FEIAP Guidelines and Recent Development in International Engineering Accreditation

Jia-Yush YEN, PhD

Secretary General & Executive Director of Accreditation Council, IEET

Dean, College of Engineering

Professor of Mechanical Engineering,
National Taiwan University

11 November 2013

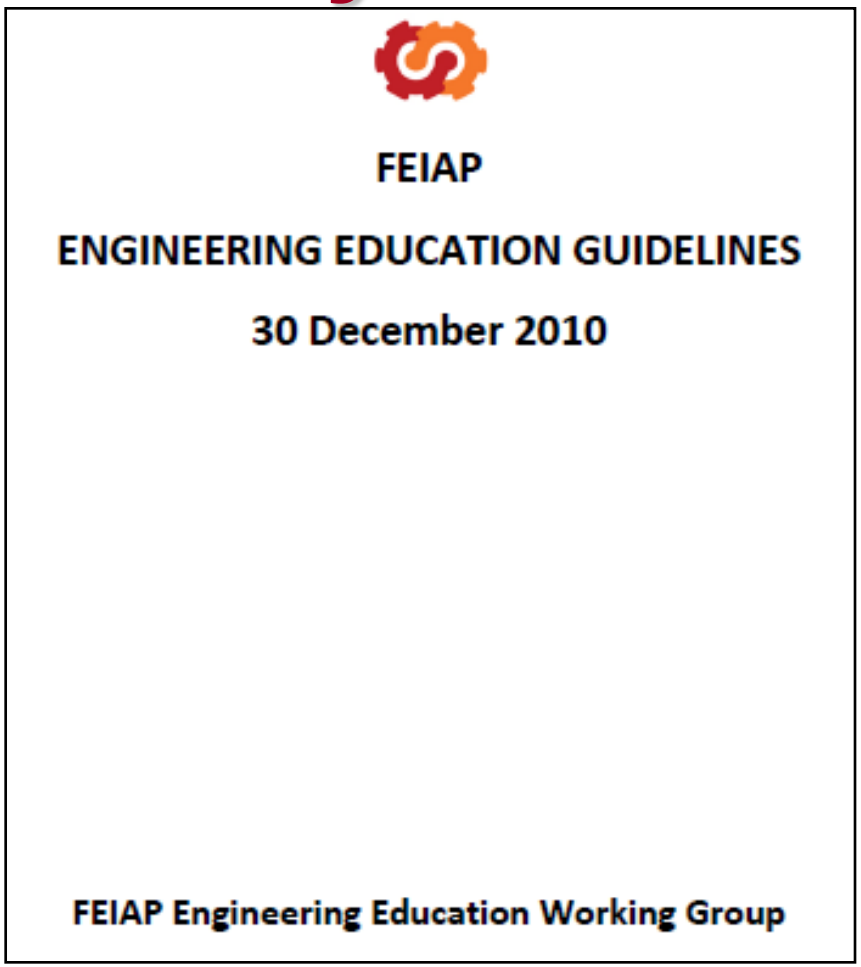
Outlines

1. About IEET
2. FEIAP Guidelines
3. IEA-Washington Accord Graduate Attributes
    1. Knowledge Profile
    2. Level of Problem Solving
    3. Graduate Attributes

Outlines

1. About IEET
2. FEIAP Guidelines
3. IEA-Washington Accord Graduate Attributes
    1. Knowledge Profile
    2. Level of Problem Solving
    3. Graduate Attributes

