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Quality Assurance in Professional Education

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Engineer

They are people who don't wish a problem away, but start doing something to solve it!

Software Engineer

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Engineering is the most advanced field in the quality assurance in professional education.

In Western countries, historically, professional societies such as an institution of professional engineers or a council of engineers have been conducting the accreditation of education to ensure that younger generation have acquired required ability and knowledge when they have graduated from the engineering study program.

In those countries, only graduates from accredited programs are eligible to be professional engineers.


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Institutional Accreditation >>> compulsory by law

Program Accreditation >>> optional

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International Engineering Alliance

<http://www.ieagreements.org/>

Educational Accords			Competence Recognition/ Mobility Agreements			
Washington Accord	Sydney Accord	Dublin Accord	International Professional Engineers Agreement	International Engineering Technologist Agreement	Agreement for International Engineering Technicians	APEC Engineers
<i>Professional Engineers</i>	<i>Engineering Technologists</i>	<i>Engineering Technicians</i>	<i>Professional Engineers</i>	<i>Engineering Technologists</i>	<i>Engineering Technicians</i>	<i>Professional Engineers (Regional Agreement)</i>


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Washington Accord

- Established in 1989 by 6 accreditation bodies for engineering education in Australia, Canada, UK, Ireland, New Zealand and USA
- Accreditation bodies (of WA signatories) accredit educational programs with “similar” criteria
- Recognizes substantial equivalency of accredited programs under the Accord
- Continuous discussion for accreditation principle


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Washington Accord membership

	Accreditation Bodies	Provisional Status	Signatory
ABET (USA) Engineers Canada ECUK (UK) EA (Australia), EngIRE (Ireland) IPENZ (New Zealand)	6 Founding Members		1989
	HKIE (Hong Kong)	No system at that time	1995
	ECSA (South Africa)	1994	1999
	JABEE (Japan)	2001	2005
	IES (Singapore)	2003	2006
	BEM (Malaysia)	2003	2009
	ASIIN (Germany)	2003 but was removed in 2013	
	ABEEK (RP Korea)	2005	2007
	IEET (Chinese Taipei)	2005	2007
	AEER (Russia)	2007	2012
	NBA (India)	2007	2014
	IESL (Sri Lanka)	2007	2014
	MUDEK (Turkey)	2010	2011
	PEC (Pakistan)	2010	2017
	COE (Thailand)	Submitted in 2010 but was differed	
BAETE (Bangladesh)	2011		
CAST (PR China)	2013	2016	
PTC (The Philippines)	2013		
ICACIT (Peru)	2014		
CFIA (Costa Rica)	2015		
CACEI (Mexico)	2016		
(Under Preparation)			
Indonesia, Chile, Poland, Saudi Arabia, Myanmar, the Netherland			


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Complex Engineering Problems

Complex engineering problems cannot be resolved without in-depth engineering knowledge. They may need multi-disciplinary approach. They involve wide-ranging or conflicting technical, engineering and other issues. They need appropriate consideration for public health and safety, cultural, societal, and environmental considerations. The complex problems may have several solutions or no solution.

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IEA Graduate Attributes

1	Engineering knowledge
2	Problem Analysis
3	Design / Development of Solutions
4	Investigation
5	Modern Tool Usage
6	The Engineer and Society
7	Environment and Sustainability
8	Ethics
9	Individual and Team Work
10	Communication
11	Project Management and Finance
12	Life Long Learning


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International frameworks for Accreditation of Professional Education

- Washington Accord (engineer)
- Seoul Accord (CS, IT)
- Canberra Accord (architect)
- Sydney Accord (engineering technologist)
- Dublin Accord (engineering technician)
- EUR-ACE (engineer)

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Seoul Accord

Computing and IT related field is classified as a different category of profession from engineering.

The Seoul Accord was established in 2008 as a multi-lateral agreement among agencies responsible for accreditation or recognition of tertiary-level computing and IT-related qualifications.

