Evidence-Based On-site Assessment during Accreditation Visits

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Dhaka

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Organized by
Board of Accreditation for Engineering and Technical Education (BAETE)
Key Points

• Target audience – PEVs
• Criteria-based accreditation
• Evidence-based on-site assessment during accreditation visits
• Program outcomes (POs) attainment-assessment methodology.
• The DOs and DON’Ts during accreditation visit
Attributes of PEVs

• Trust
• Integrity
• Competent
• Professionalism
Conflict of interest

• Definition of possible conflict of interest:
  • have financial or personal interest in the university; or
  • have or have had a close, active association with the programme or faculty/school in the university. Close or active association are, for example:
    • Employment, as staff or consultant by the faculty/school;
    • Attendance, as student at the faculty/school;
    • Business, significant business dealing
    • Receipt of honorary degree from the faculty/school;
    • Membership of a board of the university or any committee advising on the programme being accredited.
Part 1: BAETE’s Accreditation Criteria

All the Accreditation Activities are for the purpose of deciding whether the program has satisfied the 8 BAETE Accreditation Criteria
BAETE Accreditation Criteria

- 8 criteria in BAETE new Accreditation Manual
  1) Organization and Governance
  2) Financial and Physical Resources
  3) Faculty
  4) Students
  5) Academic Facilities and Technical Support
  6) Curriculum and Teaching-Learning Process
  7) Objectives, Outcomes and Assessment
  8) Continuous Improvements
BAETE Accreditation Criteria

- Enabling Resources & Facilities

• 8 criteria in BAETE new Accreditation Manual
  1) Organization and Governance
  2) Financial and Physical Resources
  3) Faculty
  4) Students
  5) Academic Facilities and Technical Support
  6) Curriculum and Teaching-Learning Process
  7) Objectives, Outcomes and Assessment
  8) Continuous Improvements
Outcomes Focused Criteria

• 8 criteria in BAETE new Accreditation Manual

1) Organization and Governance
2) Financial and Physical Resources
3) Faculty
4) Students
5) Academic Facilities and Technical Support
6) Curriculum and Teaching-Learning Process
7) Objectives, Outcomes and Assessment
8) Continuous Improvements
Criterion 1 - Program Educational Objectives (PEOs)

• Definition
  – “Program educational objectives (PEO) are broad statements that describe the career and professional accomplishments that the programme is preparing graduates to achieve.”

• Normally assessment conducted for alumni 3 to 5 years after graduation
Criterion 1 - Program Educational Objectives (PEOs)

The program seeking accreditation must demonstrate that following are in place:

a) Well-defined and published Program Mission
b) Program’s educational objectives defined and consistent with the mission & other criteria 2 to 11
c) Program’s educational objectives based on the stakeholder’s needs
d) A process in place to evaluate periodically the attainment of educational objectives from attributes and accomplishments of graduates
e) Evaluation results used for continual improvement of the program
Evidences - PEOs

- SAR – information on Criteria 1
- Check website and verify when interviewing faculty, students and alumni – “well-defined and published”
- Verify that PEO well-articulated, not in the form of SLOs (a common mistake)
- Check evidence of stakeholders involvement: industry advisory board, employers, alumni, faculty, students – survey, focus groups, etc
- Verify that “A process in place to evaluate periodically the attainment of educational objectives”
- Check that “evaluation results used for continual improvement of the program”
  - Who conduct evaluation?
  - Who receives evaluation results?
  - Who implement CQI?
Criterion 2 – Program/Student Learning Outcomes (SLOs)

• Definition:
  – “SLOs are the narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviours that the students acquire in their matriculation through the program.”

• The program must demonstrate that by the time of graduation the students have attained a certain set of knowledge, skills and behavioral traits, at least to some acceptable minimum level (SLO).
Criterion 3– Curriculum and Teaching-Learning Process

• 4-year, full-time program or equivalence.
• One-year full time study => 32 semester credit hours
• A culminating demonstration of learning outcomes at complex engineering problems via final year or capstone project

• Note: this slide is not based on actual BAETE requirements – for illustration only
Evidences

• Not less than 128 semester credit hours (4 years full-time equivalence)
• Appropriate components of Math and Sciences
• Humanities
• Facilities for teaching-learning
• Systematic progress over the years

• Note: this slide is not based on actual BAETE requirements – for illustration only
Criterion 3—Curriculum and Learning Process

• Internship program
• Laboratory work
• Design projects
• Final year project
• Co-curricular activities to hone personal skills
• Assessment of learning outcomes
• Student feedback
• Internal reviews of quality assurance procedure
Assessment of learning outcomes

• The appropriateness of the assessment methods along with the level of achievement against the targeted outcomes must be evaluated.

• Mapping of program outcomes to individual courses, nature of assessment tools (direct/indirect/rubrics) and the process of evaluation to determine the attainment of SLOs should be demonstrated through reasonably convincing evidences.
Criterion 4 - Students

- Admission criteria
- Annual intake
- Admission response
- Transfer of students
- Academic counseling
- Career and student wellness counseling
Criterion 4 - Students

- Class size (theory)
- Class size (practical)
- Semester academic load
- Completion of courses and student feedback
- Participation in competition
- Student performance evaluation
Student Performance Evaluation

- This aspect pertains to the various mechanisms being used for evaluating students’ performance in the program courses, and their suitability and affectivity for assessment of the level of achievement of course learning outcomes.
- This may include a review of various class assignments, quizzes, research reports, examinations as well as lab projects and viva-voce.
- The number and variety of such assessment tools and their coverage of subject topics in a manner which ensures a reasonably accurate assessment of students’ level of achievement against various learning outcomes is the key to monitor students’ progress in a direct manner.
- It is expected that the program should demonstrate a minimum number of such class assignments, quizzes and examinations for assessment of SLOs.
Criterion 5–Faculty

- Faculty strength – expertise to cover all curricular areas
- Full-time dedicated faculty
- Shared faculty
- Visiting faculty
- Faculty qualifications
- Student/faculty ratio
Criterion 5–Faculty

- Faculty training & mentoring
- Faculty Retention, Development and Career Planning
- Pyramid of Academic Structure
- Faculty workload
- Faculty Research & Publications
- Faculty members should be trained on outcomes assessment, to set appropriate course outcomes and to apply a combination of direct and indirect assessment tools to determine the level of outcomes achievement
Criterion 5–Faculty

• New faculty members without sufficient teaching experience should undergo training on teaching methodology. All faculty members should be trained on outcomes assessment to enable them to set appropriate course outcomes and to apply a combination of direct and indirect assessment tools to determine the level of outcomes achievement.
Criterion 6–Facilities and Learning Environment

• adequacy of teaching and learning facilities such as classrooms, learning-support facilities, study areas, information resources (library), computing and information-technology systems, laboratories, workshops, and associated equipment to cater for multi-delivery modes.
Criterion 7–Institutional Support and Financial Resources

• Financial resources and their commitment to support an engineering program.
• Adequacy of these resources to attract and retain well-qualified staff, continued development and career growth
• Acquisition, repair, maintenance & replacement of facilities and equipment
Criterion 8– Governance & Continuous Quality Improvement

• Governance structure for formulation and implementation of policies
• Defined process for quality improvement, proficient closed-loop system
• Steps taken for improvement of program quality, particularly in the light of the observations of last accreditation visit.
• Information and reports that are prepared for continuous quality improvement related to different accreditation criteria
Criterion 8– Governance & Continuous Quality Improvement

• The educational institution should have well defined process for continuous quality improvement.
• Continuous improvement is assured if a proficient closed-loop system is in place.
• The shortcomings and non-conformance identified during the last accreditation visit must be addressed.
• The educational institution should also provide details of the procedure of internal quality assessment, together with information of remedial measures taken for programme quality improvement.
Criterion 9—Interaction between Educational Institution and Industry

• Industry participation in curriculum
• Students to have opportunity to acquire industrial experience – internship, design projects
• Industrial attachment to stipulate learning outcomes to be assessed
Criterion 9– Interaction between Educational Institution and Industry

• There must be in place a form of communication channel between the educational institution and the industry.

