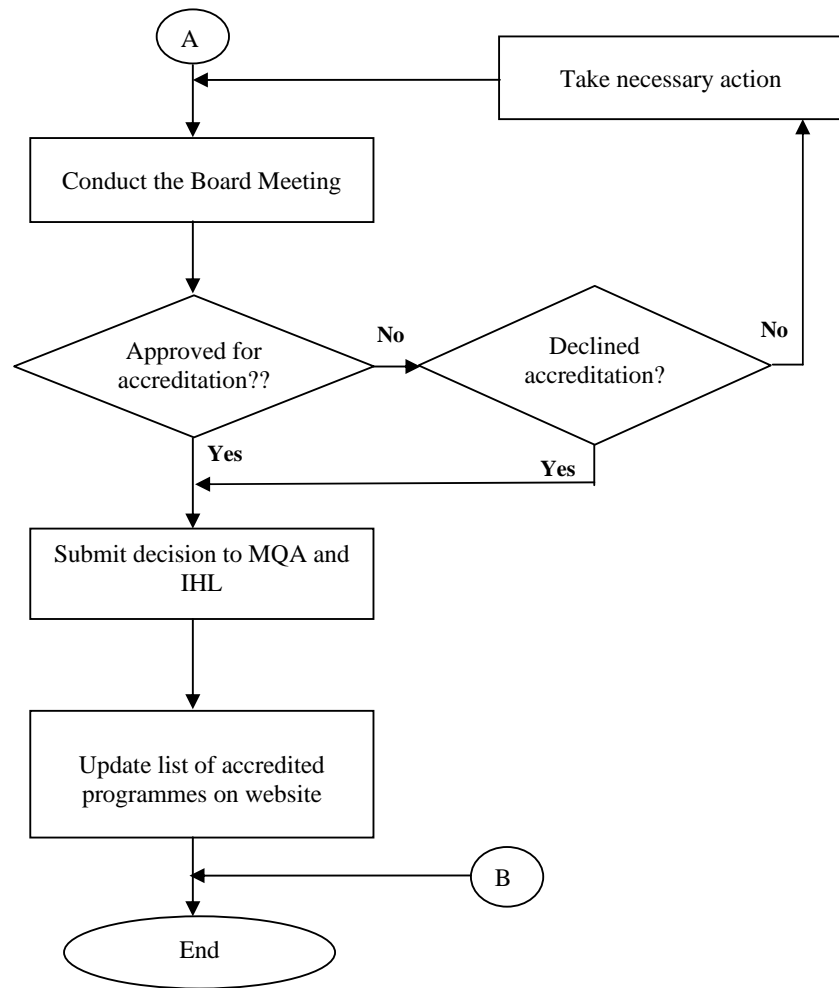
The external examiner's annual report shall contain but not be limited to the following:

- (i) Assessment on programme curriculum(eg. objectives and outcomes)
- (ii) Assessment of staff quality including qualification and industry exposure. Also assessment of loading of each staff in teaching, research, consultancy and supervision of student projects.
- (iii) Assessment on staff-student ratio and student workload. If not sufficient, corrective action to be taken by the university.
- (iv) Assessment on the process of preparation of the examination papers i.e. procedures for setting, vetting, quality assurance, confidentiality and security.
- (v) Assessment on the examination papers and marking schemes set for the standard of question, coverage of the syllabus, adequate balance between theory and application, whether the questions set are of equal level, adequate choice of questions, appropriateness of marking scheme.
- (vi) Assessment on the marked answer scripts - from samples of good candidates, average candidates and weak candidates. Fairness/disparity of marking, follow-through method adopted where one section answer is wrong, the response of the candidates to the question, the marks distribution.
- (vii) Assessment on coursework, laboratory work, assignment, design projects, final year projects.
- (viii) Assessment on examination procedures and regulations.
- (ix) Management commitment towards the programme.

APPENDIX F

PROCESS FLOW CHART FOR APPLICATION FOR ACCREDITATION AND APPROVAL OF ENGINEERING PROGRAMMES





Notes :

- 1)
 - a) Application for recommendation for approval to conduct engineering programme to be submitted before offering the engineering programme.
 - b) Approval to conduct any engineering programme does not guarantee full accreditation. The faculty needs to apply for accreditation of the programme as specified in the EAC Manual.
- 2) For programmes offered outside Malaysia, the EAC will use the accredited list by the professional engineering body of the home country as a guide.

APPENDIX G**TABLE 1 Course to PO Matrix (SAMPLE)**

Code	Course	Emphasis to the PO											
		1	2	3	4	5	6	7	8	9	
XX1A	Subject 1	3											1
XX1B	Subject 2	3											
XX1C	Subject 3	3	3										
XX1D	Subject 4	3		3			2						
XX1E	Subject 5							3					
XX1F	Subject 6	3		2						2			
XX1G	Subject 7	3											
XX1H	Subject 8	3											
XX1I	Subject 9	3			3		2						
XX1J	Subject 10	3											
XX2A	Subject 1	3											
XX2B	Subject 2		3										
XX2C	Subject 3	3											
XX2D	Subject 4	3		2	2								
XX2E	Subject 5	3											
XX2F	Subject 6	3	2	2	2	3	2	3	3	3	1	3	
XX2G	Subject 7	3											
XX2H	Subject 8	3			2		2						
XX2I	Subject 9	2		3									
XX2J	Subject 10	3		3			2			2			
XX2A	Subject 1							1					

Key

	No Emphasis
1	Very little emphasis
2	Moderate emphasis
3	Strong emphasis

TABLE 2 Distribution of Engineering Courses for an Engineering Programme (SAMPLE)