FEIAP Guidelines were Prepared by IEET & CIE



IEET, a Washington Accord Signatory since 2007

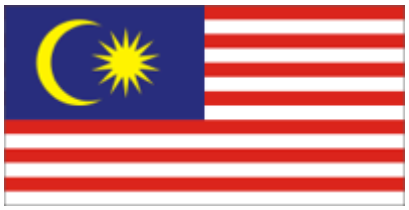
1. Australia - Represented by **Engineers Australia** (1989)
2. Canada - Represented by **Engineers Canada** (1989)
3. Chinese Taipei - Represented by **Institute of Engineering Education Taiwan** (2007)
4. Hong Kong China - Represented by **The Hong Kong Institution of Engineers** (1995)
5. Ireland - Represented by **Engineers Ireland** (1989)
6. Japan - Represented by **Japan Accreditation Board for Engineering Education** (2005)
7. Korea - Represented by **Accreditation Board for Engineering Education of Korea** (2007)
8. Malaysia - Represented by **Board of Engineers Malaysia** (2009)
9. New Zealand - Represented by **Institution of Professional Engineers NZ** (1989)
10. Russia - Represented by Association for Engineering Education of Russia (2012)
11. Singapore - Represented by **Institution of Engineers Singapore** (2006)
12. South Africa - Represented by **Engineering Council of South Africa** (1999)
13. Turkey - Represented by **MUDEK** (2011)
14. United Kingdom - Represented by **Engineering Council UK** (1989)
15. United States - Represented by **Accreditation Board for Engineering and Technology** (1989)

Singapore Recognizes IEET Accreditation

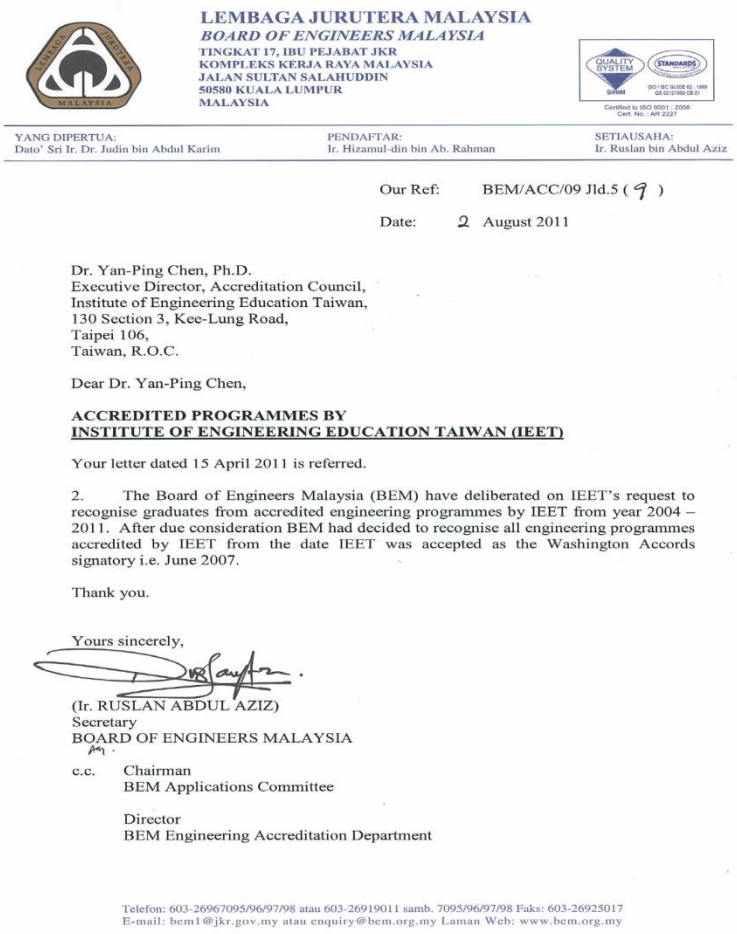
Singapore Professional Engineers Act:

the qualification is accredited by the accrediting organisation as fully meeting the academic requirements for registration as a professional engineer

Professional Engineers Act (Chapter 253): Qualifications specified in Division I of Part IV of the Schedule



Malaysia Recognizes IEET Accreditation



LEMBAGA JURUTERA MALAYSIA
BOARD OF ENGINEERS MALAYSIA
TINGKAT 17, IBU PEJABAT JKR
KOMPLEKS KERJA RAYA MALAYSIA
JALAN SULTAN SALAHUDDIN
50580 KUALA LUMPUR
MALAYSIA

YANG DIPERTUA: Dato' Sri Ir. Dr. Judin bin Abdul Karim
PENDAFTAR: Ir. Hizamul-din bin Ab. Rahman
SETIAUSAHA: Ir. Ruslan bin Abdul Aziz

Our Ref: BEM/ACC/09 Jld.5 (9)
Date: 2 August 2011

Dr. Yan-Ping Chen, Ph.D.
Executive Director, Accreditation Council,
Institute of Engineering Education Taiwan,
130 Section 3, Kee-Lung Road,
Taipei 106,
Taiwan, R.O.C.