• The industry should be encouraged to give feedback concerning the quality of the teaching-learning process and the relevance of the curriculum content to the local industry and the global market place.
 shops for greater emphasis on scientific and engineering fundamentals without compromising on engineering design component of the curriculum. It is expected that the content and depth of coverage of science subjects (e.g. mathematics, physics, chemistry, computing, materials science) are somewhat greater than that in a typical disciplinary engineering programme. Science and engineering subjects should be taught in an integrated manner so that the students are able to develop the ability to solve complex multi-disciplinary engineering problems. The programme should include design project courses providing students with hands-on learning of basic principles. Students should take a major design project, multidisciplinary in nature, incorporating different facets of engineering and an independent research project which preferably requires synthesis of both scientific and engineering knowledge. Provision of opportunities for industrial attachment is encouraged.
Evidence-Based On-site Assessment
Purpose of campus visit

• Assessment of qualitative factors which cannot be documented in written submission
  – intellectual atmosphere, morale, professional attitudes, quality of staff and students
• Examination of materials compiled by educational institution, i.e. those which cannot leave the campus
  – examination papers, student reports, instruction materials
• Clarify issues in the written submission by educational institution
Outcomes of Campus Visits & Assessment based on Pre-Visit Documents

• The role of the Evaluation Team is for the sole purpose of determining whether the program satisfies the 8 BAETE accreditation criteria

• For each criterion, the degree of compliance to be summed up as:
  – Compliance
  – Concerns
  – Weakness
  – Deficiency
Outcomes of Campus Visits & Assessment based on Pre-Visit Documents

• Where requirements of a particular criterion are not fully met, the Team will include:
  – **Recommendation** - aspects which are suggestions rather than mandatory requirements
  – **Requirement** - items requiring follow-up action as a condition of accreditation

• The Team may include observations/comments/suggestion to assist improvement process, not affecting accreditation decision
What the PEVs looks for?

• PEVs are sent to evaluate programs, certifying that they satisfy the criteria stipulated
• They look for evidences that the required criteria are met
• They identify deficiencies, weaknesses, concerns
Focus of Outcomes-based Accreditation

- Attainment of published Program Education Objectives
- Attainment of Program Learning Outcomes
- Continuous Quality Improvement system in place to sustain and improve PEO & PLO
- Resources and system available
Outcomes of Significance

• The focus of accreditation is on “Outcomes of Significance”

• Spady articulated as something that “really mattered in the long run”, long after that particular segment of curriculum or time block was over – something that learners could ultimately “take out the door and apply” .... when they “exited” the system.

• That outcomes-of-significance is encapsulated in the set of WA graduate attributes which form the multi-lateral recognition of substantial equivalency of programs within the WA framework.
Evaluation of SLOs

• Attainment of each SLOs must be carefully evaluated in terms of depth and breadth stipulated – going through evidences provided
• Application to Complex Engineering Problems
New Accreditation Manual - Program Learning Outcomes
BAETE’s 12 PLOs are identical to WA GAs

Graduate Attributes and Professional Competencies

Version 3: 21 June 2013

This document is available through the IEA website: http://www.ieagreements.org.
Graduate Attributes

- Graduate attributes form a set of individually assessable outcomes indicative of the graduate's potential competency.
- Attributes expected of graduate from an accredited programme - expected capability appropriate to the type of programme.
- The graduate attributes are intended to assist outcomes-based accreditation criteria.
PLO #1

• **Engineering Knowledge:**
  – Apply the knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PLO #2

• Problem Analysis:
  – Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PLO #3

• Design/Development of Solutions:
  – Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO #4

• Investigation:
  – Conduct investigation of complex engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PLO #5

• Modern Tool Usage:
  – Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.
PLO #6

• **The Engineer and Society:**
  
  – Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PLO #7

• **Environment and Sustainability:**
  – Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PLO #8

• Ethics:
  – Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO #9

• **Individual and Team Work:**
  – Function effectively, as an individual, as as a member or leader in diverse teams, and in multidisciplinary settings.
PLO #10

• Communication:
  – Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PLO #11

• **Project Management & Finance:**
• Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply to one’s own work, as a member and leader in a team, to manage projects in a multidisciplinary environment.
PLO #12

• Lifelong Learning:
  – Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broader context of technological change.
Assessment of Attainment of Student Learning Outcomes
Student Learning Outcomes (SLO)

• SLOs formulated for each programme by the institution must be consistent with the WA’s Graduate Attributes. (Best practice to follow WA’s Graduate Attributes, and add additional SLOs where required)

• SLOs must foster the attainment of the PEOs – mapping of SLOs to PEOs

• How and where SLOs are published and disseminated
<table>
<thead>
<tr>
<th>Educational institution’s Student Learning Outcomes [if different from graduate attributes in Criterion 2(i) (a) to (j)]</th>
<th>Graduate attributes in EAB’s Criterion 2(i) (a) to (j)*</th>
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<tbody>
<tr>
<td>(1) Student learning outcome (...)</td>
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<td>(2) Student learning outcome (...)</td>
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Student Learning Outcomes

• Illustrations of how
  – course outcomes
  – modes of delivery of the courses
  – assessment tools
  – laboratory
  – project course work
    are used to assess the impact of course delivery/course content, and are contributing towards the attainment of the SLOs

• Attainment of SLOs assessed by direct and indirect methods
Student Learning Outcomes

• Results of assessment of each SLO shall be indicated as they play a vital role in implementing the Continuous Improvement process of the programme

• How the results of assessment of the SLOs are used to improve the programme in terms of
  – curriculum
  – course delivery
  – assessment methods
  – processes of revising/redefining the SLOs
3.1. Establish the correlation between the courses and the Program Outcomes (POs) & Program Specific Outcomes (25)

**Program Articulation Matrix**

<table>
<thead>
<tr>
<th>Course</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
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<th>PO5</th>
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<th>PO10</th>
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</table>

1. Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low)  
2: Moderate (Medium)  
3: Substantial (High)

*If there is no correlation, put "-"*
Programme Curriculum

• Programme curriculum that leads to the attainment of the PEOs and the SLOs must be designed
• Flow diagram that shows the prerequisites for the courses shall also be provided
• Each programme should cover general and specialized professional content of adequate breadth and depth
• Appropriate components in the Sciences and Humanities.
Programme Curriculum

- The relevance of curriculum components including core engineering courses to the SLOs
- How the core engineering subjects in the curriculum lend the learning experience with the complex engineering problems
- Programme must satisfy Programme Specific Criteria
- Continuous Improvement process in curriculum refinement
- Evidence of assessment, evaluation and review methods – attainment of COs
### 2.1.3. State the components of the curriculum (5)

*Program curriculum grouping based on course components*

<table>
<thead>
<tr>
<th>Course Component</th>
<th>Curriculum Content (% of total number of credits of the program)</th>
<th>Total number of contact hours</th>
<th>Total number of credits</th>
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</thead>
<tbody>
<tr>
<td>Basic Sciences</td>
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<td>Engineering Sciences</td>
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<tr>
<td>Humanities and Social Sciences</td>
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<td>Program Core</td>
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<td>Program Electives</td>
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<td>Open Electives</td>
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<tr>
<td>Project(s)</td>
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<td>Internships/Seminars</td>
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<td>Any other (Please specify)</td>
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<tr>
<td><strong>Total number of Credits</strong></td>
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</table>
## Table 3.1: Curriculum and teaching processes to achieve Student Learning Outcomes, and evaluation method/criteria

<table>
<thead>
<tr>
<th>Module title</th>
<th>Category*</th>
<th>Evaluation method &amp; criteria</th>
<th>Student Learning Outcomes*</th>
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</thead>
<tbody>
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</table>

