Performance Criteria (indicators, PIs) are defined as the specific, measurable statements identifying the specific knowledge, skills, attitudes and/or behavior students must demonstrate as indicators of achieving the outcomes. Simply put, performance criteria are those statements that define the learning outcomes and enable faculty to measure student competency. Each performance criterion must also specifically describe an acceptable level of measurable performance. For performance criteria that are not directly assessable, indirect indicators of the performance can be identified. There should be a limited number of performance criteria for each outcome and a schedule set for reviewing and updating the performance criteria.

Developing measurable performance criteria is a critical step, yet because it is so time consuming, many programs neglect it. Examples of translating ABET's outcomes "a-k" into measurable sub-skills (or attributes) can spur faculty creativity to write their own. Each measurable sub-skill uses action verbs. Sub-skills are organized by levels of students' mental functioning.

The committee distributed the task required for preparing a suitable list of performance criteria for each program outcome as follows:

S.No.	Name	Program outcomes
1.	Dr. Abul Fazal M. Arif	c, d, g
2.	Dr. Abul Kalam Azad	a, b, j
3.	Dr. Adel Abdou	e, i, k
4.	Dr. Wasfi Al-Khatib	f, h

The following is the list of key Performance Criteria (PIs) for the ABET a-k program outcomes developed and proposed by the subcommittee:

Outcome (a): Ability to apply knowledge of mathematics……

1. Applies mathematics principles to obtain solutions.
2. Uses principles of sciences and engineering in solving engineering problems.

3. Combines scientific and engineering principles to formulate models of processes and systems.
4. Combines mathematics principles to formulate models of processes and systems.

Outcome (b): Ability to design and conduct experiments…….

1. Can discuss laboratory experimental protocols.
2. Uses appropriate measurement techniques to collect data.
3. Can apply statistical procedures in analyzing data.
4. Uses appropriate tools to analyze data
5. Specifies and justifies assumptions given test conditions.

Outcome (c): Ability to design a system, component, or …….

1. Understand the design problem that meet desired needs
2. Identify and understand the importance of realistic constraints
3. Propose more than one solution for design by applying appropriate knowledge and realistic constraints
4. Thoroughly analyzes and evaluates all alternate solutions in making proper judgment on the best solution
5. Able to implement a process or a system within appropriate realistic constraints.

Outcome (d): Ability to function on multi-disciplinary teams.

1. Contributes by conducting research and information gathering
2. Takes responsibilities by fulfilling different roles when applicable
3. Share work equally
4. Values other's viewpoints by listening to teammates
5. Cooperate with teammates

Outcome (e): An ability to identify, formulate and solve engineering problems.

A. Identify and formulate

1. Identifies and develops a problem statement.

2. Makes appropriate and necessary assumptions.
3. Uses basic knowledge of engineering to formulate potential problem solutions.

B. Solve and Evaluate

1. Uses appropriate resources to locate pertinent information
2. Suggests new ideas and approaches to solve engineering problems.
3. Applies basic knowledge of engineering modeling to problem solving.
4. Demonstrates the ability to apply theoretical concepts to practical problem solving.
5. Generates potential alternative solutions to a given problem.
6. Develops criteria for the evaluation of proposed engineering solutions.
7. Selects most appropriate solution based on a set criteria.
8. Documents properly the suggested solution for the problem.
9. Interprets, and explains the results of the suggested solutions.
10. Recognizes the limitations and potential impacts of the suggested solutions

Outcome (f): An Understanding of Professional and Ethical Responsibility

1. Demonstrates an ability to make informed ethical choices.
2. Demonstrates knowledge of a professional code of ethics.
3. Evaluates the ethical dimensions of professional engineering and scientific practice.
4. Demonstrates ethical practice.

Outcome (g): An ability to communicate effectively

1. Uses technology for enhanced communications to express ideas and findings, e.g. uses audio/video equipment appropriately.
2. Provides content that is factually correct, supported with evidence, explained with sufficient detail, and properly documented (a good written report).
3. Submits work with a minimum of errors in spelling, punctuation, grammar.
4. Speaks clearly and uses appropriate technical terminology during presentation
5. Responds well to questions

Outcome (h): the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

1. Awareness of global effects of the product/practice/event etc.
2. Understanding of economic factors
3. Awareness of implications to society at large
4. Awareness of (other) contemporary issues (political, cultural).

Outcome (i): A Recognition of the need for, and an ability to engage in lifelong learning.

A **recognition of the need** for lifelong learning

1. Willing to learn new material on his own.
2. Participates in professional societies' activities.
3. Reads engineering articles and books outside of class.
4. Attends extracurricular training or plans to attend graduate school.

The **ability to engage** in lifelong learning

1. Accesses information effectively and efficiently from a variety of sources.
2. Reads critically and assess the quality of information available.
3. Categorizes and classify information.
4. Provides reasoning by predicting, inferring, using inductions, questioning assumptions, and inquiring.
5. Given a situation, identifies what he needs to learn.
6. Conducts independent research.
7. Indicates interest in continuing education
8. Indentifies opportunities for continued education in his field.
9. Lists sources for continuing education opportunities.

Outcome (j): Knowledge of contemporary issues

1. Can discuss major socio-economic issues facing the country and the world.
2. Can design a strategy that addresses a particular issue in a given scenario or location.
3. Able to propose out-of-the-box alternatives
4. Can view socio-economic and political issues from different perspectives

5. Able to evaluate alternative solutions or scenarios using different measures (e.g. quality of life, economics, global and political ramifications).

Outcome (k): An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

1. Uses technical library resources and literature search tools in solving engineering problems
2. Demonstrates skills in using computers and latest **software tools** for addressing and analyzing real-life problems.
3. Uses computer **modeling** and **simulation** software tools/packages in solving practical engineering problems.
4. Uses diagnostics equipment in solving practical engineering problems.
5. Utilizes a wide range of modern tools including **computer-based tools** or state-of-the-art algorithms and solution techniques.

- Generally, it is recommended to limit performance criteria to four for each outcome. Each program can select a set of PIs from the above list as per its requirement.

- Curriculum Mapping is the alignment of the program learning outcomes with the curriculum and, therefore, it needs development of performance indicators based on the curriculum.

- Rubrics can be developed as a direct measure of student performance instead of grades and it requires development of performance indicators/criteria.

Another list of performance indicators presented by Prof. Aggarwal during his first workshop is given in *Appendix A*.