Groupings	Course Code	Course	Course Type	Hours					EAC Equivalent Total Credits
				Lecture	Lab/ Workshop/	Project	PBL*/Design	Tutorial	
Broad Area 1	XXXX	Subject 1	Core	28	28	-	-	-	3
	XXXY	Subject 2	Core	28	-	-	-	28	3
	XXXZ	Subject 3	Core	28	-	28	-	-	3
Broad Area 2	YYYY	Subject 4	Core	42					3
	YYYX	Subject 5	Core	14	28	-	28	-	3
	YYYZ	Subject 6	Core						
Broad Area 3	etc.	etc.							
Broad Area 4									
Elective Courses	FGHI	Elective I	Elective						
	HIJK	Elective II	Elective						
	IJKL	Elective III	Elective						
Total Contact Hours									
Total Equivalent Credit Hours									
Industrial Training	ABCD	Industrial Training	Core			10 Weeks			
Final Year Project	BCDE	Project I	Core			Thesis			
	DEFG	Project II	Core			Thesis			
TOTAL CREDIT HOURS ENGINEERING COURSES									

*PBL= Problem-Based Learning

TABLE 3 List of Elective Courses according to Areas of Field of Specialisation (if applicable)

AREAS	CODE	ELECTIVE COURSES
Broad Area 1		
Broad Area 2		
Broad Area 3		
Broad Area 4		
Broad Area 5		

TABLE 4 Distribution of General Education Courses for an Engineering Programme (SAMPLE)

Areas (EAC)	Code	Course	Course Type	Hours			EAC Equivalent Total
				Lecture	Lab/Workshop/Project	Tutorial	
Applied Science/Maths/Computer	XXXX	Subject 1	Core	42		14	3.5
	XXXV	Subject 2	Core	28	28		3
	XXXZ	Subject 3	Core	42		6	3.21
	TOTAL CREDIT HOURS						26.56
Management/Law/Accountancy	XXXX	Subject 1	Core	42			3
	XXXV	Subject 2	Core	42			3
	TOTAL CREDIT HOURS						6
Communication Skills/Humanities/Ethics	XXXV	Subject 1	Core	35		14	3
	XXXW	Subject 2	Core	42			3
	XXXX	Subject 3	Core	28			2
	XXXV	Subject 4	Core	28			2
	XXXZ	Subject 5	Core	42			3
	TOTAL CREDIT HOURS						13
Co-Curriculum	H	Co-Curriculum 1	Core	14			
	H	Co-Curriculum 2	Core	14			
	TOTAL CREDIT HOURS						2
TOTAL CREDIT HOURS FOR GENERAL EDUCATION COURSES						47.57	

TABLE 5 Courses Offered (Programme Structure) According to Semester and Total Credit Hours (SAMPLE)

Semester	Code	Courses	Course Type	IHL Credits		EAC Equivalent Credits	
				Engineering Courses	Related Courses	Engineering Courses	Related Courses
1	XXXA	Subject 1	Core		1		1
	XXXB	Subject 2	Core	3		3	
	XXXC	Subject 3	Core	3		3.71	
	XXXD	Subject 4	Core		3		3
	XXXE	Subject 5	Core		3		3.5
II	XXXV	Subject 1	Core	3		3.82	
	XXXW	Subject 2	Core		3		3.93
	XXXX	Subject 3	Core	3		3.71	
	XXXY	Subject 4	Core		3		3.5
	XXXZ	Subject 5	Core		3		3
INTER SESSION	etc.	etc.	Core				
III							
IV							
V							
VI							
INTER SESSION							
VII							
VIII							
TOTAL CREDIT HOURS							
TOTAL CREDIT HOURS							

TABLE 6 Distribution of Student Enrolment for all Academic Years for the Past Four Years

<u>YEAR</u>	YEAR			
	200a/200b	200b/200c	200c/200d	200d/200e
1 st Year				
2 nd Year				
3 rd Year				
4 th Year				
Total No. of Students Per Year				

TABLE 7 Entry Qualification of Final Year Students of the Current Year

ENTRY QUALIFICATION	NUMBER
STPM	
Matriculation	
Diploma	
Others (Please Specify)	
TOTAL	

TABLE 8 Breakdown in terms of Numbers of Academic Staff (Fulltime, Part-Time and Interprogramme) by Year for all Academic Years for the Past Four Years

ACADEMIC STAFF	YEAR			
	200a/200b	200b/200c	200c/200d	200d/200e
(a) Total number of full-time staff (including those servicing other programme, staff on study or sabbatical leave & tutors)				
(b) Full-time equivalent of academic staff servicing other programme				
(c) Academic staff (on study or sabbatical leave)				
(d) Tutors				
(e) Effective full-time academic staff = (a)-(b)-(c)-(d)				
(f) Full-time equivalent of academic staff from other programme servicing this programme				
(g) Full-time equivalent of part time academic staff				
Full-Time Equivalent Academic Staff (FTES) Contributing to Staff:Student Ratio = (e)+(f)+(g)				

Notes :

If an academic staff member is involved in teaching more than one degree programme (including off-campus and distance learning), then the full-time equivalent of that particular staff has to be calculated.

For full time equivalent staff calculation, the following can be used as a basis:

One Full-Time Equivalent Staff Member should normally have 15 contact hours (lecture/tutorial/lab supervision/student consultation) per week.

TABLE 10 Academic Qualification of Academic Staff

Academic Qualifications	Number
Doctorate	
Masters	
Bachelor	
TOTAL	

TABLE 11 Professional Qualifications and Membership in Professional Bodies of Academic Staff

Type of Qualification/Field	Number
PEng	
CEng	
CPEng	
FIEM	
MIEM	
Graduate Member IEM	
IEAust	
etc	

TABLE 12 Post Held by Academic Staff

Post	Number	
	Full Time	Part Time
Professor		
Assoc. Professor		
Lecturer		
Others		
Tutors		
TOTAL		

TABLE 15 Post Held by Support Staff

Post	Number
TOTAL	

TABLE 16 Staff:Student Ratio

SESSION	200a/200b	200b/200c	200c/200d	200d/200e	AVERAGE
RATIO					

GUIDELINES FOR EVALUATION PANEL

1. INTRODUCTION

This Appendix serves as a guide to all Evaluation Panel members who are appointed by the EAC, on their responsibilities and conduct during the accreditation exercise. It must be adhered to strictly in order to ensure consistencies between one Evaluation Panel to another in terms of evaluation and final recommendation. The Guidelines has been developed based on the IEM Accreditation Handbook for Engineering Degrees: Volume 1 & 2 and Buku Penilaian Kursus Pengajian IPTS, LAN, and improved further based on feedbacks from Washington Accord Mentors and relevant stakeholders, IHL and industries.