* Category is to indicate whether module is Core, Electives, Faculty Requirements, Major Requirements, University Requirements, Unrestricted Elective, etc.
Table 3.2: Curriculum/Course Time Allocation and Content

(A) Course Time Allocation by semester

Semester n Year n:

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Total Number of Contact Hours</th>
<th>No of MCs or AUs</th>
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<tbody>
<tr>
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<td>Lec 3</td>
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Total

<table>
<thead>
<tr>
<th>Course Title</th>
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Total
Complex problems
(A requirement of WA)

• Involve wide-ranging or conflicting technical, engineering and other issues
• Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
• Requires research-based knowledge much of which is at, or informed by, the forefront of the professional discipline and which allows a fundamentals-based, first principles analytical approach
• Involve infrequently encountered issues
• Are outside problems encompassed by standards and codes of practice for professional engineering
• Involve diverse groups of stakeholders with widely varying needs
• Have significant consequences in a range of contexts
• Are high level problems including many component parts or sub-problems
Unique Academic Structure at Singapore University of Technology and Design
http://www.sutd.edu.sg/Education/

<table>
<thead>
<tr>
<th>FRESHMORE</th>
<th>TERM 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Math I, Physics I, Chemistry and Biology: Natural World, and World Texts and Interpretations</td>
<td></td>
</tr>
<tr>
<td>TERM 2</td>
<td>Adamed Math II, Physics II, Introduction to Design, and Theorising Society, the Self, and Culture</td>
</tr>
<tr>
<td>TERM 3</td>
<td>Modelling the Systems World, Engineering in the Physical World, The Digital World, Introduction to Biology* and Introduction to Physical Chemistry*</td>
</tr>
<tr>
<td>TERM 4 TO 8</td>
<td>Capstone: Integrated Design Experience</td>
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<td>Technical Application Electives</td>
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<td>Entrepreneurship, Management, Social Sciences, Economics, Humanities, Arts</td>
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<td>PILLAR</td>
<td>Architecture Core</td>
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<td>System Design Core</td>
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Evaluation of SLOs

• Attainment of each SLOs must be carefully evaluated in terms of depth and breadth stipulated – going through evidences provided
• Application to Complex Engineering Problems
The achievement of each SLO, both breadth and depth, should be assessed and evaluated.
SLO Folder

• For accreditation evaluation, good to prepare a folder for each outcomes
• Contains relevant subjects and assessment details which support achievement of the SLO
• Includes other student learning activities and assessment details
• Samples of student work
Evidence beyond mapping exercise

• Program Accreditation Committee undertake the task of mapping subjects/courses to each outcomes

• Faculty teaching a particular subject is not aware of the outcomes contribution from his subject, and has not conducted proper outcomes assessment

• Just a mapping exercise – not acceptable
Evidences from Meetings/Interviews

• Provost/President
• Dean and Head of Department/Program
• Group of faculty members
• Group of alumni
• Group of students
• Group of other constituencies, e.g. members of industrial advisory board, employers
Evidences from Examination of Exhibits (1)

- Sample of teaching materials
- CV of faculty staff, publications
- Sample of exam papers
- Sample of exam scripts – excellent, good, marginal
- Transcripts of immediate past graduates
- Sample project and design reports
- Sample of industry attachment reports & assessment
Evidences from Examination of Exhibits (2)

• Samples of student feedback form
• Reports of other internal or external reviews of the course, department and faculty
• Results of quality assurance reviews
• Statistics of graduate employment
• Other documents requested by the evaluation team
Course Learning Outcomes (COs)

• A learning outcome is what a student can do as a result of a learning experience.
• It describes a specific task that student is able to perform at a given level of competence under a certain situation.
• The three broad types of learning outcomes are:
  • Disciplinary knowledge and skills
  • Generic skills
  • Attitudes and values
Table 3.1: Curriculum and teaching processes to achieve Student Learning Outcomes, and evaluation method/criteria

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</table>
Course Learning outcomes

- Course Learning Outcomes describe the complex performances a student should be capable of as a result of learning experiences within a course.
- These are determined by the course instructor(s).
- Mapping course learning outcomes to program outcomes and how overall learning experience meet the accreditation criteria.
Learning outcomes of a subject/course may support several SLOs.

Evidence of course assessment to be documented.
Contribution of each course

• Each undergraduate course in the programme contributes to a list of SLOs
• Usually, a course may contribute strongly to some SLOs and less strongly to other SLOs
• While a course may contribute to several SLOs, usually only a subset of its strong outcomes need to be used for SLO assessment.
Evidences of Outcomes Assessment

• Not merely mapping of courses to outcomes
• Evidence of outcomes assessment at course level
• Evidence that faculty has training in conducting outcomes assessment
• Going beyond subject/course marks & grading being used as justification that overall outcomes are contributed by the subject(s)
Evidence of Faculty actively involved in outcomes assessment

• Do faculty members know the requirements of outcome-based accreditation?
• Are they trained in outcomes assessment?
• Evidence of faculty conducting outcomes assessment at their courses
• Reflection and continuous improvement at course level
Bloom’s Taxonomy – Cognitive Domain
(modified by Anderson & Krathwohl)

Knowledge (Remembering)
- List ...

Comprehension
- Explain ...
- Calculate ...

Application
- Analyse ...
- Design ...

Synthesis
- Compare, decide ...

Evaluation

Creation
Psychomotor Domain

- Naturalisation
- Articulation
- Precision
- Manipulation
- Imitation

Based on Dave (1975)

http://www.learningandteaching.info/learning/bloomtax.htm
Affective Domain

Affective domain
- Organising and Conceptualising
- Valuing
- Responding
- Receiving
- Characterising by Value or Value Concept

http://www.learningandteaching.info/learning/bloomtax.htm
COGNITIVE learning is demonstrated by knowledge recall and the intellectual skills: comprehending information, organizing ideas, analyzing and synthesizing data, applying knowledge, choosing among alternatives in problem-solving, and evaluating ideas or actions.

<table>
<thead>
<tr>
<th>Level</th>
<th>Illustrative Verbs</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>arrange, define, describe, duplicate, identify, label, list, match, memorize, name, order, outline, recognize, relate, recall, repeat, reproduce, select, state</td>
<td>remembering previously learned information</td>
<td>memory of specific facts, terminology, rules, sequences, procedures, classifications, categories, criteria, methodology, principles, theories, and structure</td>
</tr>
<tr>
<td>Comprehension</td>
<td>classify, convert, defend, describe, discuss, distinguish, estimate, explain, express, extend, generalize, give examples, identify, indicate, infer, locate, paraphrase, predict, recognize, rewrite, report, restate, review, select, summarize, translate</td>
<td>grasping the meaning of information</td>
<td>stating problem in own words, translating a chemical formula, understanding a flow chart, translating words and phrases from a foreign language</td>
</tr>
<tr>
<td>Application</td>
<td>apply, change, choose, compute, demonstrate, discover, dramatize, employ, illustrate, interpret, manipulate, modify, operate, practice, predict, prepare, produce, relate, schedule, show, sketch, solve, use, write</td>
<td>applying knowledge to actual situations</td>
<td>taking principles learned in math and applying them to figuring the volume of a cylinder in an internal combustion engine</td>
</tr>
<tr>
<td>Analysis</td>
<td>analyze, appraise, break down, calculate, categorize, compare, contrast, criticize, diagram, differentiate, discriminate, distinguish, examine, experiment, identify, illustrate, infer, model, outline, point out, question, relate, select, separate, subdivide, test</td>
<td>breaking down objects or ideas into simpler parts and seeing how the parts relate and are organized</td>
<td>discussing how fluids and liquids differ, detecting logical fallacies in a student’s explanation of Newton’s 1st law of motion</td>
</tr>
<tr>
<td>Synthesis</td>
<td>arrange, assemble, categorize, collect, combine, comply, compose, construct, create, design, develop, devise, design, explain, formulate, generate, integrate, manage, modify, organize, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize, synthesize, tell, write</td>
<td>rearranging component ideas into a new whole</td>
<td>writing a comprehensive report on a problem-solving exercise, planning a program or panel discussion, writing a comprehensive term paper</td>
</tr>
<tr>
<td>Evaluation</td>
<td>appraise, argue, assess, attach, choose, compare, conclude, contrast, defend, describe, discriminate, estimate, evaluate, explain, judge, justify, interpret, relate, predict, rate, select, summarize, support, value</td>
<td>making judgments based on internal evidence or external criteria</td>
<td>evaluating alternative solutions to a problem, detecting inconsistencies in the speech of a student government representative</td>
</tr>
</tbody>
</table>


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**AFFECTIVE** learning is demonstrated by behaviors indicating attitudes of awareness, interest, attention, concern, and responsibility, ability to listen and respond in interactions with others, and ability to demonstrate those attitudinal characteristics or values which are appropriate to the test situation and the field of study.

