

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
ENVIRONMENTAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	1. Introduction			1
	1.1 Information about the Company			
Location 1	Description 1			
	1.1.1 Own Organisation			
	a) Discuss the size, history and internal culture of the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	b) Discuss an overview of the relationship between the trainee’s own organisation, government departments and other organisations.	<i>CCO 1.10</i>	11	
	c) Discuss the structure and functions of different units within the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	d) Demonstrate the awareness to follow operational procedures and practices as required by the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	e) Discuss the objectives, requirements and processes that support the quality assurance system within the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	1.1.2 Training Programme, Prospects and Career Development			
	a) Discuss an overview of the internal communication systems, training system and career development pathway within the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	b) Demonstrate a commitment to extend and develop up-to-date technical knowledge through reading relevant engineering publications, participating in seminars or conferences, and information searching.	<i>CCO 1.2</i>	11	

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	c) Demonstrate a commitment to extend and develop up-to-date knowledge of local, regional and international current affairs through reading relevant engineering publications, participating in seminars or conferences, and information searching.	<i>CCO 1.3</i>	11	
	d) Demonstrate a commitment to participate in the local organisations or community services for general personal development.	<i>CCO 1.3</i>	11	
	1.2 Information about the HKIE			
Location 2	Description 2			
	a) Discuss an overview of the HKIE organisation as well as its history and role in society.	<i>CCO 1.1</i>	11	
	b) Demonstrate a commitment to participate in relevant activities organised by the HKIE.	<i>CCO 1.1</i>	11	
	2. Engineer as a Profession			Continuous
	2.1 Professionalism			
Location 3	Description 3			
	a) Discuss the social and ethical responsibilities of engineers in society.	<i>CCO 1.2</i>	8	
	b) Explain the rules and standard requirements of conducting engineering activities to the HKIE, employers, clients, general public and colleagues in accordance with the HKIE Rules of Conduct.	<i>CCO 1.2</i>	8	
	c) Explain the ethical standards and responsibilities of professional engineers as required by the HKIE.	<i>CCO 1.2</i>	8	
	d) Demonstrate the awareness to follow the codes of practice of professional engineers.	<i>CCO 1.2</i>	8	

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	e) Demonstrate the awareness to uphold the dignity, standing and reputation of the engineering profession.	<i>CCO 1.2</i>	8	
	f) Demonstrate the awareness to protect the interests of the community including the environment, welfare, health and safety in conducting engineering activities.	<i>CCO 1.2</i>	8	
	2.2 Occupational Safety and Health and Quality Assurance			
Location 4	Description 4			
	a) Demonstrate an understanding of the statutory health and safety requirements.	<i>CCO 1.5</i>	9	
	b) Demonstrate an understanding of the responsibilities of professional engineers for the health and safety of the employers, employees and general public when engaging in engineering activities.	<i>CCO 1.5</i>	9	
	c) Apply the safety management system in accordance with the industry standards and regulatory requirements.	<i>CCO 1.5</i>	7	
	d) Examine the principles of quality assurance; and environment, health and safety standard.	<i>CO 1.2</i>	1	
	e) Apply the environment, health & safety standard in the execution of tasks according to the policy of the trainee’s own organisation.	<i>CO 1.2</i>	1	
	f) Apply the quality assurance system according to the policy of the trainee’s own organisation.	<i>CCO 1.10</i>	11	
	2.3 Environment			
Location 5	Description 5			
	a) Demonstrate an understanding of the relevant statutory environmental requirements related to the trainee’s discipline.	<i>CCO 1.6</i>	9	

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	<ul style="list-style-type: none"> b) Evaluate the inter-relationship of technology with the environment in the work place. c) Demonstrate the awareness of the impact of technology on the environment in society. d) Apply the environmental protection legislation in Hong Kong including relevant Technical Memoranda. e) Apply the relevant environmental engineering guidelines and best practice notes. 	<p><i>CCO 1.6</i></p> <p><i>CCO 1.6</i></p> <p><i>CO 2.1</i></p> <p><i>CO 2.1</i></p>	<p>9</p> <p>9</p> <p>2</p> <p>2</p>	
	2.4 Fundamentals of environmental protection			
Location 6	Description 6			
	<ul style="list-style-type: none"> a) Recognise the history and development of the global and local environmental issues and movements. b) Appreciate the concept of sustainable development and how it may affect engineering decisions. c) Recognise major international conventions, treaties, protocols or practices for the protection or improvement of the global and local environment. d) Demonstrate a commitment to maintain the role of engineering and technology in environmental protection. 	<p><i>CO 1.1</i></p> <p><i>CO 1.1</i></p> <p><i>CO 1.1</i></p> <p><i>CO 1.1</i></p>	<p>9</p> <p>9</p> <p>1</p> <p>11</p>	
	3. Environmental Engineering Practices, Design, Impact Assessment, Pollution Control and Prevention			71
	3.1 Professional practices			2
Location 7	Description 7			
	<ul style="list-style-type: none"> a) Comply with Codes of Practice of environmental engineering. b) Apply computer / mathematical modelling with clear awareness of assumptions and limitations. 	<p><i>CO 3.1</i></p> <p><i>CO 3.1</i></p>	<p>2</p> <p>3</p>	