2. PREPARATION FOR ACCREDITATION VISIT

The Evaluation Panel needs to be aware of the EAC policies on accreditation as detailed in Section 5 of this Manual.

The Evaluation Panel members shall read the programme documentation carefully, with a view to ensuring that it provides the necessary information sought by the EAC in the prescribed format.

The Evaluation Panel will assess the Programme Objectives and Outcomes as well as carry out an evaluation based on all the accreditation Criteria 1 to 5 set forth in Section 7 of this Manual. The assessment includes the auditing and confirmation of documents submitted by the IHL. If the document submitted is not complete, the Evaluation Panel shall request for the additional information through the EAU.

This *Guidelines for Evaluation Panel* is a useful tool for ensuring that every important aspect of a degree programme and its delivery are assessed and reported on. However, it should be remembered that the aim of the accreditation is to determine whether a degree programme meets the academic requirements of the EAC.

The Evaluation Panel chair and Evaluation Panel members, either together or separately, should prepare a list of questions for each section of the criteria to be certain that all aspects of the criteria have been addressed. If the IHL does not provide sufficient information, the EAU should be notified and asked to request the additional information from the IHL. When the information is received, it should be forwarded to the Evaluation Panel chair and Evaluation Panel

members. It is highly desirable for the Evaluation Panel to meet face to face and/or communicate by phone and/or e-mail (pre-accreditation visit meeting) regarding issues associated with the evaluation before the final Day (-1) meeting. Issues related to curriculum should have been cleared before the Day (-1) meeting.

3. DURING VISIT

Experience indicates that the success and credibility of an accreditation visit is shaped by:

- the professionalism and **prior preparation** of the Evaluation Panel and the rigour and objectivity of on-site enquiries and the report,
- the quality of feedback provided to the IHL by the Evaluation Panel,
- the timeliness of report to the EAC.

The visit schedule should allow time for group discussion among all Evaluation Panel members for preliminary feedback and discussion of issues with the Dean and/or Head of the Faculty/School/Department/Programme.

Typical Schedule

Accreditation: Day –1

A day before the accreditation visit, the Evaluation Panel chair and Evaluation Panel members should hold a further meeting to finalise their findings and other issues related to the institutional programme to be evaluated. It is also important to review the questions and concerns that they have developed. At this meeting, the Evaluation Panel chair and Evaluation Panel members should discuss the EAC evaluation criteria and how they apply to the programme being evaluated.

The discussion should include, but not to be limited to the following:

- the programme objectives and specification of graduate outcomes
- whether the development, review and attainment monitoring of graduate outcomes are informed by industry stakeholders
- whether the outcome specification drives a top-down educational design process

- whether the academic curricular reflects a professional engineering programme, and whether it satisfies the criteria completely
- whether the learning outcomes and assessment measures within courses systematically map to track delivery of the targeted graduate outcomes
- whether the mathematics, chemistry and physics courses are at appropriate levels
- whether the content of each course is appropriate
- whether the level of course material is appropriate
- whether the courses are built on previous course work
- whether the teaching-learning process includes appropriate assessment
- whether the internship and project work are at a sufficient level
- students standing in terms of their admission standards, their academic performance, their industrial internship
- the academic and support staff in terms of their credentials and qualifications, their range of competencies, their advanced degrees, their industrial experience, their teaching loads, their involvement and accountability as an Evaluation Panel member for educational design, review and improvement, etc.
- whether the facilities are appropriate for the programme and operational, whether there are sufficient laboratory space for the programme, whether safety is a theme conveyed in the laboratories, etc.
- whether the quality management system is adequate for the programme
- whether the external assessment is appropriate, consistent and fair
- whether the quality loop is properly closed at both programme and individual course levels

These matters should be discussed by the Evaluation Panel to ensure that they are all in agreement with the issues to be investigated during the accreditation visit and be used as a basis for finalising proposed questions or themes for questioning during the various visit sessions. A proposed schedule for the evaluation visit is provided below. It should be noted that the objective is to be efficient with the time available, and to ensure that all of the questions and issues are addressed.

Accreditation Visit: Day 1

8.30 – 9.00	Evaluation Panel Meeting (Private Session)
9.00 – 9.10	Evaluation Panel briefing to the IHL
9.10 – 9.30	IHL (Vice Chancellor/Rector/Dean/Head) briefing to the Evaluation Panel

9.30 – 10.30	Meetings with Programme head(s) and leadership team to discuss curriculum design and quality system (includes morning tea)
10.30 – 12.00	Meeting with academic staff (schedule to be established the evening before)
12.00 – 2.00	Evaluation Panel Meeting (Private Session) to review displayed documents (includes a light working lunch)
2.00 – 3.00	Evaluation Panel Visit to supporting units and facilities
3.00 – 4.00	Meeting with students
4.00 – 5.00	Meeting with external stakeholders (employers, alumni, industry advisors/programme advisors) (includes a light refreshment)
5.00 – 6.00	Evaluation Panel Meeting (Private Session) to discuss issues and to prepare draft report
6.00	Return to hotel
7.30 – 10.30	Evaluation Panel Working Dinner (Private Session)

Accreditation Visit: Day 2

8.30 – 10.00	Evaluation Panel tour of engineering laboratories and associated facilities
10.00 – 11.00	Evaluation Panel review of examinations, course materials and student work (includes morning tea)
11.00 – 12.00	Evaluation Panel Meeting with technical/administrative staff (additional meeting with academic staff and/or students may also be arranged)
12.00 – 2.00	Evaluation Panel Meeting (Private Session) (includes a light working lunch)
2.00 – 3.00	Evaluation Panel review of quality assurance system and outcome based assessment processes

- 3.00 – 4.30 Evaluation Panel Meeting (Private Session) to revise draft report (includes a light refreshment)
- 4.30 – 5.00 Exit meeting with IHL Senior leadership team

Throughout the discussions with the administrators, academic staff, students, and support staff, the Evaluation Panel should confirm that an outcome-based approach to education is progressively being implemented by the IHL.