<table>
<thead>
<tr>
<th>Level</th>
<th>Illustrative Verbs</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving</td>
<td>asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits erect, replies, uses</td>
<td>willingness to receive or attend</td>
<td>listening to discussions of controversial issues with an open mind, respecting the rights of others</td>
</tr>
<tr>
<td>Responding</td>
<td>answers, assists, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes</td>
<td>active participation indicating positive response or acceptance of an idea or policy</td>
<td>completing homework assignments, participating in team problem-solving activities</td>
</tr>
<tr>
<td>Valuing</td>
<td>completes, describes, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works</td>
<td>expressing a belief or attitude about the value or worth of something</td>
<td>accepting the idea that integrated curricula is a good way to learn, participating in a campus blood drive</td>
</tr>
<tr>
<td>Organization</td>
<td>adheres, alters, arranges, combines, compares, completes, defends, explains, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes</td>
<td>organizing various values into an internalized system</td>
<td>recognizing own abilities, limitations, and values and developing realistic aspirations</td>
</tr>
<tr>
<td>Characterization by a value or value complex</td>
<td>acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, uses, verifies</td>
<td>the value system becomes a way of life</td>
<td>a person's lifestyle influences reactions to many different kinds of situations</td>
</tr>
</tbody>
</table>


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**PSYCHOMOTOR** learning is demonstrated by physical skills: coordination, dexterity, manipulation, grace, strength, speed; actions which demonstrate the fine motor skills such as use of precision instruments or tools, or actions which evidence gross motor skills such as the use of the body in dance or athletic performance.

<table>
<thead>
<tr>
<th>Level</th>
<th>Illustrative Verbs</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception</td>
<td>chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects, separates</td>
<td>using sense organs to obtain cues needed to guide motor activity</td>
<td>listening to the sounds made by guitar strings before tuning them, recognizing sounds that indicate malfunctioning equipment</td>
</tr>
<tr>
<td>Set</td>
<td>begins, displays, explains, moves, proceeds, reacts, responds, shows, starts, volunteers</td>
<td>being ready to perform a particular action: mental, physical or emotional</td>
<td>knowing how to use a computer mouse, having instrument ready to play and watching conductor at start of a musical performance, showing eagerness to assemble electronic components to complete a task</td>
</tr>
<tr>
<td>Guided response</td>
<td>assembles, builds, calibrates, constructs, dismantles, displays, dissects, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches</td>
<td>performing under guidance of a model: imitation or trial and error</td>
<td>using a torque wrench just after observing an expert demonstrate a its use, experimenting with various ways to measure a given volume of a volatile chemical</td>
</tr>
<tr>
<td>Mechanism</td>
<td>(same list as for guided response)</td>
<td>being able to perform a task habitually with some degree of confidence and proficiency</td>
<td>demonstrating the ability to correctly execute a 60 degree banked turn in an aircraft 70 percent of the time</td>
</tr>
<tr>
<td>Complex or overt response</td>
<td>(same list as for guided response)</td>
<td>performing a task with a high degree of proficiency and skill</td>
<td>dismantling and re-assembling various components of an automobile quickly with no errors</td>
</tr>
<tr>
<td>Adaptation</td>
<td>adapts, alters, changes, rearranges, reorganizes, revises, varies</td>
<td>using previously learned skills to perform new but related tasks</td>
<td>using skills developed learning how to operate an electric typewriter to operate a word processor</td>
</tr>
<tr>
<td>Origination</td>
<td>arranges, combines, composes, constructs, creates, designs, originates</td>
<td>creating new performances after having developed skills</td>
<td>designing a more efficient way to perform an assembly line task</td>
</tr>
</tbody>
</table>


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## SLOs & Assessment Domains

<table>
<thead>
<tr>
<th>SLO</th>
<th>SLO Description</th>
<th>Assessment Domains</th>
<th>Evidence?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering Knowledge</td>
<td>Cognitive</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Problem Analysis</td>
<td>Cognitive</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Design/Development of Solutions</td>
<td>Cognitive, Affective</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Investigation</td>
<td>Cognitive, Psychomotor</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Modern Tool Usage</td>
<td>Psychomotor, Cognitive</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Engineer &amp; Society</td>
<td>Affective</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Environment &amp; Sustainability</td>
<td>Affective, Cognitive</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Ethics</td>
<td>Affective</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Individual &amp; Team Work</td>
<td>Psychomotor, Affective</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Communication</td>
<td>Psychomotor, Affective</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Project Management &amp; Finance</td>
<td>Cognitive, Psychomotor</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Life-long Learning</td>
<td>Affective, Psychomotor</td>
<td></td>
</tr>
</tbody>
</table>
Avoid Obsession with Assessment

• Assessment involves:
  • Cognitive domain (thinking, knowledge)
  • Psychomotor domain (doing, skills)
  • Affective domain (feeling & attitude)

• Is the assessment efforts sustainable?
Wrong Justification of Outcomes Attainment

• Wrong interpretation of the Bloom’s Taxonomy
• Entry level courses are used to map achievement of outcomes at mastery level simply because some assessment exercises include activities of
  • Write
  • Evaluate
  • Design, etc
• Note that Complex Engineering Problems should be used for assessment at masterly level
Evidences that Curriculum adequate to support all the 12 SLOs

• Curriculum adequately structured to achieve all the 12 SLOs?

• Common curriculum deficiencies
  • The engineer and society
  • Environment and sustainability
  • Ethics
  • Finance and project management
Curriculum

• Does the curriculum satisfy the program specific criteria of the particular engineering discipline?
• Are performance indicators established to measure the outcomes of the courses with respect to the student learning outcomes of accreditation criteria)?
• Major design experience?
• Prerequisites
• Course syllabi
• Cores and electives
Adequate evidences to demonstrate compliance with criteria?

- Sufficient evidences to demonstrate compliance with criteria?
- Best practices
  - Course folders
  - Folders for each outcomes
  - Samples of student portfolio
Check Samples of Student Works

• Each course is required to save samples of student homework solutions, laboratory reports, project or design reports, and exam solutions, typically from poor to good quality.

