



**INSTITUTION OF ENGINEERS  
SINGAPORE**

**CHARTERED  
ENGINEER  
OF  
SINGAPORE**

**COMPETENCY STANDARD  
&  
ASSESSMENT STATEMENT**

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# INTRODUCTION

## 1 REGISTRATION AS CHARTERED ENGINEER OF SINGAPORE

- 1.1 The Institution of Engineers Singapore (IES)'s Chartered Engineer of Singapore registration is formal peer recognition as a competent person who is expected to demonstrate that he/she is able to practice competently in his/her practice area and wishing to be recognised as meeting the generic international standard for professional engineering.
- 1.2 The level of professional competency which IES's Chartered Engineer is expected to meet is listed as our Competency Standard. This Competency Standard has been developed from the International Engineering Alliance's "Graduate Attributes and Professional Competencies"<sup>1</sup>.
- 1.3 The IES will maintain a register of Chartered Engineers. This register will list individuals, and not firms.
- 1.4 Engineers registered by the IES as Chartered Engineers will be able to use the post-nominal "CEng (S'pore)" to their names.

## 2 ELIGIBILITY REQUIREMENTS

- 2.1 The 3 key benchmarks for registration by the IES as Chartered Engineer are –
  - (i) applicant must be IES member;
  - (ii) acceptable academic qualification; and
  - (iii) skills and experience which will satisfy the competence standard.

The 2 latter benchmarks are described in the next chapters.

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<sup>1</sup> The Graduate Attributes and Professional Competencies of the International Engineering Alliance (IEA) can be downloaded from IEA's website: <http://www.ieagreements.com/GradProfiles.cfm>

# ACADEMIC QUALIFICATIONS

## 3 QUALIFICATIONS ACCEPTABLE FOR REGISTRATION

- 3.1 Engineers seeking registration as Chartered Engineers of Singapore must demonstrate a level of academic achievement at, or following, completion of formal education substantially equivalent to that associated with successful completion of –
- (i) an engineering degree accredited by an organisation holding full membership of, and operating in accordance with the terms of, the Washington Accord; or
  - (ii) an engineering degree that can substantially meet the graduate attributes<sup>2</sup> profiles for Washington Accord Graduate that is listed in the International Engineering Alliance’s “Graduate Attributes and Professional Competencies”. An extract of the graduate attributes profiles for Washington Accord Graduate is in Annex A.
- 3.2 A comprehensive list of qualifications that has been deemed to satisfy the above can be found in IES’s website on registration as Chartered Engineer of Singapore.
- 3.3 The above list of qualifications is not intended to be definitive or comprehensive, and may be amended or supplemented as necessary.

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<sup>2</sup> Graduate attribute is a set of outcomes that are exemplar of the attributes expected of graduates from an engineering degree programme.

# COMPETENCY STANDARD

## 4 ELEMENTS OF COMPETENCY STANDARD

4.1 The Competency Standard<sup>3</sup> is the ability to perform 12 elements that represent broad practice areas of professional engineering performance. These elements are adapted from the professional competencies outlined in International Engineering Alliance’s “Graduate Attributes and Professional Competencies” for the class of professional engineer.

4.2 These 12 elements comprise the following –

	<b>Descriptor</b>	<b>Elements</b>
(1)	Comprehend and apply knowledge	Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice to the local practice
(2)	Problem analysis	Define, investigate and analyse complex problems
(3)	Design and develop solutions	Design or develop solutions to complex problems
(4)	Evaluation	Evaluate the outcomes and impacts of complex activities
(5)	Protection of society	Recognise the reasonably foreseeable social, cultural and environmental effects of complex activities generally, and have regard to the need for sustainability; recognise that the protection of society is the highest priority
(6)	Legal and regulatory	Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities
(7)	Ethics	Conduct his or her activities ethically
(8)	Manage engineering activities	Manage part or all of one or more complex activities

<sup>3</sup> Competency Standard is an indication of level of performance expected of a professional engineer.

	<b>Descriptor</b>	<b>Elements</b>
(9)	<b>Communication</b>	<b>Communicate clearly with others in the course of his or her activities</b>
(10)	<b>Lifelong learning</b>	<b>Undertake CPD activities sufficient to maintain and extend his or her competence</b>
(11)	<b>Judgement</b>	<b>Recognize complexity and assess alternatives in light of competing requirements and incomplete knowledge. Exercise sound judgement in the course of his or her complex activities</b>
(12)	<b>Responsibility for decisions</b>	<b>Be responsible for making decisions on part or all of complex activities</b>

4.3 Examples of characteristics or indicators of each of these elements that the assessors will be looking for are given in Annex B.