Meeting with alumni, employers, and other stakeholders are important, as this would give an indication of their involvement in the CQI process of the programme.

4 EVALUATION PANEL REPORT

GENERAL STATEMENT

It is expected that all IHLs will strive to achieve and maintain the highest standards. Thus, the quality control aspect has to be audited by the Evaluation Panel.

The Evaluation Panel is to evaluate the submitted documents and check on the relevant sections of Appendix C (Checklist of Documents for Accreditation/Approval of New Programme and Relevant Information).

The Evaluation Panel is to prepare a report as per Appendix D (Evaluation Panel Report). Appropriate comments and remarks shall be made based on the assessment, which includes auditing and confirmation of the documents submitted by the IHL.

The Evaluation panel report (Appendix D) shall:

- (a) State whether the programme meets EAC requirements.
- (b) Where appropriate, provide constructive feedback (weakness and concern) and note positive elements (strength). Suggestion for opportunities for improvement should be given in the report.
- (c) In the event of adverse comments, provide a judgement as to the seriousness, any remedial action proposed or required, the time frame for the remedial action, and whether accreditation should be recommended, or deferred.
- (d) Make clear and unequivocal recommendations to EAC.

The Evaluation Panel report should be forwarded to EAC no later than 4 weeks after the visit.

For full accreditation, there should not be any weaknesses for each criterion (Section 7.1 to 7.5) including the programme objectives and outcomes (Section 3.0 and 4.0). Up to four (4) years accreditation may be recommended if the programme has several weaknesses (minor shortcomings) and concerns. Declined accreditation, would be recommended for the programme if there are any major shortcomings (non compliances) for any of the criterion.

Before proceeding with the thorough evaluation of the criteria, the Evaluation Panel must ensure that the following qualifying requirements have been met by the programme:

1. Minimum 120 credit hours of which 80 credit hours must be engineering subjects normally offered over a four-year period
2. Final year project
3. Industrial training
4. Minimum of 8 full-time academic staff
5. Staff:student ratio of 1:25 or better
6. External examiner's report
7. Programme Objectives
8. Programme Outcomes

If any of the requirements above are not met, the application for accreditation shall be rejected.

ASSESSMENT AND EVALUATION

The following guidelines may be used by the Evaluation Panel to evaluate the Programme Objectives and Programme Outcomes.

PROGRAMME OBJECTIVES

MANUAL REFERENCE	GUIDE FOR EVALUATION
Section 3.0(i) Programme Objectives	<p>An engineering programme seeking accreditation shall have published Programme Objectives that are consistent with the mission and vision of the IHL, and are responsive to the expressed interest of various groups of programme stakeholders.</p> <p>The following are examples of performance indicators expected for Programme Objectives:-</p> <ul style="list-style-type: none"> • defined, measurable and achievable • linked to Programme Outcomes • have own niche • detailed out and documented • published • consistent and linked to mission & vision of IHLs and stakeholder needs • linked to curriculum design • reviewed and updated <p>The process of establishing the educational objectives should be evaluated by the Evaluation Panel by examining the evidence provided by the programme. The following guidelines are recommended for evaluation:</p> <p style="text-align: center;">Performance Level</p> <p>Indicative Guide</p> <p>Poor Fail to address the performance indicators</p> <p>Satisfactory Addressing most of the performance indicators</p> <p>Good Addressing all or more of the performance indicators</p>

PROGRAMME OBJECTIVES

**MANUAL
REFERENCE****GUIDE FOR EVALUATION**

Section 3.0(ii) Processes and Results The programme shall have a clear linkage between Programme Objectives and Programme Outcomes; having the process of formulating Programme Objectives; and the process of assessing and evaluating the achievement of Programme Objectives with documented results; and the evaluation results are used in the continual improvement of the programme.

The following are examples of **performance indicators** expected for **Processes & Results**:-

- Established process for formulating Programme Objectives
- Established process for assessing achievement of Programme Objectives
- Established process for evaluating achievement of Programme Objectives
- the performance target of the Programme Objectives is achieved
- evaluation results are used in the CQI of the programme

The process for achieving the stated objectives through continuous quality improvement shall be evaluated based on the following guidelines:

Performance Level**Indicative Guide****Poor**

Fail to address the performance indicators

Satisfactory

Addressing most of the performance indicators

Good

Addressing all or more of the performance indicators

PROGRAMME OBJECTIVES

MANUAL
REFERENCE

GUIDE FOR EVALUATION

**Section
3.0(iii)**

The IHL shall provide evidence of stakeholders involvement in the programme with regard to Sections 3.0(i) and (ii) of the Manual.

**Stakeholders
Involvement**

The following are examples of **performance indicators** expected for **Stakeholders Involvement**:-

- high degree of involvement in defining Programme Objective statements
- high degree of involvement in assessing the achievement of Programme Objectives
- high degree of involvement in assessing improvement cycles (CQI)
- involvement in strategic partnership

The involvement of stakeholders should be of prime importance for the programme. The Evaluation Panel shall examine the relationship established between the programme and the intended stakeholders. The following guidelines are recommended for evaluation:

Performance Level**Indicative Guide****Poor**

Fail to address the performance indicators

Satisfactory

Addressing most of the performance indicators

Good

Addressing all or more of the performance indicators

PROGRAMME OUTCOMES

**MANUAL
REFERENCE****Section 4.0(i)
Programme
Outcomes****GUIDE FOR EVALUATION**

An engineering programme seeking accreditation must have published Programme Outcomes that have been formulated considering items (i) to (x) given in Section 4.0 of the Manual, and/or any added outcomes by the programme that can contribute to the achievement of its stated Programme Objectives. The Programme Outcomes must be shown linked to the Programme Objectives.