• At the end of each quarter, the lecturers of all undergraduate courses must compile a binder containing in addition to the solutions, the corresponding homework questions, exam questions, lab description, and project description.
Assessment &
Demonstration of Outcomes Achievement

Breadth
Depth
Where gained
Learning Process
Assessment Methods

Stylus Publishing LLC, 2008
Assessment of SLO

• Assessment is big subject and probably the major challenge of the teaching faculty
• Are assessment methods adequate to provide evidence of achievement of SLO?
• Each SLO may be measured or evaluated in terms of performance indicators
• Is there a system in place to ensure that students will acquire the stated SLO before graduation? (bearing in mind the various core and optional subjects available, and overseas attachment)
Sustainable Program Assessment Processes

• Direct and indirect methods of assessment to be applied to measure a wide variety of different student abilities

• Consider best fit between program needs, satisfactory validity and affordability (time, money and effort)

• Need to use multiple methods to maximise validity and reduce bias of any approach – triangulation.
<table>
<thead>
<tr>
<th>Terms</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Educational Objective</td>
<td>Broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve.</td>
</tr>
<tr>
<td>Student outcomes</td>
<td>Narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.</td>
</tr>
<tr>
<td>Performance Indicators (Criteria)</td>
<td>Specific, measurable statements identifying the performance(s) required to meet the outcome; confirmable through evidence.</td>
</tr>
<tr>
<td>Assessment</td>
<td>Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes and program educational objectives. Effective assessment uses relevant direct, indirect, quantitative and qualitative measures as appropriate to the objective or outcome being measure. Appropriate sampling methods may be used as part of an assessment process.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment processes. Evaluation determines the extent to which student outcomes and program educational objectives are being attained. Evaluation results in decisions and actions regarding program improvement</td>
</tr>
</tbody>
</table>
Assessment

• Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student learning outcomes and program educational objectives.

• Effective assessment uses relevant direct, indirect, quantitative and qualitative measures as appropriate to the objective or outcome being measured.

• Appropriate sampling method may be used as part of an assessment process.
Evaluation

• Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment processes.
• Evaluation determines the extent to which student outcomes and program educational objectives are being attained.
• Evaluation results in decisions and actions regarding program improvement.
Outcome based education & assessment

• An OBE curriculum means starting with a clear picture of what is important for students to be able to do, then organizing the curriculum, instruction and assessment to make sure this learning ultimately happens.
A learning outcome is what a student CAN DO as a result of a learning experience. It describes a specific task that he/she is able to perform at a given level of competence under a certain situation. The three broad types of learning outcomes are:

- Disciplinary knowledge and skills
- Generic skills
- Attitudes and values

What students are able to do once they have completed a course or program? What evidence that they are able to do so? How to assess each learning outcome? What evidence of student learning is most relevant for each learning outcome? What standard or criteria to be used to evaluate that evidence?

Selecting teaching and learning activities to help students to attain the intended learning outcomes and engage them in these learning activities through the teaching process.
Steps for assessment design

1) Define results to be measured
2) Identify data required and sources
3) Review existing assessment method
4) Define additional methods and measures
5) Implement & evaluate
Assessment tools and methods

• **Formative assessment**
The collection of information about student learning during the progression of a course or program in order to improve students learning. Example: reading the first lab reports of a class to assess whether some or all students in the group need a lesson on how to make them succinct and informative.
Summative assessment

• The gathering of information at the conclusion of a course, program, or undergraduate career to improve learning or to meet accountability demands. When used for improvement, impacts the next cohort of students taking the course or program. Examples: examining student final exams in a course to see if certain specific areas of the curriculum were understood less well than others; analyzing senior projects for the ability to integrate across disciplines.
Rubric

• A rubric is a set of criteria for assessing student work or performance. Rubrics are particularly suited to learning outcomes that are complex or not easily quantifiable, for which there are no clear “right” or “wrong” answers, or which are not evaluated with standardized tests or surveys. Assessment of writing, oral communication, critical thinking, or information literacy often requires rubrics.
### Communication Skills

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>Performance Criteria</th>
<th>Performance Criteria</th>
<th>Performance Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exemplary 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfactory 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developing 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsatisfactory 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dimensions**

**Scales**

**Descriptors**
<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set-up and Equipment Care</strong></td>
<td>Set-up of equipment is not accurate, help is required with several major details</td>
<td>Set-up of equipment is generally workable with several details that need refinement</td>
<td>Set-up of equipment is generally accurate with 1 or 2 small details that need refinement</td>
<td>All equipment accurately placed</td>
<td>All equipment accurately placed</td>
</tr>
<tr>
<td></td>
<td>Many necessary supplies must be found in mid-lab</td>
<td>Some necessary supplies must be searched out</td>
<td>All necessary supplies on hand</td>
<td>All necessary supplies on hand</td>
<td>Very neat and organized</td>
</tr>
<tr>
<td><strong>Following Procedure</strong></td>
<td>Lacks the appropriate knowledge of the lab procedures</td>
<td>Demonstrates general knowledge of lab procedures</td>
<td>Demonstrates good knowledge of lab procedures</td>
<td>Demonstrates sound knowledge of lab procedures</td>
<td>Demonstrates very good knowledge of the lab procedures</td>
</tr>
<tr>
<td></td>
<td>Often requires help from the teacher to even complete basic procedures</td>
<td>Requires help from teacher with some steps in procedures</td>
<td>Will ask peers for help with problems in lab procedures</td>
<td>Will discuss with peers to solve problems in procedures</td>
<td>Gladly helps other students to follow procedures</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Works to follow each step before moving on to the next step</td>
<td>Carefully follows each step</td>
<td>Thoroughly and carefully follows each step</td>
</tr>
<tr>
<td><strong>Data Collection</strong></td>
<td>Measurements are incomplete, inaccurate and imprecise</td>
<td>Measurements are somewhat inaccurate and very imprecise</td>
<td>Measurements are mostly accurate</td>
<td>Measurements are accurate with reasonable precision</td>
<td>Measurements are both accurate and precise</td>
</tr>
<tr>
<td></td>
<td>Observations are incomplete or not included</td>
<td>Observations are incomplete or recorded in a confusing way</td>
<td>Observations are generally complete</td>
<td>Observations are thorough</td>
<td>Observations are very thorough and may recognize possible errors in data collection</td>
</tr>
<tr>
<td></td>
<td>Symbols, units and significant figures are not included</td>
<td>There are 3 or more minor errors using symbols, units and significant digits or 2 major errors</td>
<td>Work is organized</td>
<td>Work is generally neat and organized</td>
<td>Work is neat and organized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Includes symbols, units and significant digits</td>
<td>Includes appropriate symbols, units and significant digits</td>
<td>Includes appropriate symbols, units and significant digits</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Proper safety precautions are consistently missed</td>
<td>Proper safety precautions are generally used</td>
<td>Proper safety precautions are consistently used</td>
<td>Proper safety precautions are consistently used</td>
<td>Proper safety precautions are consistently used</td>
</tr>
<tr>
<td></td>
<td>Needs to be reminded often during the lab</td>
<td>Needs to be reminded more than once during the lab</td>
<td>May need to be reminded once during the lab</td>
<td>Consistently thinks ahead to ensure safety</td>
<td>Consistently thinks ahead to ensure safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Uses general reminders of safe practices independently</td>
<td>Will often help other students to conduct labs safely</td>
<td>Will often help other students to conduct labs safely</td>
</tr>
<tr>
<td><strong>Clean-up</strong></td>
<td>Proper clean-up procedures are seldom used</td>
<td>Needs to be reminded more than once during the lab to use proper clean-up procedures</td>
<td>Proper clean-up procedures generally used</td>
<td>Consistently uses proper clean-up procedures</td>
<td>Consistently uses proper clean-up procedures</td>
</tr>
<tr>
<td></td>
<td>Often requires help to complete clean-up</td>
<td>1 or 2 items left at station or station not cleaned</td>
<td>May need some help on occasion to complete tasks</td>
<td>Station generally neat and clean</td>
<td>Often will help other students to complete tasks properly</td>
</tr>
<tr>
<td></td>
<td>3 or more items left at station or station not cleaned</td>
<td>Station generally left clean</td>
<td>Station generally neat and clean</td>
<td>Station always left neat and clean</td>
<td>Station always left neat and clean</td>
</tr>
</tbody>
</table>

*Blaine Pearce, Regina Public Schools, August 2003*
# RBG: Rubric for Evaluating Program Outcome B