Dear Dr. Yan-Ping Chen,

ACCREDITED PROGRAMMES BY
INSTITUTE OF ENGINEERING EDUCATION TAIWAN (IEET)

Your letter dated 15 April 2011 is referred.

2. The Board of Engineers Malaysia (BEM) have deliberated on IEET's request to recognise graduates from accredited engineering programmes by IEET from year 2004 – 2011. After due consideration BEM had decided to recognise all engineering programmes accredited by IEET from the date IEET was accepted as the Washington Accords signatory i.e. June 2007.

Thank you.

Yours sincerely,

(Ir. RUSLAN ABDUL AZIZ)
Secretary
BOARD OF ENGINEERS MALAYSIA

c.c. Chairman
BEM Applications Committee

Director
BEM Engineering Accreditation Department

Telefon: 603-26967095/96/97/98 atau 603-26919011 samb. 7095/96/97/98 Faks: 603-26925017
E-mail: bem1@jkr.gov.my atau enquiry@bem.org.my Laman Web: www.bem.org.my

BEM has decided to recognize all engineering programs accredited by IEET from the date when IEET was accepted as the Washington Accord signatory, i.e. since 2007.

IEET Assists FEIAP Members

Outlines

1. About IEET
2. FEIAP Guidelines
3. IEA-Washington Accord Graduate Attributes
    1. Knowledge Profile
    2. Level of Problem Solving
    3. Graduate Attributes

Contents of FEIAP Guidelines

	Document
1	Glossary of Terms
2	Accreditation Criteria Template for Accreditation Agencies
3	The Accreditation System Model Framework
4	Mentoring System
5	Evaluation of Accreditation Agency
6	Periodic Monitoring

Glossary of Terms

1. Organizational Acronym
2. Terminologies for Accreditation of Engineering Education

Accreditation Criteria

1. A template

   to steer the development of appropriate accreditation criteria → commensurate with Washington Accord and/or EUR-ACE systems.

2. Hierarchy of references

   Graduate attributes (umbrella body) → Outcomes (accreditation body) → Outcomes (program)

3. Elements must embrace
   1. Educational environment
   2. Program design, structure, content and assessment processes
   3. Quality systems

Accreditation System Model Framework

1. To guide the development of an engineering program accreditation system that focuses on delivery of assured graduate outcomes appropriate to a particular economy at a particular stage in development.
2. Provide guidance on developing documents as:
   1) Graduate outcomes specification,
   2) Accreditation criteria
   3) Accreditation process
   4) Governance of the accreditation body

Mentoring System

1. Participation
2. Appointment and Qualification of Mentor
3. Reporting
4. Expenses
5. Continuation and Termination of the Mentoring Services
6. Guidelines for Mentors
7. Mentoring Provided by Individual Signatories

Evaluation of Accreditation Agency

1. Application
2. Documentation in Support of Applications
3. Appointment of Review Team
4. Evaluation Process
5. Evaluation Standards
6. Decision Making

Periodic Monitoring

1. Submission of Documents
2. Appointment of Review Team
3. Evaluation Process
4. Evaluation Standards
5. Decision Making
6. Expenses

Outlines

1. About IEET
2. FEIAP Guidelines
3. IEA-Washington Accord Graduate Attributes
   1. Knowledge Profile
   2. Level of Problem Solving
   3. Graduate Attributes

History of the Washington Accord

1989 -1994: Initial Phase	1995-2006 Initial Expansion	2007-present: Structured Development
Signatories: UK, Ireland, USA Canada, Australia, New Zealand	Hong Kong, South Africa Japan, Singapore,	Chinese Taipei, Korea, Malaysia, Turkey, Russia
Original Rules and Procedures		• 2007 Educational Accords Rules and Procedures • 2011 Educational Accords Rules and Procedures
Substantial Equivalence of Accreditation Criteria	2001-2005: Developing The Graduate Attributes (GA)	2007: GA are exemplars 2011: GA to become standards
WA Secretariat Provided by a Volunteer Signatory		2007 International Engineering Alliance Secretariat

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Washington Accord: Status in Accord

- **Signatory:** A body entitled to fully participate in the Accord, enjoys the same rights and obligations as all other signatories. The body must be:
  - independent of the academic institutions delivering accredited or recognised programs within their jurisdiction.
  - An authority, agency or institution representative of the engineering profession that has legal or recognised authority to accredit programs
- **Provisional Status:** A body that has demonstrated that it has an accreditation / recognition system conceptually similar to signatories
  - Has none for the rights or duties of signatories.