The following **performance indicators are** expected for **Programme Outcomes:-**

- covers (i) to (x)
- linked to Programme Objectives
- have own wordings
- have own niche
- defined, measurable and achievable
- detailed out and documented
- published
- consistent and tied to Programme Objectives
- outcomes in line with national needs
- reviewed and updated

Evaluation shall be based on the following:

Performance Level**Indicative Guide****Poor**

Fail to address the performance indicators

Satisfactory

Addressing most of the performance indicators

Good

Addressing all or more of the performance indicators

PROGRAMME OUTCOMES

MANUAL REFERENCE	GUIDE FOR EVALUATION
Section 4.0(ii) Processes and Results	<p>The programme shall also establish a process of measuring, assessing and evaluating the degree of achievement of Programme Outcomes by the students. The results of this assessment process shall be applied for continual improvement of the programme.</p> <p>The following performance indicators are expected for Processes and Results:-</p> <ul style="list-style-type: none">• processes for all elements of criteria are quantitatively/qualitatively understood and controlled• processes are clearly linked to mission, programme objectives, and stakeholders needs• systematic evaluation and process improvement in place• CQI involved support areas• processes are deployed throughout the programme, faculty, and IHLs• sound and highly integrated system• common sources of problems understood and eliminated• sustained results• results clearly caused by systematic approach <p>Evaluation shall be based on the following:</p> <p style="text-align: center;">Performance Level</p> <p>Indicative Guide</p> <p>Poor Fail to address the performance indicators</p> <p>Satisfactory Addressing most of the performance indicators</p> <p>Good Addressing all or more of the performance indicators</p>

PROGRAMME OUTCOMES

MANUAL REFERENCE	GUIDE FOR EVALUATION
Section 4.0(iii) Stakeholders Involvement	<p>The IHL shall produce evidence of stakeholders involvement in the programme with regard to Sections 4.0 the second group of (i) and (ii) in the Manual.</p> <p>The following performance indicators are expected for Stakeholders Involvement:-</p> <ul style="list-style-type: none"> • high degree of involvement in defining Programme Outcomes statements • high degree of involvement in assessing the achievement of Programme Outcomes • high degree of involvement in assessing improvement cycles (CQI) • involvement in strategic partnership

The involvement of stakeholders should be of prime importance for the the programme. The Evaluation Panel shall examine the relationship established between the programme and the intended stakeholders. Evaluation shall be based on the following:

Performance Level

Indicative Guide

Poor

Fail to address the performance indicators

Satisfactory

Addressing most of the performance indicators

Good

Addressing all or more of the performance indicators

* Please refer to the following Table PO-1 for further explanation about evidence etc.

Table PO-1 Explanation on the possible evidences acceptable for evaluation

Required Features of Programme Outcomes	Possible Evidence	Generally not acceptable	Comments
Demonstration of Student Outcomes	<p><i>Evidence must be directly linked to the specific outcome being assessed.</i></p> <p>A limited set of performance indicators have been developed that define each of the outcomes to be assessed. Data collection methods are focused on the indicators and can include such things as: student portfolios; subject content examinations; performance evaluation of work/study, intern or co-ops; and/or performance observations. Surveys and other indirect measures provide secondary evidence and should be used in conjunction with direct measures such as those above.</p>	<p>Student learning outcomes that have not been defined (e.g., What is “effective communication skills?” How will you know “effective communication skills” when you see it?) Student self-assessments and surveys are used as the only evidence of student outcomes. Using course mapping as an indicator of student learning.</p>	<p>Students do not possess the long-term, objective, calibrated perspective on their performance level that faculty do. Therefore, student opinion surveys are a weak method for demonstrating achievement of outcomes. Using course mapping to documents student learning only documents what is “taught” not what is learned.</p>
Outcomes Linked to the Curriculum	<p>Map of outcomes to the curriculum or associated programme activities (student professional groups); course syllabi that indicate the desired programme learning outcomes that are ‘covered’ in the course.</p>	<p>Making the assumption that students achieve all outcomes by merely completing the curriculum.</p>	<p>The educational experience to achieve the targeted programme outcomes should be guaranteed to all students; it is not necessary that all outcomes have the same emphasis in all programmes.</p>

Assessment Process	<p>Schematic drawing of the assessment process with a timeline that reflects systematic processes.</p> <p>Documentation of how the process is being sustained and what multiple assessment methods are being used to assess the various outcomes.</p>	<p>Collecting information that is not used to evaluate outcomes.; inappropriate use of assessment methods; no <u>direct</u> measures of student learning, overuse of surveys; data collection is irregular; inefficient process; inordinate faculty programme assessment load; faculty not involved in the decision making process.</p>	<p>Every outcome does not need to be assessed yearly; assessment cycles should meet programme needs for information, but must be systematic. Systematic timeline for data collection should be evident. Process coordinator is desirable.</p>
With Documented Results	<p>Summary of results are available that reflects evidence of systematic outcomes assessment. Summaries, evaluation of results, and action taken is presented outcome by outcome.</p>	<p>Documentation that does not focus directly on the process; presentation of raw data or charts of raw data instead of brief summaries of findings and action taken (i.e., “data dump”).</p>	<p>Documentation of results with evaluation is important to this process. Generally, a lot of raw data or tables of results with no summaries generally reflect inadequate evaluation processes.</p>
Results Applied for Programme Improvement	<p>Data must be evaluated by the faculty or a group of faculty and recommendations for action documented. For those IHLs that have had multiple cycles of assessment, documentation should reflect the results of previous improvements.</p>	<p><i>Ad hoc</i> consideration of programme improvement; “traditional” course evaluations & student “satisfaction” surveys used as basis for improvements. Failure to document how the changes that are made relate to the evaluation of the assessment data.</p>	