"Design and Conduct Electrical Engineering Experiments, as well as to analyze and interpret data"

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Exemplary</th>
<th>Satisfactory</th>
<th>Developing</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to conduct experiment</td>
<td>Quite able to conduct the entire experiment with negligible help from the lab instructor.</td>
<td>Able to conduct experiment with some help from the lab instructor.</td>
<td>Able to conduct experiment with a lot of help from the lab instructor.</td>
<td>Unable to conduct experiment on his own; lab instructor provides help in almost every step of the experiment.</td>
</tr>
<tr>
<td>Data collection and presentation</td>
<td>Collects data very accurately; very systematically; presents data very clearly using appropriate graphics; figure captions and units are always included.</td>
<td>Collects data accurately most of the time; presents data clearly using appropriate graphics; figure captions and units are included most of the time.</td>
<td>Some of the data collected is inaccurate; somewhat systematic in data collection; data presentation is not that clear; figure captions and units are not always included.</td>
<td>Much of the data collected is inaccurate; not at all systematic in data collection; presents data in a very obscure manner.</td>
</tr>
<tr>
<td>Data analysis and interpretation</td>
<td>Always analyzes and interprets data correctly and precisely; always draws correct and useful conclusions; always compares theory against experiment and calculates related error.</td>
<td>Analyzes and interprets data correctly most of the time; most of the conclusion are correct and useful; compares theory against experimental data and calculates related error most of the time.</td>
<td>Analyzes and interprets data occasionally; some conclusion are incorrect; occasionally compares theory against experimental data and calculates related error.</td>
<td>Analyzes and interprets data incorrectly most of the time; many conclusions are incorrect; most of the time never attempts to compare theory against experimental data.</td>
</tr>
<tr>
<td>Subject Knowledge</td>
<td>Fully understands the experiment, including its purpose and results; able to discuss experimental protocols in a clear and precise manner.</td>
<td>Has very good understanding of the experiment, its purpose and results; able to discuss experimental protocols in a reasonably clear manner.</td>
<td>Has some understanding of the experiment, its purpose and results; almost able to discuss experimental protocols in a clear manner.</td>
<td>Has poor understanding of the experiment, its purpose and results; unable to discuss experimental protocols.</td>
</tr>
</tbody>
</table>

Notes:
1) This rubric, RBG, is to be used for program outcome (b) assessment in any EE lab with the exception of EE 390 lab.
2) Evaluation of students' performance using this rubric is to be reported using the corresponding excel file **RBG-EEXXX Lab-Section (yyy)-zzz.xls**.
3) Before sending the filled excel file, please rename it using the following naming codes: XXX = core course number, yyy = lab section number and zzz = current semester code. Example: **RBG-EE201 Lab-Section (051)-081.xls**.
## Work Effectively in Teams

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfactory</th>
<th>Developing</th>
<th>Satisfactory</th>
<th>Exemplary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Research &amp; Gather Information</strong></td>
<td>Does not collect any information that relates to the topic.</td>
<td>Collects very little information--some relates to the topic.</td>
<td>Collects some basic information--most relates to the topic.</td>
<td>Collects a great deal of information--all relates to the topic.</td>
</tr>
<tr>
<td><strong>Fulfill Team Role's Duties</strong></td>
<td>Does not perform any duties of assigned team role.</td>
<td>Performs very little duties.</td>
<td>Performs nearly all duties.</td>
<td>Performs all duties of assigned team role.</td>
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<tr>
<td><strong>Share in work of team</strong></td>
<td>Always relies on others to do the work.</td>
<td>Rarely does the assigned work--often needs reminding.</td>
<td>Usually does the assigned work--rarely needs reminding.</td>
<td>Always does the assigned work without having to be reminded.</td>
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<tr>
<td><strong>Listen to Other Teammates</strong></td>
<td>Is always talking--never allows anyone else to speak.</td>
<td>Usually doing most of the talking--rarely allows others to speak.</td>
<td>Listens, but sometimes talks too much.</td>
<td>Listens and speaks a fair amount.</td>
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Evidences Required

• Demonstrate that students have achieved the specified learning outcomes at appropriate level by the time of graduation, and

• Provide evidence that the program has contributed to students’ ability to achieve the SLOs
Performance Indicators

• **PIs** indicate what concrete actions the student should be able to perform as a result of participation in the program.
• They are measurable/observable knowledge and skills necessary for the mastery of learning.
• They allow the desired behavior of the students to be described, and will eliminate ambiguity concerning demonstration of expected competencies.
• PIs are made up of at least two main elements; action verb and content (referent).
• The expected behavior must be specified by name, using an observable action verb such as demonstrate, interpret, discriminate, or define.
Sample PIs
(G. Rogers)

• Students will know a professional code of ethics. (knowledge)
• Students will be able to describe the problem solving process. (comprehension)
• Students will solve research problems through the application of scientific methods. (application)
Assessment of SLO – Where?

- Course work & curricular activities
  - Classes chosen, major
- Classroom experience
  - Pedagogy, facilities, faculty & student interaction
- Out-of-class experience
  - Co-curricular, internships, support services
Capstone/Final Year Project

• A well-designed capstone/final year project is a culminating demonstration of whole range of learning outcomes

• Depth of specialized topic, e.g. design, analysis, investigation, ..

• Breadth of other outcomes, e.g. communication, environment, project management, ...
Assessment Methods

- Written exams
- Class tests
- Project reports
- Final Year/Capstone projects
- Design assignments
- Locally developed examinations, e.g. FEE for Professional Engineers
- Oral exam
- Internship/Industry Attachment report
- Lab reports

- Written surveys and questionnaires
- Exit and other interviews
- Focus groups
- External examiner
- End-of-course instructor survey
- End-of-course student survey
- Portfolios
- ...
The Program Learning Outcomes are supported by learning outcomes of individual modules of student learning activities.

We should therefore look for evidences that assessment of learning outcomes is carried out at individual modules of student learning activities.
Table 3.1: Curriculum and teaching processes to achieve Student Learning Outcomes, and evaluation method/criteria

<table>
<thead>
<tr>
<th>Module</th>
<th>Category#</th>
<th>Evaluation method &amp; criteria</th>
<th>Student Learning Outcomes*</th>
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<td>(1) (2) (3) (4) (5) (6) (7)</td>
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</table>
**Writing Intended Learning Outcomes**

• Intended learning outcomes need to be written at both program and course levels.

• Both of them need two essential elements:
  – A statement of what content are the students expected to be able to do at the end of learning experience;
  – The levels of understanding or performance in those content areas.
Course Learning outcomes

• Course Learning Outcomes describe the complex performances a student should be capable of as a result of learning experiences within a course.
• These are determined by the course instructor (s)
• Mapping course learning outcomes to program outcomes and how overall learning experience meet the accreditation criteria
Contribution of each course

• Each undergraduate course in the department contributes to a list of SLOs.
• Usually, a course may contribute strongly to some BAETE SLOs and less strongly to other outcomes.
• While a course may contribute to several BAETE SLOs, usually only a subset of its strong outcomes need to be used for BAETE assessment.

Adapted from: UCLA Electrical Engineering Department’s “Guide for instructors and teaching Assistants of undergraduate courses
Two Assessment Mechanisms

• The End-of-Course Instructor Survey and
• The Instructor Evaluation of Students’ Performance on an BAETE-related Problem
  – It is the main mechanism used to obtain instructor feedback on whether the students in the course achieved some of the desired course outcomes.

Adapted from: UCLA Electrical Engineering Department’s “Guide for instructors and teaching Assistants of undergraduate courses
BAETE – outcome problem

• The BAETE problem is meant to measure how well the students in a course learned some of the most significant (strong) SLOs that a course contributes to.