4.4 It is expected that an engineer would typically require at least 4 years of practical working experience in order to acquire these elements of professional competencies.

# REGISTRATION POLICY

## 5 CHARTERED ENGINEER BOARD (CEB)

5.1 The Chartered Engineer Board (CEB), constituted by the IES Council, will manage the assessment and registration process. The CEB will approve engineers to be placed on the register of Chartered Engineers of Singapore. The structure of CEB may include representatives from government, industry, relevant professional associations, and higher education institutions delivering engineering programs.

5.2 The Terms of Reference of the CEB are to –

- (a) develop and maintain accreditation procedures, criteria and systems for the registration of Chartered Engineers of Singapore;
- (b) develop and maintain a register of Chartered Engineers of Singapore, including a list of persons whose Chartered Engineer registration has been cancelled;
- (c) audit continuing compliance by Chartered Engineers of Singapore with the conditions of registration; and
- (d) receive, investigate and resolve complaints against Chartered Engineers of Singapore.

5.3 In approving the application, the CEB will take into consideration the recommendation of an Assessment Panel. The CEB will approve the registration of each successful engineer by positive vote of more than half of the total number of board members in the CEB.

5.4 The contact person for CEB is:

Secretary  
Chartered Engineer Board  
The Institution of Engineers, Singapore  
70 Bukit Tinggi Road  
Singapore 289758  
Tel : (65) 64695000  
Fax : (65) 64671108  
Email : [ies@iesnet.org.sg](mailto:ies@iesnet.org.sg)



## **6 ASSESSMENT PANEL**

- 6.1 The CEB will appoint Assessment Panels each comprising a Lead Assessor and 2 Assessors who are senior and experienced engineers to review and assess applications to be placed on the Chartered Engineer register. The assessment by Assessment Panels shall include a professional review interview with the engineer. The Assessment Panels will make their recommendations to the CEB on whether an engineer should be placed on the register.

## **7 STANDING COMMITTEE TO ASSESS APPLICATION FORM AND REPORT**

- 7.1 The CEB will appoint a Standing Committee to carry out the initial screening and assessment to determine if the academic qualification meets the prescribed acceptable academic qualification, and the adequacy of the application form and report describing the type, significance and level of responsibility of the engineering work experience.
- 7.2 The Standing Committee will report its assessment to the Assessment Panel.

## **8 DISCIPLINE OR BRANCH OF ENGINEERING**

- 8.1 For each engineer to be placed on the register of Chartered Engineers of Singapore, the CEB may identify one or more recognised engineering disciplines, selected from a list as approved by the CEB, within which that engineer has been assessed as being eligible for independent practice. The list of engineering disciplines, as shown in Annex C, will be updated to include new disciplines as necessary.

## **9 PROFESSIONAL REVIEW INTERVIEW**

- 9.1 The Professional Review Interview is a mandatory part of the registration process to be conducted by an Assessment Panel, unless the applicant has already been assessed and registered as a professional engineer by the Professional Engineers Board of Singapore.

- 9.2 The Interview will not be carried out if the Assessment Panel is satisfied that the academic qualifications have not satisfied the prescribed acceptable academic qualification.
- 9.3 The Interview will be based on the information provided in the application and is used to determine the level of competence that the engineer demonstrates. It will focus largely on the most recent and relevant experience.

## **10 OBLIGATIONS OF CHARTERED ENGINEERS OF SINGAPORE**

- 10.1 Chartered Engineers of Singapore are assessed for competence in the practice area of the engineering discipline (which is also referred to as branch of engineering) they have chosen. The IES's Rules for Professional Conduct requires that Chartered Engineers of Singapore work only within their competence, and should not offer to provide engineering services that lies outside their area of expertise.
- 10.2 Chartered Engineers of Singapore are bound by the IES's Rules for Professional Conduct.
- 10.3 In particular, a Chartered Engineer of Singapore is to note that he/she should:
- (a) practise only in areas which he/she is competent in;
  - (b) not hold himself/herself out or conduct himself/herself in any way or by any means as a person who is authorised to supply professional engineering services in Singapore if he/she is not a registered professional engineer;
  - (c) not hold himself/herself out as a Chartered Engineer in another country in which the title of Chartered Engineer (or its abbreviation or post-nominal) is controlled.
- 10.4 Chartered Engineers of Singapore are required to maintain their continuing professional development at a satisfactory level, which should not be less than the level as prescribed by the CEB in Annex D.