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Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	c) Comply with technical specifications of environmental engineering projects.	<i>CO 3.1</i>	4	
	d) Examine the validity of information.	<i>CO 3.1</i>	6	
	3.2 Design or Design related Investigations / Modelling			26
Location 8	Description 8			
	a) Apply Briefs appropriately in design investigations or modelling.	<i>CO 3.2</i>	3	
	b) Collect and analyse data for design investigations or modelling.	<i>CO 3.2</i>	3	
	c) Develop evaluation criteria for design investigations or modelling.	<i>CO 3.2</i>	3	
	d) Carry out a design.	<i>CO 3.2</i>	4	
	e) Compare design alternatives with respect to short and long term engineering implications, and social, economic and environmental aspects.	<i>CO 3.2</i>	4	
	f) Select appropriate solution(s).	<i>CO 3.2</i>	12	
	3.3 Environmental Impact Assessment (EIA)			26
Location 9	Description 9			
	a) Appraise the stage of EIA process.	<i>CO 3.3</i>	2	
	b) Conduct EIA and/or environmental assessment.	<i>CO 3.3</i>	9	
	c) Develop mitigation measures.	<i>CO 3.3</i>	4	
	d) Carry out Environmental Monitoring and Audit.	<i>CO 3.3</i>	6	
	3.4 Pollution Prevention and Control			8
Location 10	Description 10			
	a) Evaluate options to prevent or control pollution at source.	<i>CO 3.4</i>	5	
	b) Evaluate options to prevent or control cross or secondary pollution.	<i>CO 3.4</i>	5	
	3.5 Environmental Management			9
Location 11	Description 11			
	a) Set up or implement Environmental Management Systems.	<i>New CO</i>	6	
	b) Use renewable resources appropriately.	<i>New CO</i>	6	

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Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	c) Carry out carbon and energy audit with consideration of life cycle aspects.	<i>New CO</i>	6	
	d) Carry out sustainability analysis.	<i>New CO</i>	6	
	4. Engineering Administration and Management			32
	4.1 Communication of Project Requirements			8
Location 12	Description 12			
	a) Develop or appraise project requirements through specifications, conditions of contract and drawings.	<i>CO 4.1</i>	6	
	4.2 Procurement Procedures			8
Location 13	Description 13			
	a) Evaluate different forms of contracts such as: Design-and-Build, Design-Build-Operate, Build-Operate-Transfer and Build-Operate-Own.	<i>CO 4.2</i>	6	
	b) Carry out procurement procedures including tender preparation, evaluation and contract award.	<i>CO 4.2</i>	6	
	4.3 Estimating Project Costs			8
Location 14	Description 14			
	a) Assess capital costs.	<i>CO 4.3</i>	6	
	b) Assess operational and maintenance costs.	<i>CO 4.3</i>	6	
	c) Assess life cycle cost.	<i>CO 4.3</i>	6	
	4.4 Project Management			8
Location 15	Description 15			
	a) Formulate work plan and budget.	<i>CO 4.4</i>	6	
	b) Carry out contract administration.	<i>CO 4.4</i>	6	
	5. Environmental Engineering Field Experience			26
	5.1 Environmental Field Experience			12
Location 16	Description 16			
	a) Carry out or examine mitigation measures of environmental impacts.	<i>CO 5.1</i>	6	
	b) Comply with contract documents, drawings and manuals.	<i>CO 5.1</i>	6	
	c) Produce site records.	<i>CO 5.1</i>	6	
	d) Propose a solution for trouble shooting.	<i>CO 5.1</i>	12	