• The BAETE problem could be chosen as any of the following:
  – One of the problems in a midterm or a final examination in a lecture course.
  – One of the problems in a quiz in a laboratory course.
  – The instructor’s personal evaluation of a student ability to participate in teamwork, to successfully complete a design assignment, to write good technical reports, or to make good presentations. This option, in combination with others, may be useful for laboratory courses required to assess student ability to function in a team or for design courses that do not have examinations or quizzes.
  – The instructor’s personal evaluation of a student performance in a supervised research course.

Adapted from: UCLA Electrical Engineering Department’s “Guide for instructors and teaching Assistants of undergraduate courses
Student Survey

• End-of-Course Student Surveys.
• The Student Surveys collect student input on course material, course organization, and instruction.
• Besides asking students questions about the quality of a course and its instruction, the surveys also assess, for each course, the main topics that students are expected to have been exposed to during the course.

Adapted from: UCLA Electrical Engineering Department’s “Guide for instructors and teaching Assistants of undergraduate courses
Student Survey

• Students are asked to rate, on a scale from Poor to Excellent, whether they feel they have had an opportunity to learn the Specific Course Outcomes well.

• The student input is then summarized and tracked in:
  1. Individual reports on Course Performance for each course offering.
  2. Yearly reports on Course Performance during an academic year.
  3. Quarterly reports on Department Performance.
  4. Yearly reports on Department Performance.

Adapted from: UCLA Electrical Engineering Department’s “Guide for instructors and teaching Assistants of undergraduate courses
Other student feedback mechanisms

• Student feedback may be collected through two additional mechanisms:
  – *Exit surveys administered to graduating seniors.*
  – *Student Advisory Committee.*
Saving Samples of Student Works

• Each course is required to save samples of student homework solutions, laboratory reports, project or design reports, and exam solutions, typically from poor to good quality.

• At the end of each quarter, the lecturers of all undergraduate courses must compile a binder containing in addition to the solutions, the corresponding homework questions, exam questions, lab description, and project description.
Concluding Remarks

• Onsite accreditation visits should focus on evidence-based assessment of attainment of outcomes
• Adequate breadth and depth of POs
• Evidences of outcomes assessment – at course level
• Evidence of Continuous Improvement process
• Outcomes folder, course folder, portfolio of student work
• Evidences from interactions with stakeholders – faculty, students, alumni, ...
Part 2:
Role of PEVs & Convener in Accreditation Visits
Pre-visit Activities

• The University
  – Determine need & readiness for accreditation
  – Request for accreditation visit – a few months before visit
  – Preparation of documents for submission (self-study materials)

• Accreditation Board
  – Notify acceptance to conduct accreditation visit and communicate with university to clarify accreditation requirements
  – Arrange timeline of accreditation visit and the submission of self-study materials
  – Assemble the evaluation team.
Team Convener

• has the overall responsibility for the accreditation visit
• assigns duties to each team member keeping in view the overall perspective
• be familiar with the accreditation process and gather in advance the earlier reports
• has the responsibility for the preparation of the consolidated team report and its timely submission, for the consideration of the BAETE
Attributes of Program Evaluators

- Enthusiastic volunteer
- Technically competent
- Well-regarded
- Effective communication
- Listening skill
- Interpersonal skill
- Team-oriented
- Professional approach
- Courteous
- Time management
- Organised
Communication – Active Listening

Ear
Physiologically, we need ears to listen. As someone once said, “God made us with a pair of ears and one mouth so that we can listen more and talk less!” Listening involves bending our ears to people.

Eyes
We listen with our eyes. We know someone is listening to us when there is eye contact. The non-listener tends to look at his watch or elsewhere or becomes distracted by more important people.

Undivided attention
Active listeners focus their attention on the person who is talking. People go to counselors and psychiatrists because in that one hour, they are given an uninterrupted hearing. We show concern when we are focused.

Heart
Effective listening involves paying attention to verbal and non-verbal communication. Too often, we neglect the latter. We must learn to listen not just to facts but also to feelings being communicated. We should be sensitive to the frown, sweaty palms, indifferent posture, or anxious cracking of knuckles.

King
True listening treats the other person as royalty. We honor the person when we listen. We acknowledge that what he or she says is important.
Role & Responsibilities of PEV

• Team Members, including Chairman
  – Evaluate programme together with Team Leader
  – Received training
  – Familiar with accreditation system in general
  – Well-versed with accreditation criteria
  – Good understanding of outcomes-based system and assessment
  – Go through self study report, and seek clarification or additional information
  – Thorough evaluation of criteria and outcomes
  – Professional approach, unbiased, free of conflict of interest
  – Committed full-time during accreditation visit, focused
Role & Responsibilities of Secretary
- If provided for

• Secretary
  – Liaise with university on additional information, changes to schedule, etc
  – Take notes of comments, concerns, etc
  – Obtain from Chairman & Team members main issues to be included in report
  – Draft report – use standardise format of report for consistency
  – Refrain from acting as PEV
Role & Responsibilities of Convener/Chairman (1)

- Team Convener/Chairman:
  - Lead the evaluation team
  - Chair Team meetings
  - Chair Exit Interview with HOD
  - Spoke person for the Team
  - Harmonise comments from team members when preparing report
  - Collate Team inputs from review of Self-Study-Report and request clarification or further information
Role & Responsibilities of Convener/Chairman (2)

- Team Convener:
  - Meet/interview Provost/President/Top Management
  - Sign and be responsible for evaluation report
  - Liaise with BAETE, and with the institution where necessary
  - Receive factual clarification from institution on draft report and make report adjustment accordingly (with input from other team members if issue is major)
Desirable Attributes of Convener/Chairman

• Good professional standing
• Expertise in subject matter and/or accreditation system & process
• Professional approach
• Leadership skills
• Communication skills – Listening in particular
Conflict of interest

• Definition of possible conflict of interest:
  • have **financial or personal interest** in the university; or
  • have or have had a **close, active association with the programme or faculty/school** in the university. Close or active association are, for example:
    • **Employment**, as staff or consultant;
    • **Attendance**, as student at the faculty/school;
    • **Receipt** of honorary degree from the faculty/school;
    • **Membership** of a board of the university or any committee advising on the programme being accredited.
BAETE Guidelines on Conflict of interest??

• Does BAETE has documented definition of conflict of interest?
Confidentiality of information

- Information provided by University and derived from evaluation process, including reports, should be classified as confidential.
- They should not be released to any unauthorised persons except with written permission from the University.
- BAETE has Non-Disclosure Agreements with universities:
  - Accreditation documents are classified as confidential.
  - Use the information provided for the purpose of the specific evaluation exercise only.
  - Do not share any of the given information with any party outside of the evaluation team.
Pre-visit activities of Evaluation Team

• Pre-visit communication among team members
• Analyse the self-study documents from university
• Check whether additional information required
• Preliminary assessment (identify concerns, if any) and prepare list of questions for campus visit
• Pre-visit meeting with team members, briefing on accreditation process and admin program
• Team to discuss initial assessment & issues specific to each Team
Campus Visit

- Normally 3 days for BAETE
- Detailed visit time-table proposed by institution based on template of accreditation body
- Adjustments could be made after pre-visit discussion
Purpose of campus visit

• Assessment of qualitative factors which cannot be documented in written submission
  – intellectual atmosphere, morale, professional attitudes, quality of staff and students

• Examination of materials compiled by educational institution, i.e. those which cannot leave the campus
  – examination papers, student reports, instruction materials

• Clarify issues in the written submission by educational institution
Outcomes of Campus Visits & Assessment based on Pre-Visit Documents

• The role of the Evaluation Team is for the sole purpose of determining whether the program satisfies the accreditation criteria

• For each criterion, the degree of compliance to be summed up as:
  – Compliance
  – Concerns
  – Weakness
  – Deficiency
Outcomes of Campus Visits & Assessment based on Pre-Visit Documents

• Where requirements of a particular criterion are not fully met, the Team will include:
  – **Recommendation** - aspects which are suggestions rather than mandatory requirements
  – **Requirement** - items requiring follow-up action as a condition of accreditation

• The Team may include observations/comments/suggestion to assist improvement process, not affecting accreditation decision
Evaluation of PLOs

• Attainment of each PLOs must be carefully evaluated in terms of depth and breadth stipulated – going through evidences provided
• Application to Complex Engineering Problems
The DO’S
During Campus Visit

• Discuss issues of concern
• Interview Dean, HOD, management team, faculty, alumni and students to assess:
  – Morale, attitudes and motivation
  – Institutional and industry support
  – Theoretical and practical aspects of curriculum
• Tour relevant physical facilities
• Review of examination papers, student reports, instruction materials
• Exit Interview – present Team’s prelim findings
What the PEVs looks for?