## **11 DISCIPLINARY ACTION**

- 11.1 A complaint against any Chartered Engineer of Singapore relating to contravention of the rules of professional conduct shall be lodged with the Secretary of the CEB.
- 11.2 If the CEB has determined the complaint to be bona fide, the CEB will constitute an Investigation Committee to investigate into the complaint and make recommendation to the CEB.

11.3 Any action to be taken by the CEB against the Chartered Engineer, including removal from the register, shall not be taken unless the Chartered Engineer has been given an opportunity of being heard.

## **12 DISPUTE RESOLUTION**

12.1 An engineer may appeal against the refusal to be placed on the register if he/she believes that the assessment outcome is not appropriate.

12.2 A Chartered Engineer of Singapore may appeal against the decision of the CEB to remove him/her from the register.

12.3 An appeal must be made in writing to the Honorary Secretary, Council of IES within 30 days after receiving notification of refusal or removal. The appeal should be accompanied by a report to substantiate the request.

12.4 The Council of IES will appoint an Appeal Committee comprising not less than 3 members to consider the request based on the report submitted by the appellant and respond with its recommendations within 90 days.

12.5 The Council of IES will consider the findings of the Appeal Committee and arrive at a final decision within 90 days after receipt of the appeal.

12.6 If the appeal is denied, the IES Council will provide the appellant with reasons for the decision.

12.7 If a review of the certification is necessary, the IES Council, in consultation with the CEB, will appoint another Assessment Panel to carry out the review.

12.8 If appeal for reinstatement on the register is successful, the CEB will reinstate the Chartered Engineer on the register.

12.9 The IES Council may impose a fee for lodgement of an appeal. The fee will be refunded to appellant's membership account if the outcome is in appellant's favour, but there will be no refund if the original decision is confirmed.

# **APPLICATION GUIDANCE**

## **13 APPLICATION FORM**

13.1 The Application Form is available for download from the IES web site.

## **14 WHO IS ELIGIBLE TO APPLY**

14.1 Application for registration as Chartered Engineer of Singapore is open only to IES Corporate Members and Fellows.

14.2 The CEB may refuse to register an engineer who in the opinion of the CEB is not of good character or reputation.

## **15 WHAT IF YOU ARE ALREADY A PE?**

15.1 IES Corporate Members and Fellows who are Professional Engineers registered by the Professional Engineers Board may also apply.

## **16 APPLICATION FEE**

16.1 The IES will impose a nominal fee to cover the cost of processing the application and the assessment by the Assessment Panels. The application fee is shown on the Application Form which is available for download from the IES web site.

## **17 RENEWAL OF REGISTRATION**

17.1 Each Chartered Engineer of Singapore will be required to renew their registration annually in order to remain on the register.

17.2 The annual fee is shown on the Annual Renewal Form which is available for download from the IES web site.

# ASSESSMENT MECHANISM

## 18 BODY RESPONSIBLE FOR ASSESSMENT

- 18.1 The Assessment Panel appointed by the CEB shall be the body to assess the qualifications and experience required for applicants seeking registration as Chartered Engineers of Singapore. The assessment mechanisms described herein shall apply to all engineering disciplines.
- 18.2 Prior to the assessment by the Assessment Panel, the Standing Committee will carry out the initial screening and assessment to determine adequacy of the application form and report describing the type; significance, level of responsibility of the engineering work experience; and the academic qualification to determine whether it meets the prescribed acceptable academic qualification.
- 18.3 The Standing Committee will report its assessment to the Assessment Panel.

## 19 REQUIREMENTS FOR REGISTRATION

- 19.1 The CEB shall grant registration as Chartered Engineers of Singapore to an engineer if he/she has met any of the following set of:

**Set A**<sup>4</sup>

- i) is a professional engineer registered with the Professional Engineers Board Singapore.

or

**Set B**

- i) has met the necessary and mutually agreed minimum threshold of professional formation and threshold of accredited academic formation (or professionally assessed equivalence) which has been assessed by an engineering institution in accordance with a Mutual Agreement of Co-operation and Recognition entered with the IES;
- ii) agrees to maintain continuing professional development at a satisfactory level prescribed by the CEB; and

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<sup>4</sup> The registration of Professional Engineers as CEng (Spore) will only commence at such time when the IES is ready, after consultation with the Professional Engineers Board Singapore.