Measurement of Outcomes	Outcomes are measurable, in that there are performance indicators for each outcome, which enable direct measurement.	Faculty not involved in decisions about assessment; assessment is done by external parties; use of methods that do not align with programme's own definition of its outcomes.	Course grades do not constitute measurement of outcomes. Surveys allow <i>measurement</i> , but are not directly focused on student work.
Outcomes Related to Programme Educational Objectives	Clear linkages between the after graduation programme objectives and student learning outcomes.	No clear distinction between objectives and outcomes. Terms are used interchangeably throughout the document, and it is not clear that a distinction has been made between how they are assessed and evaluated.	It is important to note that the terms "outcomes" and "objectives" are not standardised. Some programmes may use other terms to describe the same processes. It is important to understand the terms being used by each programme.

The following guide shall be used by the Evaluation Panel to assess Criteria 1 – 5:

CRITERION 1 - ACADEMIC CURRICULUM

Aspects**Guide for Evaluation**

Unless stated otherwise, the evaluation should follow this scale:

	Poor	Satisfactory	Good
Addressing:	Not at all		Yes a lot

**Programme
Structure and
Course
Contents, and
Balanced
Curriculum**

The academic curriculum and curricular design shall strongly reflect the philosophy and approach adopted in the programme structure. The programme structure shall be appropriate to, consistent with, and shall support the attainment or achievement of the Programme Outcomes.

Emphasis on the curriculum shall be placed on the understanding and acquisition of basic principles and skills of a discipline, rather than detail memorisation of facts. The curriculum shall also provide students with ample opportunities for analytical, critical, constructive, and creative thinking, and evidence-based decision making. The curriculum shall include sufficient elements for training students in rational thinking and research methods and other Programme Outcomes listed by the programme. Presence of co-curriculum activities to enrich students' experiences, foster personal development and prepare them for responsible leadership. For each course, title shall be suitable; pre-requisites shall be mentioned, appropriate in terms of content.

The course content and core materials etc. shall cover each component specified in **Appendix B** to an appropriate breadth and depth, and shall be adequate and relevant to the Programme Outcomes. Adequate time shall be allocated for each component of the content/course, including the elective courses. The sequence of contents shall be appropriate and updated to keep up with the scientific, technological and knowledge development in the field, and to meet the needs of society. There shall be mechanisms for regularly identifying topics of contemporary importance at local, national and global levels and topics that may not be adequately addressed in the curriculum.

The curriculum content shall cover:

- mathematical techniques, technical subjects, co-curriculum subjects and technical communication subjects.
 - technical proficiency in a major field of engineering, including the ability to tackle a wide variety of practical problems.
-

- a professional attitude towards matters such as the design reliability and maintenance, product quality and value, marketing and safety.
- skills in oral and written communication.
- an appropriate exposure to professionalism, codes of ethics, safety and environmental considerations.

The curriculum shall be balanced and includes all technical and non-technical attributes listed in the Programme Outcomes. Electives are strongly encouraged, monitored, and appraised. The proportion of electives shall not exceed the core subjects and shall preferably offer wide options. The curriculum integrates theory with practice through adequate exposure to laboratory work and professional engineering practice.

Programme Delivery and Assessment Methods

The programme delivery and assessment methods shall be appropriate to, consistent with, and shall support the attainment or achievement of the Programme Outcomes. Alongside traditional methods, other variety of teaching-learning (delivery) modes, assessment and evaluation methods shall be designed, planned and incorporated within the curriculum to enable students to effectively develop the range of intellectual and practical skills, as well as positive attitudes as required in the Programme Outcomes.

The assessment to evaluate the degree of the achievement of the Programme Outcomes by the students shall be done both at the programme as well as at course levels. The teaching-learning methods shall enable students to take full responsibility for their own learning and prepare them for life long learning.

The Evaluation panel is to find out from Staff Members and Students on the opportunities provided for interaction and group learning. Tutorials must be supervised and attendance made compulsory. Sufficient contact hours must be allocated for consultation and interaction between staff members and students. The staff members can be full time academic staff members at the remote campuses, or qualified Engineers from the industry.

Tutorials, group learning, interaction and innovative educational experience are given to complement lectures. Tutorial and all other delivery approaches are part and parcel of the programme so as to complement the lectures. A tutorial session should preferably not exceed 30 students at any one time.

Laboratory

Laboratory reports shall be checked by the Evaluation Panel.

The assessment of laboratory reports shall have been done through a systematic manner. There must be proper laboratory supervision by academic staff members or qualified Engineers from the industry. Students shall receive sufficient laboratory work to complement engineering theory that is learnt through lectures. The laboratory should help students develop competence in executing experimental work. Students are working in groups, preferably not more than five in a group.

Laboratory exercises shall be relevant and adequate, illustrative, developing instrumentation skills, and inspection of reports show that the required outcomes have been achieved.

Final Year Project

Final year project report shall be checked by the Evaluation Panel.

The assessment shall have been done through a systematic manner. The appropriateness of the project topics in relation to the degree programme is to be monitored. It is proposed that at least 9 reports are to be examined by the Evaluation Panel (3 from the best group, 3 from the middle group and 3 from the poor group). The supervisors of the Projects must be academic staff members or qualified Engineers from the industry. The place where the projects are conducted should have the facilities to support the projects.

The final year projects is made compulsory to all students and demands individual analysis and judgement, and assessed independently from the work of others. The student is shown to have developed techniques in literature review and information prospecting. It provides opportunities to utilise appropriate modern technology in some aspect of the work, emphasising the need for engineers to make use of computers and multimedia technology in everyday practice.

Industrial Training

Exposure to professional engineering practice in the form of an industrial training scheme is made compulsory. The industrial training is shown to have exposed students and to have made them familiar and to be aware of to a practical level with all common engineering processes. Efforts have been made to assist all students gain placements of suitable quality.