- PEVs are sent to evaluate programs, certifying that they satisfy the criteria stipulated.
- They look for evidences that the required criteria are met.
- They identify deficiencies, weaknesses, concerns.
Meetings/Interviews

• Provost/President
• Dean and Head of Department/Program
• Group of faculty members
• Group of alumni
• Group of students
• Group of other constituencies, e.g. members of industrial advisory board, employers
Examination of Exhibits (1)

- Sample of teaching materials
- CV of faculty staff, publications
- Sample of exam papers
- Sample of exam scripts – excellent, good, marginal
- Transcripts of immediate past graduates
- Sample project and design reports
- Sample of industry attachment reports & assessment
Examination of Exhibits (2)

• Samples of student feedback form
• Reports of other internal or external reviews of the course, department and faculty
• Results of quality assurance reviews
• Statistics of graduate employment
• Other documents requested by the evaluation team
Visits

- Laboratories (teaching)
- Classrooms
- Library
- Computer facility
- Others if necessary
Major focus

• Quality assurance processes, including internal reviews
• Entry standards for admission of students
• Qualifications, enthusiasm, workload of faculty
• Facilities
• Industry participation
Major focus

• **Undergraduate degree** in engineering
  – equivalent to a 4-year full-time course
• Title of a programme as shown on graduate’s certificate and transcript
• All modes of delivery have to satisfy the accreditation criteria
  • full-time on-campus
  • evening or part-time
Post-visit activities

- Coordinate with team members to finalize evaluation report, if this is not completed at the end of the accreditation visit
- Secretary may help to draft report under guidance of Chairman
- Team members to review report through e-mail
- Submit report to Consistency Committee
- Team members to review any comments and changes by Consistency Committee
- Submit final draft report to university for comments on errors of fact
- Submit final report to Secretary
- Accreditation Board to meet and decide on recommendation by Evaluation Team
- Secretary will notify Chair/Team Members of Board decisions
Understanding the Terminology

• **Observation** – a comment or suggestion not affecting accreditation decision; is to assist improvement process

• **Concern** – indicates criterion, policy or procedure is met, but situation could potentially exist for criterion, policy or procedure not to be met in near future

• **Weakness** – criterion, policy or procedure met substantially, but lacks strength of compliance; remedial action to strengthen compliance is necessary before next evaluation

• **Deficiency** – criterion, policy or procedure is not met

• **Recommendation** - aspects which are suggestions rather than mandatory requirements

• **Requirement** - items requiring follow-up action as a condition of accreditation
Possible accreditation decisions

• Full accreditation - for maximum of 5 years:
  • Possible even when there are some concerns
  • If weaknesses are not severe, need to indicate:
    • whether the adequacy of the corrective action(s) can be determined on the basis of a written report (with appropriate supporting documentation); or
    • whether a follow-up review visit is required in order to assess the adequacy of the action(s)
Possible accreditation decisions

• Full accreditation but for a shorter term, say 2 to 3 years:
  • If weaknesses are severe
  • If deficiencies are not severe
  • Need to indicate:
    • Whether corrective action(s) can be determined on the basis of a written report (with appropriate supporting documentation); or
    • whether a follow-up review visit is required in order to assess the adequacy of the action(s)
Possible accreditation decisions

• Not to be accredited
  • If deficiencies are severe
  • When one or more of BAETE’s criteria are not met
  • Requirements in order to achieve accreditation should be specified
The DON’Ts
DON’Ts

• Don’t keep on talking most of the time
• Don’t waste time listening to presentation of information already well-documented (e.g. in self-study report)
• Don’t give solutions/advices to problems identified – no need to tell how you would have run the program
• Don’t group diverse stakeholders in a joint feedback session, e.g. employers, alumni and parents all together
DON’Ts

• Don’t group HOD, senior Professors in management position and junior staff in a single session for faculty feedback
• Don’t engage in non-accreditation activities during the campus visit
• Don’t be aloof, abusive – but should be assertive at times
• Don’t be overly fault-finding – adopt a balanced assessment of strengths and weaknesses
DON’Ts

• Don’t engage in bean-counting – rather look at the bigger picture & the outcomes
• Don’t examine all thoroughly – sufficient samples are good enough
• Don’t delay in completing and submitting the evaluation report
• Don’t engage in conflict-of-interest activities
Part 3
What the WA Verification Team Will Focus On When Observing On-site Visits
Summary of visits and observations to two HEIs

• Background
  – Background information about the HEI, including location, type (publicly or privately funded, undergraduate only, research, etc.), when established, overall student enrolment numbers, programs / courses offered, financial situation (e.g., research funding from external sources), organizational structure, etc
  – Background information about the academic unit delivering the engineering program, including range of engineering disciplines covered by programs / courses, overall student enrolment numbers, annual number of degrees awarded, financial situation (e.g., research funding from external sources), organizational structure, etc
Summary of visits and observations to two HEIs

• The accreditation process
  – details about the visit, including timing, programs observed, student enrolment by years as well as number of graduates, other contextual data
  – Observations about how the visit conformed to the BAETE accreditation process, noting any deviations or anomalies
Summary of visits and observations to two HEIs

• The visit schedule
  – Provide the visit schedule

• Visiting team
  – Describe the visiting team, including roles and previous experiences, training, including performance of the team during the visit.

• Documentation
  – Provide comments on the documentation that was submitted by the HEI prior to the visit, as well as information that was made available on-site during the visit.
Summary of visits and observations to two HEIs

• Observations
  – Comments about the conformance of the program(s) with the BAETE criteria, including issues raised by the visiting team during or at the end of the visit; provide an assessment of whether the program(s) observed can be considered to be substantially equivalent to the engineering programs of WA signatory jurisdictions

• Visit outcomes
  – Describe the end of visit procedures, i.e., exit meeting, and comment on whether the outcomes conform to expectations based on the BAETE criteria.
Summary of visits and observations to two HEIs

• Comments on the performance of the visiting team
  – Summary comments about the qualifications, performance, conduct of visiting team members; include a statement indicating whether the team’s interpretation and application of BAETE criteria was appropriate and whether prescribed procedures were thoroughly and fairly followed.
Decision Meeting

• Background
  – Explanation of decision-making procedures and policies, including allowable outcomes

• Meeting progress
  – Description of the conduct of the meeting, including processes to avoid conflicts of interest

• Discussion of programs and decisions
  – Insert comments about the decision(s) taken, especially for the programs that were observed, indicating whether decisions conform with published policies and whether the decisions reflect verification team’s expectations.
Compliance with stated policies and procedures

• Pre-visit documentation
  – adequacy of the pre-visit documentation, including timeliness, comprehensiveness, alignment with on-campus observations

• On-campus activities
  – adequacy of the on-campus activities, including actions of the visiting team, interactions with HEI, noting any anomalies

• Decision meeting
  – the conduct of the decision meeting, including appropriateness of decisions, alignment with policies and procedures, noting any anomalies.
Summary

• Desirable attributes of program evaluation team
• Role of Chairman in accreditation visit
• DO’s and DON’Ts during accreditation visit
• What the WA verification team will focus on when observing on-site visits
Q&A

Thank you for listening!