- iii) agrees to be bound by the IES's Rules for Professional Conduct.

or

### **Set C**

- i) has completed an acceptable academic qualification in engineering;
- ii) has, since graduation, obtained at least 4 years of practical skills and experience which will satisfy the competence standard;
- iii) agrees to maintain continuing professional development at a satisfactory level prescribed by the CEB; and
- iv) agrees to be bound by the IES's Rules for Professional Conduct.

## **20 ASSESSMENT PROCEDURE UNDER SET A**

- 20.1 A professional engineer (PE) will be assessed based on his professional engineer registration status by the Professional Engineers Board of Singapore (PEB), and the IES may seek confirmation from the PEB.

## **21 ASSESSMENT PROCEDURE UNDER SET B**

- 21.1 An engineer who is already registered by an engineering institution in accordance with a Mutual Agreement of Co-operation and Recognition with the IES and who is seeking registration as Chartered Engineer of Singapore will be assessed based on the following:

- (i) supporting material comprising the engineer's professional curriculum vitae (CV) with note of academic attainment, and evidence of their existing registration with the engineering institution. The extent of exchange of application documentation that resides with the engineering institution shall be determined in accordance with the Mutual Agreement of Co-operation and Recognition.
- (ii) The CEB will seek confirmatory certification from the engineering institution of the engineer's current standing.

## **22 ASSESSMENT PROCEDURE UNDER SET C**

### **22.1 Completion of an acceptable academic qualification**

22.1.1 An engineer is considered to have met the academic qualification requirement if he/she holds any one of the following qualifications:

(i) an engineering degree accredited by an organisation holding full membership of, and operating in accordance with the terms of, the Washington Accord. Engineering degrees which are accredited under the Washington Accord framework are at:

<http://www.ieagreements.com/Washington-Accord/Accredited.cfm>

(ii) an engineering degree that can substantially meet the graduate attributes profiles for Washington Accord<sup>5</sup> that is listed in the International Engineering Alliance's "Graduate Attributes and Professional Competencies".

22.1.2 The CEB may accept an engineering degree accredited by a body whose accreditation criteria and/or examination standards has been determined by the IES as substantially equivalent to the graduate attributes profiles referred to in paragraph 22.1.1(ii) above.

### **22.2 Attainment of at least 4 years of practical skill and experience**

22.2.1 The CEB will assess practical skill and experience through submission of a report describing the type, significance and level of responsibility of the engineering work experience. The report must demonstrate that the engineer has engaged in professional practice which, directly or indirectly, calls upon his engineering knowledge, skills, experience and judgment, and has a significant influence on the technical direction of engineering projects or programs.

22.2.2 A professional review interview will be conducted by Assessment Panels each comprising a Lead Assessor and 2 Assessors who are senior and experienced engineers in the appropriate work area or discipline to review and assess practical skill and experience. The interview will cover aspects of work experience that are relevant to his field of work experience, such as:

- (a) knowledge of engineering processes and management;
- (b) understanding of investigation, planning, design, construction, manufacture, operation, maintenance and research;
- (c) understanding of Rules for Professional Conduct.

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<sup>5</sup> An extract of the graduate attributes profiles for Washington Accord Graduate is in Annex A.

22.2.3 Acceptable engineering experience includes design or other practical engineering experience such as technical, economic and administrative factors as well as ability to express his ideas.

22.2.4 Prior to the professional review interview, the Standing Committee to Assess Report will review the submission to ensure that the documentation is relevant and complete. Where necessary, the Standing Committee will require the engineer to modify or supplement the report with appropriate information.

## **23 CONTINUING PROFESSIONAL DEVELOPMENT**

23.1 Chartered Engineers need to maintain a Continuing Professional Development (CPD) programme which aims to reinforce the need for lifelong learning and to provide a framework through which could systematically maintain and enhance competency to do a job in their area of expertise. This will be assessed annually through the renewal of registration.

23.2 The requirement, in terms of professional development units (PDUs) over a one-year period, will be pegged to the Professional Engineers Board of Singapore (PEB)'s requirement for renewal of practising certificate, details of which are in shown in the PEB's web site.