Exposure to Professional Practice

Exposure to engineering practice are integrated throughout the curriculum. It has been obtained through a combination of the following:

- (a) lectures/talks by guest lecturers from industry;
 - (b) academic staff with industrial experience;
 - (c) courses on professional ethics and conduct;
 - (d) industry visits;
 - (e) an industry-based final year project;
 - (f) regular use of a logbook in which industrial experiences are recorded.
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CRITERION 2: STUDENTS

Aspects	Guide for Evaluation
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Unless stated otherwise, the evaluation should follow this scale:

	Poor	Satisfactory	Good
Addressing:	Not at all		Yes a lot

Entry Requirements (Academic)	The entry requirement to the programme shall be evaluated to ensure that the students accepted are at the minimum qualifications required for training and education as an engineer.
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Transfer policy/Selection Procedures/Appropriateness of Arrangements for Exemptions from Part of the Course/Transfer Policy	The IHL shall develop a clear, documented and enforced policy on admission and transfer of students. The policy shall take into account the different background of students in order to allow alternative educational pathways. The exemptions of credit hours shall be based on justifiable grounds. A maximum of 30% of the total credit hours is allowed for credit transfer.
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Student Counseling	IHLs shall monitor and evaluate student performance, advise and counsel students regarding academic and career matters, as well as provide assistance in handling health, financial, stress, emotional and spiritual problems.
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Workload	Students shall not be over burdened with workload that may be beyond their ability to cope with.
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Average Credit hours per 14 week semester:

18 – 25	16 & 17	15 or less
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Poor	Satisfactory	Good
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Enthusiasm and Motivation	The teaching-learning environment shall be conducive to ensure that students are always enthusiastic and motivated.
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Co-Curricular Activities	IHLs shall also actively encourage student participation in co-curricular activities and student organisations that provide experience in management and governance, representation in education and related matters and social activities.
Observed Attainment of the Programme Outcomes by the Students	The Evaluation Panel is to get a first-hand feel of the students' achievement of the Programme Outcomes by interviewing and observing them at random.

CRITERION 3 - ACADEMIC AND SUPPORT STAFF

Aspects**Guide for Evaluation**

Unless stated otherwise, the evaluation should follow this scale:

	Poor	Satisfactory	Good
Addressing:	Not at all		Yes a lot

ACADEMIC STAFF

Adequacy of Academic Staff The staff shall be sufficient in number and competencies to cover all curricular areas.

Academic Qualification There must be at least **8 full-time** staff members for a particular degree programme. It is proposed at least 60% of the staff members be full-timers, and majority with PhDs in appropriate areas, while the remaining at Masters in appropriate areas

Professional Qualification Staff Members are encouraged to attain the Professional Engineer status and be active in engineering learned societies such as IEM, IMechE, IEE etc.

Research/ Publication Academic Staff members should be given opportunities to conduct research. The IHL should have research grant for the staff members.
Research Output includes recent publication in conferences/refereed journals and patents.

Industrial Involvement/ Consultancy The Evaluation Panel is to assess whether the staff members are involved in appropriate consultancy and industrial jobs.

Teaching Load Average teaching load (teaching hours per week): < 12 hours (good), 12 – 15 (satisfactory), <15 (poor),

Motivation and Enthusiasm The Evaluation Panel is to have a separate meeting with the faculty staff members to assess their motivation and enthusiasm.

Use of Lecturers from Industry/Public Bodies The Faculty is encouraged to invite engineers from industry and professional bodies to deliver seminars/lectures/talks to students. However, this is not meant as replacement of the full-time staff members for teaching purposes.

Awareness Of the Outcome-Based Approach to Education The Evaluation panel is to assess the staff awareness of the Outcome-Based approach to education.

SUPPORT STAFF

Qualifications Certificates, diplomas and degrees in the relevant areas:
 $\geq 80\%$ of staff (Good)
 60-80 (Satisfactory)
 < 60 (Poor)

Adequacy of Support Staff 1 Laboratory Staff Member to 1 Laboratory: Good
 1 Laboratory Staff Member to 2 Laboratories: 60-80% Satisfactory

DEVELOPMENT OF STAFF

Staff Development The IHL shall systematically plan and provide appropriate training, sponsorship for Postgraduate Studies/ sponsorship for conferences, sabbatical leave for the academic staff. Similarly for support staff, the IHL shall provide the opportunities for them to upgrade their competencies through training and practical exposure.

Staff Assessment The IHL shall incorporate annual assessment of the staff performance which takes into account participation in professional, academic and other relevant bodies as well as community involvements.
 Similarly the IHL shall also establish a working system for evaluation/feedback by students on matters relevant to their academic environment.

Staff:Student Ratio The Evaluation Panel shall evaluate the ratio of academic staff: student for the programme for the last four academic sessions. The following guide shall be used for evaluation.

Poorer than 1:20 Poor	1:20 or better – poorer than 1:15 Satisfactory	1:15 or better Good
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CRITERION 4: FACILITIES

Aspects

Guide for Evaluation

Facilities in terms of lecture rooms, laboratory facilities, library/resource centre, should be available and accessible to the students.

In the case of off-campus/distance-learning mode, the Evaluation Panel should comment on whether the facilities are equivalent to those provided for the on-campus students. In the case where the students are sent to the main campus to complete the experiments over a short period of time rather than being spread out (as in the case of main campus), the Evaluation Panel should comment on the effectiveness of such a practice in the report after interviewing the students.

Lecture Rooms - Quantity Provided and Quality of A/V

(a) Lecture Rooms – Quantity and Quality (in terms of furniture, environment and AV Equipment)

Poor	Satisfactory	Good
Inadequate	Moderately Adequate	Adequate

Laboratory / Workshop - Student Laboratory and Equipment

Laboratory/Workshop – The laboratory facilities should be examined to ensure there are sufficient facilities and equipment to cater for the students.