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Washington Accord: Mutual Recognition

Agreement states:

- Accreditation criteria, policies and procedures of the signatories have been verified comparable
- Accreditation decisions made by one signatory are acceptable to the other signatories
- Recognition applies only to accreditations conducted within the signatory's national or territorial boundaries, except:
  - Offshore programmes offered by university with programs accredited in home territory
  - A designated signatory accredits in a developing countries where the is no capacity to operate an accrediting body

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Implication of Substantial Equivalence

Assume that we have a programme that satisfies the Graduate Attributes exactly

To be substantially equivalent to the Graduate Attributes: the programmes accredited by a signatory must produce graduates that would be equally prepared to progress to training and experience to achieve professional registration

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Old Method vs. New Method of Judging Substantial Equivalence

2007-2011 Rules and Procedures

5.3.3. The Final Report shall include: ….

g. A statement as to whether the standard of the graduates of accredited/ recognised programs are substantially equivalent to graduates of other Accord signatories.

2011-- Rules and Procedures

5.1.9.g

– **a collective judgement by the Team as a whole as to whether the accreditation standard is substantially equivalent to that of the Accord as illustrated by the exemplar graduate attributes of the relevant Accord.**

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Purpose of Engineering Education

The *purpose of engineering education* must include:

- to build knowledge, skill and attitudes to enable the graduate to proceed to training and experience that will develop the competencies required for independent practice in an engineering role

How do we know that the purpose is achieved?

- Ensure that the graduates have agreed characteristics or *graduate attributes*

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Graduate Attributes Defined

- *Graduate attributes* form a set of individually assessable outcomes that indicate the graduate's potential to acquire competence to practise at the appropriate level.
- The Graduate Attributes are exemplars of the attributes expected of graduate from an accredited programme.
- Graduate Attributes are clear, succinct statements of the expected capability, qualified if necessary by a range indication appropriate to the type of programme.

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

Benefit of Agreed Standards

The Graduate Attributes

- Are the consensus emerging from a long learning process
- Capture a common understanding of the globally-relevant outcomes and (their level)
- Are mature: future changes to GA are likely to be for clarification only
- Are aspirational standards for bodies wishing to improve their education and accreditation systems
- Are neutral: bodies developing their accreditation systems may not want to imitate other signatories

Reference: Presentation by Prof. Hu Hanrahan, WA Chair, Taipei, Sept. 2011.

WA Knowledge Profile

- A systematic, theory-based understanding of the **natural sciences** applicable to the discipline (e.g. calculus-based physics);
- Conceptually-based **mathematics**, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline;
- A systematic, theory-based formulation of **engineering fundamentals** required in the engineering discipline;
- Engineering **specialist knowledge** that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline;
- Knowledge that supports **engineering design** in a practice area;
- Knowledge of **engineering practice** (technology) in the practice areas in the engineering discipline;
- **Comprehension of** the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability; and,
- Engagement with selected knowledge in the **research literature** of the discipline.

Level of Problem Solving: WA Definition of Complex Problems

Complex problems: [are] engineering problems which cannot be resolved without in-depth engineering knowledge, much of which is at, or informed by, the forefront of The professional discipline, and have some or all of the following characteristics:

- 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

WA Graduate Attributes (1/3)

1. **Engineering Knowledge** – Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering* problems.
2. **Problem Analysis** – Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
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.
4. **Investigation** – Conduct investigations of complex 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.

WA Graduate Attributes (2/3)

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.
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.
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.
8. **Ethics** – Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

WA Graduate Attributes (3/3)

9. **Individual and Team Work** – Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
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.
11. **Project Management and Finance** – Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life Long Learning** – Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Thank You for Listening!

2011, Taipei

2009, Kyoto

2005, Hong Kong

2007, Washington DC