23.3 In addition to courses which are accredited by the PEB to qualify for PDUs under the Professional Engineers Act, the IES will also accredit using the same framework those courses which are not in the PEB's prescribed disciplines or branches of engineering. These will be posted on the IES web site.

23.4 The CEB will carry out random audit (of between 2% and 5% of records for the past year) of participation in CPD programme.

## **24 COMPLIANCE WITH RULES FOR PROFESSIONAL CONDUCT**

24.1 Chartered Engineers of Singapore who are professional engineers (PEs) registered with the PEB are deemed to have met this requirement as all PEs are bound by the Professional Engineers Act (Code of Professional Conduct and Ethics) Rules, a copy of which is in the PEB's web site.

24.2 Chartered Engineers of Singapore who are not PEs will be required to sign a Declaration of Compliance that they shall comply with the IES's Rules for Professional Conduct.



- 24.3 In particular, a Chartered Engineer of Singapore is to note that he/she should:
- (a) practise only in areas which he/she is competent in;
  - (b) not hold himself/herself out or conduct himself/herself in any way or by any means as a person who is authorised to supply professional engineering services in Singapore if he/she is not a registered professional engineer;
  - (c) not hold himself/herself out as a Chartered Engineer in another country in which the title of Chartered Engineer (or its abbreviation or post-nominal) is controlled.

## **BIBLIOGRAPHY**

- 1 The APEC Engineer Manual, July 2009
- 2 International Engineering Alliance – “Graduate Attributes and Professional Competencies”, June 2009
- 3 IPENZ – Chartered Professional Engineer Competence Standard
- 4 The Institution of Mechanical Engineers, UK – Chartered & Incorporated Engineers Application Guidance
- 5 The Professional Engineers Board, Singapore – Continuing Professional Development for Professional Engineers

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# ANNEX A

## GRADUATE ATTRIBUTES PROFILES FOR WASHINGTON ACCORD GRADUATE\*

	<b>Descriptor</b>	<b>Differentiating Characteristic</b>	<b>Washington Accord Graduate</b>
1.	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems
2.	Problem Analysis	Complexity of 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	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified	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	Breadth and depth of investigation and experimentation	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
5.	Modern Tool Usage	Level of understanding of the appropriateness of the tool	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations
6.	The Engineer and Society	Level of knowledge and responsibility	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	Type of solutions	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development
8.	Ethics	Understanding and level of practice	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice

	<b>Descriptor</b>	<b>Differentiating Characteristic</b>	<b>Washington Accord Graduate</b>
9.	<b>Individual and Team work</b>	<b>Role in and diversity of team</b>	<b>Function effectively as an individual, and as a member or leader in diverse teams and in multi- disciplinary settings</b>
10.	<b>Communication</b>	<b>Level of communication according to type of activities performed</b>	<b>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</b>
11.	<b>Project Management and Finance</b>	<b>Level of management required for differing types of activity</b>	<b>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</b>
12.	<b>Lifelong learning</b>	<b>Preparation for and depth of continuing learning</b>	<b>Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change</b>

\* Adapted from the International Engineering Alliance's "Graduate Attributes and Professional Competencies"

# ANNEX B

## CHARACTERISTICS OR INDICATORS OF EACH ELEMENTS OF COMPETENCY STANDARD\*

	Descriptor	Elements	Characteristics or Indicators
(1)	Comprehend and apply knowledge	Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice to the local practice	<ul style="list-style-type: none"> <li>• Pursuit of post-graduate study or further learning to broaden knowledge and apply new knowledge</li> <li>• Work done to broaden knowledge of codes, standards and specifications</li> <li>• Work from first principles to make reliable predictions of outcomes</li> <li>• Seek advice, where necessary, to supplement own knowledge and experience</li> <li>• Use evidence from best practice to improve effectiveness</li> </ul>
(2)	Problem analysis	Define, investigate and analyse complex problems	<ul style="list-style-type: none"> <li>• Develop specification and procurement of new engineering products, processes and systems</li> <li>• Identify and define the scope of the problem</li> <li>• Investigate and analyse relevant information using quantitative and qualitative techniques</li> <li>• Test analysis for correctness of results</li> <li>• Conduct any necessary research and reach substantiated conclusions</li> </ul>
(3)	Design and develop solutions	Design or develop solutions to complex problems	<ul style="list-style-type: none"> <li>• Develop criteria for evaluating design solution</li> <li>• Identify needs, requirements, constraints and performance criteria</li> <li>• Develop concepts and recommendations that were tested against engineering principles</li> <li>• Evaluate options and selects solution that best matched needs, requirements and criteria</li> <li>• Plan and implement effective, efficient and practical systems or solutions</li> </ul>