Average Student Number per Laboratory Experiment where there is no group activity:

6 or more (Poor)	4-5 (Satisfactory)	2 or less (Good)
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Average Student Number per Laboratory Experiment where group activity is required:

6 or more (Poor)	4-5 (Satisfactory)	3 or less (Good)
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IT/Computer Laboratory - Adequacy of Software

IT/Computer Laboratory

Average Number of Students per Computer: A minimum of 10:1

greater than 6 (Poor)	4-5 (Satisfactory)	3 or less (Good)
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Library / Resource Centre - Quantity of Books Provided

The IHL is to have sufficient titles of text and reference books, standards and journals to support teaching and research for the programme evaluated.

For off-campus/distance-learning mode, the Evaluation Panel should comment on how the learning materials are made available and accessible to the students.

Poor	Satisfactory	Good
Availability:	Not at all	Yes a lot

CRITERION 5: QUALITY MANAGEMENT SYSTEMS

Aspects**Guide for Evaluation**

Unless stated otherwise, the evaluation should follow this scale:

Poor	Satisfactory	Good
<u>Inadequate</u>	<u>Moderately Adequate</u>	<u>Adequate</u>

Institutional Support, Operating Environment, and Financial Resources

Quality and Continuity of the Programme

The Evaluation Panel should examine the evidence provided by the Faculty/IHL on whether the institutional support and financial resources is sufficient so that the programme can be assured of quality and continuity. External support from external bodies should be encouraged.

Attract and Retain a Well-Qualified Academic and Support Staff

The Evaluation Panel should examine the evidence provided by the Faculty/IHL on whether the institutional support and financial resources is sufficient so that the programme can attract and retain well-qualified academic and support staff. External support from external bodies should be encouraged.

Acquire, Maintain, and Operate Facilities and Equipment

The Evaluation Panel should examine the evidence provided by the Faculty/IHL on whether the institutional support and financial resources is sufficient so that the programme can acquire, maintain and operate facilities and equipment. External support from external bodies should be encouraged.

Programme Quality Management and Planning

System for Programme Planning, Curriculum Development , and Regular Curriculum And Content	<p>The Evaluation Panel should concentrate on auditing the implementation of the quality control system. Generally the Evaluation Panel will assess whether there are proper and sufficient policies/rules/regulations/ procedures in the Department/ Faculty or IHL; and whether those systems are implemented. Quality system such as ISO9000 should be encouraged. Other form of implementation for quality purposes such as external examiners, board of studies, and benchmarking shall also be evaluated.</p> <p>The established system for the programme shall be evaluated to see the effectiveness of such system towards improvement of the overall programme quality.</p>
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External Assessment and Advisory System

External Examiners and how these are being used for Quality Improvement	<p>The programme shall appoint an external examiner to assess the overall quality of the programme. The Evaluation Panel shall examine the external examiners reports and determine whether the recommendations by the examiners have been implemented by the programme to improve the overall quality.</p>
Advisory Evaluation Panel from Industries and other Relevant Stakeholders	<p>The programme shall have advisory Evaluation Panel from industries and other relevant stakeholders. The programme shall provide evidence of meetings and dialogues with the advisory Evaluation Panel and the extent of their involvement in terms of quality improvement.</p>

Quality Assurance

System for Examination Regulations including Preparation and Moderation of Examination Papers	<p>The IHL shall establish a working system for examination regulations including preparation and moderation of examination papers.</p>
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System of Assessment for Examinations, Projects, Industrial Training	The IHL shall establish a working system for assessment of examinations, projects, industrial training and other forms of learning delivery. The scope of assessment shall be wide enough to cover the achievement of programme outcomes.
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DISTANCE LEARNING/ OFF-CAMPUS PROGRAMMES

The quality of the environment in which the programme is delivered is regarded as paramount in providing the educational experience necessary for engendering independence of thought of its graduates.

There must be adequate classrooms, learning support facilities, study areas, information resources (resource centres or libraries), computing and information technology systems, and general infrastructure to meet the programme's objectives. This must enable students to learn the use of modern engineering, organisational and presentation tools, and explore beyond the formal dictates of their specific programme of study.

For programmes offered wholly or partly in distance mode or at multiple or remote locations, communication facilities must be sufficient to provide students with the learning experience and support equivalent to on-campus attendance. There must also be adequate facilities for student-student and student-staff interactions.

Laboratories and workshops should be adequately equipped for experiments and "hands-on" experience in the areas of the engineering subjects. Adequate experimental facilities must be available for students to gain substantial understanding and experience in operating engineering equipment and of designing and conducting experiments. The equipment must be reasonably representative of modern engineering practice. Where practical work is undertaken at another IHL, or in industry, arrangements must be such as to provide reasonable accessibility and opportunity for learning, as well as supervision and monitoring by the teaching staff.

In assessing the non-traditional mode of delivery, it is proposed that the Evaluation Panel should give a report that compares the system of the parent IHLs (or main campus) and the system in each of the remote locations or branch campuses or distance-learning modes. Assuming the syllabus and examination questions are the same, the following areas need to be addressed in detail (A table of comparison between the main campus and the remote location/distance-learning mode will be useful):

(a) Teaching Staff

- Percentage of the part-time staff and their workload
- Number of supporting academic staff members for tutorials or interaction with off-campus or distance learning or remote location students
- Percentage of the staff from main campus and their workload

(b) Student

- Entry requirement
- Selection Procedures
- Student Counseling
- Exposure to Industry
- Enthusiasm and Motivation
- Workload
- Interaction with other students
- Interaction with teaching staff

(c) Facilities available at the Remote Location

- Lecture Rooms and AV facilities
- Laboratory/Workshop
- IT/Computer and Adequacy of Software
- Library Resources
- Recreation Facilities

(d) Quality Control

- Assessment of coursework
- Final Examination and Grading
- Moderation or Quality Assurance Process by the main campus

Evaluation Panel visit is required for each remote location (preferably by the same Evaluation Panel who assesses the degree programme at the main campus).