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	5.2 Environmental Survey and Monitoring			14
Location 17	Description 17			
	a) Develop a survey and monitoring plan.	<i>CO 5.2</i>	3	
	b) Formulate a quality control plan.	<i>CO 5.2</i>	3	
	c) Carry out environmental sampling.	<i>CO 5.2</i>	3	
	d) Assess the sampling results.	<i>CO 5.2</i>	3	
	e) Develop a system for data storage and retrieval.	<i>CO 5.2</i>	4	
	6. Consolidation Stage			26
	<i>This section covers any activities related to environmental engineering. It should aim to develop skills and knowledge relating to personal qualities, communication, human resources management and business operational sense in addition to the technical, commercial and engineering knowledge acquired by the trainees during earlier parts of their training. Latest developments in the discipline should be included. All Training Outcomes, if not yet achieved in earlier parts of training, should be completed here.</i>			
	7. Other Common Core Outcomes for Continuous Development			Continuous
	7.1 Technical and Commercial Leadership			
Location 18	Description 18			
	a) Discuss the various leadership qualities required of a leader including accountability, conflict management and resources management etc.	<i>CCO 1.9</i>	6	
	b) Explain the importance of accountability and responsibility required by a leader for making decisions on engineering activities.	<i>CCO 1.9</i>	6	
	c) Apply various management skills in engineering projects.	<i>CCO 1.9</i>	6	
	d) Distinguish the relationship between good leadership and good management skills.	<i>CCO 1.9</i>	6	
	e) Demonstrate an understanding of the importance of teamwork and partnering skills in engineering projects.	<i>CCO 1.9</i>	6	

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	7.2 Development of Personal Qualities			
Location 19	Description 19			
	a) Identify appropriate innovative approach and/or tools for professional development.	<i>CCO 1.4</i>	11	
	b) Demonstrate interpersonal skills for professional development.	<i>CCO 1.4</i>	10	
	c) Demonstrate negotiating skills required for various engineering activities.	<i>CCO 1.4</i>	10	
	d) Demonstrate sound time management skills for professional development.	<i>CCO 1.4</i>	11	
	e) Demonstrate a commitment to continuous development and enhancement.	<i>CCO 1.4</i>	11	
	7.3 Communication			
Location 20	Description 20			
	a) Communicate ideas orally in an accurate and clear manner under various situations (including presentations and meetings).	<i>CCO 1.7</i>	10	
	b) Formulate an oral presentation of complicated data and information in an effective and persuasive manner.	<i>CCO 1.7</i>	10	
	c) Produce grammatically correct, clear and concise documents (including memos, letters, instructions, reports, resumes and technical papers) which meet the business objectives.	<i>CCO 1.7</i>	10	
	d) Evaluate the needs of the intended readers to design appropriate technical contents for communication.	<i>CCO 1.7</i>	10	
	7.4 Human Resources Management			
Location 21	Description 21			
	a) Demonstrate the awareness of the duties and employment criteria for different job positions in an engineering project.	<i>CCO 1.8</i>	6	
	b) Demonstrate an understanding of the relevant legal requirements and regulatory issues of labour employment and management.	<i>CCO 1.8</i>	6	

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	c) Discuss the appropriate staff training and development programmes in the organisation.	<i>CCO 1.8</i>	6	
	7.5 Business Operations			
Location 22	Description 22			
	a) Recognise the importance of intellectual property to business operations.	<i>CCO 1.11</i>	11	
	b) Describe the legal requirements in Hong Kong relevant to intellectual property rights.	<i>CCO 1.11</i>	11	
	c) Identify appropriate tools and method to measure and improve the productivity of business operations.	<i>CCO 1.11</i>	11	
	d) Identify appropriate information technology applications to manage business information and to facilitate business operations.	<i>CCO 1.11</i>	11	
	e) Recognise the importance of research and development towards business operations.	<i>CCO 1.11</i>	11	
	f) Demonstrate the awareness of financial considerations in operating business.	<i>CCO 1.11</i>	11	
	g) Recognise the importance of business development in business operations.	<i>CCO 1.11</i>	11	

N.B.

1. The training period must not be less than 156 weeks (36 months).
2. The programme set out is for guidance only but substantial departure should not be made. Employers should endeavour to provide training to their trainees in as many areas as possible as is appropriate to the sector of employment.
3. This guide should be read in conjunction with Section 3 of the M3 Routes to Membership.
4. During the training, each trainee is required to maintain a Graduate Training Log Book, Record of Continuing Professional Development and Record of Training Outcomes.

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Additional Notes for Scheme “A” trainees in Environmental Discipline:

Trainees should aim to develop basic understanding and general knowledge in major issues related to protection of the environment including:

- (a) History and development of the global and local environmental protection movements, green groups and relevant stakeholders.
- (b) Current status of global and local environmental quality.
- (c) The social context of environmental protection, and how it may affect engineering decisions such as site selection and technological solutions.
- (d) The concept of Environmental Costs and Life Cycle Analysis.
- (e) The role of engineering and technology in the protection and enhancement of the natural and urban environmental quality.

Moreover, trainees should be familiar with the contents and the application of:

- (a) Major international conventions, treaties, protocols or practices for the protection or improvement of the global environment
- (b) Environmental protection ordinances in Hong Kong, including supporting Technical Memoranda and relevant guidelines and best practices.
- (c) Hong Kong Planning Standards and Guidelines.