	<b>Descriptor</b>	<b>Elements</b>	<b>Characteristics or Indicators</b>
(4)	Evaluation	Evaluate the outcomes and impacts of complex activities	<ul style="list-style-type: none"> <li>• Evaluate outcomes against original specifications</li> <li>• Learn from feedback on results to improve future design solutions and build best practice</li> <li>• Identify and manage risks through 'elimination, minimisation and avoidance' techniques</li> </ul>
(5)	Protection of society	Recognise the reasonably foreseeable social, cultural and environmental effects of complex activities generally, and have regard to the need for sustainability; recognise that the protection of society is the highest priority	<ul style="list-style-type: none"> <li>• Develop and implement appropriate hazard identification and risk management systems to manage safety and hazards</li> <li>• Develop and implement environmental impact assessments, or environmental risk assessments</li> <li>• Consider and takes into account possible social, cultural and environmental impacts</li> <li>• Understand and facilitate stakeholder involvement in sustainable development</li> <li>• Recognises impact and long-term effects of engineering activities on the environment</li> </ul>
(6)	Legal and regulatory	Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities	<ul style="list-style-type: none"> <li>• Demonstrate understanding and work within all relevant legislation and regulatory frameworks</li> </ul>
(7)	Ethics	Conduct his or her activities ethically	<ul style="list-style-type: none"> <li>• Demonstrate understanding of and comply with the rules of professional conduct of the IES</li> <li>• Act with integrity and honesty</li> </ul>
(8)	Manage engineering activities	Manage part or all of one or more complex activities	<ul style="list-style-type: none"> <li>• Organise and lead work teams, coordinating project activities</li> <li>• Work in cross-disciplinary team involving complex projects</li> <li>• Plan, schedule and organise projects to deliver specified outcomes</li> <li>• Apply appropriate quality assurance techniques</li> <li>• Manage resources, including personnel, finance and physical resource constraints</li> <li>• Manage conflicting demands and expectations</li> <li>• Apply continuous improvement through quality management</li> </ul>

	<b>Descriptor</b>	<b>Elements</b>	<b>Characteristics or Indicators</b>
(9)	Communication	Communicate clearly with others in the course of his or her activities	<ul style="list-style-type: none"> <li>• Prepare and deliver presentations on strategic matters</li> <li>• Communicate using a range of media suitable to the audience and context</li> <li>• Treat people with respect</li> <li>• Develop empathy and use active listening skills when communicating with others</li> <li>• Operate effectively as a team member</li> </ul>
(10)	Lifelong learning	Undertake CPD activities sufficient to maintain and extend his or her competence	<ul style="list-style-type: none"> <li>• Maintain evidence of competence development</li> <li>• Demonstrate a commitment to extending and developing knowledge and skills</li> <li>• Participate in education, training, mentoring or other programmes contributing to professional development</li> <li>• Adapt and update knowledge base in the course of professional practice</li> </ul>
(11)	Judgement	Recognize complexity and assess alternatives in light of competing requirements and incomplete knowledge. Exercise sound judgement in the course of his or her complex activities	<ul style="list-style-type: none"> <li>• Demonstrate ability to identify and choose alternative options and justify decisions</li> <li>• Peer's recognition of ability to exercise sound professional engineering judgement</li> </ul>
(12)	Responsibility for decisions	Be responsible for making decisions on part or all of complex activities	<ul style="list-style-type: none"> <li>• Demonstrate understanding of responsibilities involved when making engineering decisions</li> <li>• Take accountability for outputs</li> <li>• Accept responsibility for engineering activities</li> </ul>

\* Adapted from the International Engineering Alliance's "Graduate Attributes and Professional Competencies"