ABEEK (Korea), ABET (USA), JABEE (Japan), Australian Computer Society, British Computer Society and Canadian Information Processing Society are the founding members. The first 3 are signatories of the Washington Accord and the last 3 are computer societies. The Hong Kong Institution of Engineers (HKIE) and the Institution of Engineering Education Taiwan (IEET), which are both signatories of the Washington Accord joined the Seoul Accord latter. Engineers Ireland, Institute of IT Professional New Zealand and The Philippine Information and Computing Accreditation Board are provisional members.

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ENAAE and EUR-ACE

European Network for Accreditation of Engineering Education (ENAAE) is another framework (regional and based in Europe) of accreditation for engineering education. It was founded in 2006.

ENAAE launched in 2007 EUR-ACE labelled program for engineering degree programs at First Cycle (Bachelor), Second Cycle (Master) and Second Cycle Integrated (Master) which have been accredited by accreditation agencies located in the European Higher Education Area.

These agencies have applied accreditation criteria and procedures in line with the EUR-ACE Framework Standards and Guidelines. Thus they have been authorized by ENAAE to award the EUR-ACE Label to these programs.

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Paradigm shift from input-based teaching to outcome-based learning

In the 2000's, ABET (USA) drastically changed its evaluation method from input base to outcome base. ABET triggered the world paradigm shift of engineering education from input-based teaching to outcome-based learning. The Washington Accord adopted OBE methods for evaluation.

The European Union has proposed an education shift to focus on outcomes, across the EU.

Study programs shall set up learning outcome, taking into consideration what students shall acquire rather than what professors wish to teach.

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Engineering Design Education

Design abilities to develop solutions to societal needs by applying science, technology and information:

- Ability to identify a problem that is expected to be solved
- Ability to identify restricted conditions such as public welfare, environmental preservation, and cost which are expected to be considered
- Ability to logically identify, organize, and investigate the problem that is expected to be solved
- Ability to establish a plan to solve the problem considering the restrictions and by applying body of knowledge of mathematics, sciences and technology in each applicable field
- Ability to actually solve the problem in accordance with the plan that is established


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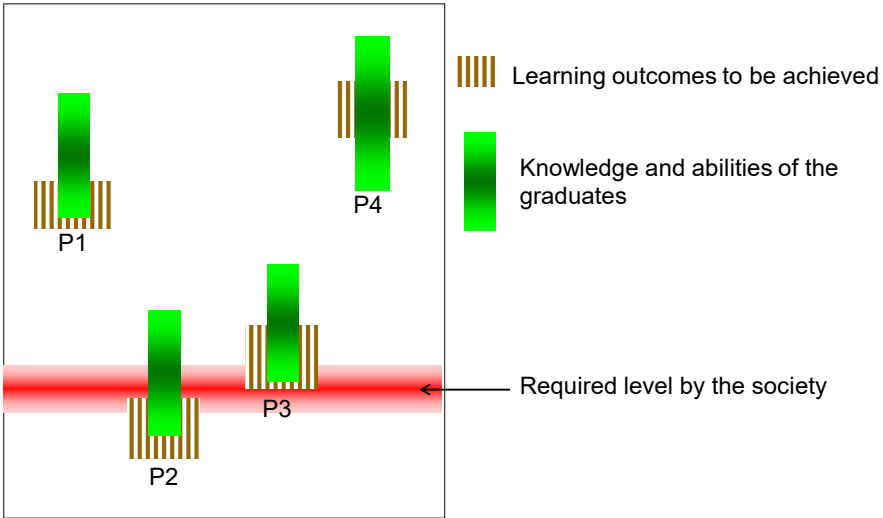


Why accreditation?

- Purpose is the improvement of education
- International equivalency (there is no value unless the level of education is recognized at international level)
- Review by the third party (self-evaluation is not sufficient)
- Accountability to the society
- Enhance outcome-based education

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Learning outcomes to be achieved

Knowledge and abilities of the graduates

Required level by the society

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