# ANNEX C

## LIST OF ENGINEERING DISCIPLINES

- (i) Aerospace Engineering
- (ii) Bioengineering
- (iii) Building Services Engineering
- (iv) Chemical Engineering
- (v) Civil Engineering<sup>6</sup>
- (vi) Computer Engineering
- (vii) Electrical Engineering<sup>6</sup>
- (viii) Electronics Engineering
- (ix) Environmental Engineering
- (x) Fire Engineering
- (xi) Geotechnical Engineering
- (xii) Industrial Engineering
- (xiii) Information Engineering
- (xiv) Materials Engineering
- (xv) Manufacturing Engineering
- (xvi) Marine Engineering
- (xvii) Mechanical Engineering
- (xviii) Mechatronics Engineering<sup>6</sup>
- (xix) Mining Engineering
- (xx) Petroleum Engineering
- (xxi) Power Engineering
- (xxii) Structural Engineering<sup>6</sup>
- (xxiii) Transportation Engineering

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<sup>6</sup> The registration of CEng (Spore) in these disciplines will only commence at such time when the IES is ready, after consultation with the Professional Engineers Board Singapore.

# ANNEX D

## CONTINUING PROFESSIONAL DEVELOPMENT (CPD) FRAMEWORK<sup>7</sup>

### D1 CPD Policy

D3.1 In this fast changing environment, there is a need for Chartered Engineers of Singapore to adopt a lifelong learning process to maintain and update their professional competence on a continuing basis.

D3.2 As a Chartered Engineer may be operating under circumstances which are unique to him, the focus of the CPD activities is best left to each Chartered Engineer to decide. The principle is that the relevant CPD activities must be those related to the scope of practice of each Chartered Engineer. There is therefore no prescribe specific rules as to the nature and type of activities to be undertaken but each Chartered Engineer will be given the flexibility to select from amongst a broad range of activities. The range of activities in this CPD programme is not intended to be inclusive but to act as a general guide. The activities that would be relevant are those that will enable one to:

- a) maintain, improve, or expand technical skills and knowledge;
- b) keep abreast of changing procedures and standards;
- c) understand and apply advances in technology;
- d) better serve the engineering profession, community and environment;
- e) develop communication and management skills; and
- f) broaden into related fields, such as those covering management, financial or legal aspects.

### D2 Definitions

D3.3 The terms used in this document have the following meanings:

- a) “contact hour” refers to an attendance or involvement lasting one clock hour of not less than 50 minutes;
- b) “professional development units” or “PDU” refers to the unit of measure for effort in continuing professional development program;
- c) “renewal qualifying period” refers to a 12-month period immediately preceding the application for renewal of registration;

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<sup>7</sup> Adapted from the Professional Engineers Board, Singapore



- d) “structured activity” refers to a course or activity that is accredited by the PEB or the IES or which involves active participation;
- e) “unstructured activity” refers to an activity that involves self-directed learning, reading, discussion or participation.

### **D3 Requirement**

- D4.1 Every Chartered Engineer who wishes to renew his registration is required to obtain a minimum of 40 PDUs over the renewal qualifying period. The 40 PDUs shall comprise a minimum of 15 PDUs in structured activities, and the remainder can be obtained from either structured or unstructured activities.
- D4.2 The determination of PDUs in structured and unstructured activities is in Appendix I.

### **D4 Carrying over of excess PDUs**

- D4.1 If a Chartered Engineer exceeds the annual requirement in one renewal qualifying period, a maximum of 40 PDUs from excess PDUs obtained from structured activities may be carried forward into the next renewal qualifying period.

### **D5 Insufficient PDU for renewal of registration**

- D5.1 A Chartered Engineer who has not obtained sufficient PDUs in the renewal qualifying period to meet the requirement for renewal of his registration may apply to have his registration renewed by providing reasons for the failure to meet the requirement. The CEB may renew his registration and may impose a condition that the shortfall in PDUs in that renewal qualifying period has to be obtained during the following renewal qualifying period. The PDUs to be obtained in the next renewal qualifying period to meet the shortfall would not be used for the renewal of the registration for the next renewal period.

### **D6 Reinstatement after a lapse of 3 years**

- D6.1 A Chartered Engineer whose registration had lapsed for 3 years or more is required to obtain 80 PDUs within the renewal qualifying period, of which at least 30 PDUs must be obtained from structured activities.

### **D7 Exemptions**

- D7.1 A Chartered Engineer may be exempt, subject to review and approval of the CEB, from CPD requirements if he experiences physical disabilities, prolonged illness or other extenuating circumstances.

## **D8 Records**

D8.1 When applying for renewal of registration, a Chartered Engineer is to submit the Annual Renewal Form (which can be downloaded from the IES web site) which contains a form to record the PDUs obtained during the renewal qualifying period. Chartered Engineers do not have to submit documentary evidence together with the Annual Renewal Form. However, Chartered Engineers are advised to retain their CPD documentary evidence for a period of at least 2 years.

## **D9 Audit Process**

D10.1 The CEB will conduct random audit on compliance with CPD. Those selected will be asked to produce documentary evidence of their CPD participation during the particular period. The documentary evidence may take any one of the following forms:

- a) Summary of diary records or a log showing the activities claimed;
- b) Course enrolment record;
- c) Receipts;
- d) Certificate of attendance;
- e) Attendance list from course organiser;
- f) Employer's report or certification.

## **D10 Accreditation of structured activities**

D10.2 Structured activities qualifying under Category 1 can be those accredited by the PEB or the IES. All activities that are accredited by the PEB are posted on the PEB's web site, while those accredited by the IES will be on the IES web site.

## APPENDIX I

**Requirement:** A minimum of 40 PDUs over a renewal qualifying period of 12 months, of which a minimum of 15 PDUs must be from structured activities.

**Determination:** Structured Activities are listed in Table 1 and Unstructured Activities are listed in Table 2.

**Table 1 - Structured Activities**

CATEGORY	CRITERIA	PDUs
<b>Category 1(a):</b> Accredited formal study courses	Relevant post-graduate or diploma courses on engineering and/or construction/project management. Example: a) MSc (Engineering) b) MSc (Project Management)	1 PDU for each contact hour
<b>Category 1(b):</b> Accredited lectures, short courses, conferences, workshops & seminars	Lectures, short courses, conferences, workshops & seminars which are relevant for professional engineers on technical, management, professional development, legal or regulatory matters. Examples: a) Seminars on regulatory requirements by government agencies eg. BCA, FSB, ENV, LTA, etc. b) "Engineers and the Law" by IES c) Workshops and seminars on engineering topics by NUS or NTU	1 PDU for each contact hour
<b>Category 1(c):</b> Accredited in-house training	Structured in-house training which are relevant to professional engineers on technical, management, professional development, legal or regulatory matters. [CV of speakers to be similar to category 1(a) or 1(b)]	1 PDU for each contact hour

CATEGORY	CRITERIA	PDUs
<b>Category 2:</b> Participation in Professional Boards, Committees and Societies	a) Member of Boards of local Professional institutions or relevant government agencies. Examples: i) Board Member of BCA, LTA, HDB, URA, JTC, PEB and BOA ii) Council Member ACES and IES	8 PDUs per organisation.
	b) Member of relevant technical or working committees of professional associations and government agencies. Examples: i) Member of Technical Committees of government departments and Statutory Boards; ii) Member of technical or other working committees of ACES & IES; iii) Member of approved technical societies.	4 PDUs per Committee (Maximum for this category is 8 PDUs)
<b>Category 3:</b> Contribution to relevant engineering or management Knowledge	a) Conduct accredited lectures, seminars, conferences or training courses for the first time. (Exclude regular lectures by full-time lecturers)	4 PDUs for each lecture hour or part thereof
	b) Conduct accredited lectures, seminars, conferences or training courses after the first time. (Exclude regular lectures by full-time lecturers)	2 PDUs for each lecture hour or part thereof
	c) Write or edit technical articles or papers published in distinguished publications, conference proceedings, professional journals or books.	5 PDUs for each topic
	d) Engineering patents registered during the year	15 PDUs for each patent

**Table 2 - Unstructured Activities**

<b>CATEGORY</b>	<b>CRITERIA</b>	<b>PDU's</b>
<b>Category A:</b> Self study of relevant topics	i) Reading of relevant technical, professional, financial, legal or business literature.	1 PDU for every 2 hours (Maximum for this category is 16 PDU's)
	ii) Listening/viewing audio/video tapes on relevant topics or taking correspondence courses.	
<b>Category B:</b> Informal In-house training and discussion	i) Conducting informal in-house training and presentations to colleagues.	1 PDU for every 2 hours (Maximum for this category is 16 PDU's)
	ii) Attending informal in-house training and presentations.	
<b>Category C:</b> Professional Membership	i) Membership of professional engineering or management bodies.	2 PDU's per organisation (Maximum for this category is 16 PDU's)
<b>Category D:</b> Non-accredited engineering activities	i) Attending professional and technical courses which are not accredited.	1 PDU for every 2 hours (Maximum for this category is 16 PDU's)
	ii) Attending organised group technical site visits and exhibitions.	