THE HONG KONG INSTITUTION OF ENGINEERS
ENGINEERING GRADUATE TRAINING SCHEME "A"
CONSOLIDATED MODEL TRAINING GUIDE
MANUFACTURING, INDUSTRIAL & SYSTEMS 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.	*CCO 1.10*	11	
	b) Discuss an overview of the relationship between the trainee's own organisation, government departments and other organisations.	*CCO 1.10*	11	
	c) Discuss the structure and functions of different units within the trainee's own organisation.	*CCO 1.10*	11	
	d) Demonstrate the awareness to follow operational procedures and practices as required by the trainee's own organisation.	*CCO 1.10*	11	
	e) Discuss the objectives, requirements and processes that support the quality assurance system within the trainee's own organisation.	*CCO 1.10*	11	
	f) Apply the quality assurance system according to the policy of the trainee's own organisation.	*CCO 1.10*	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.	*CCO 1.10*	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.	*CCO 1.2*	11	
	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.	*CCO 1.3*	11	
	d) Demonstrate a commitment to participate in the local organisations or community services for general personal development.	*CCO 1.3*	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.	*CCO 1.1*	11	
	b) Demonstrate a commitment to participate in relevant activities organised by the HKIE.	*CCO 1.1*	11	
	2. Engineer as a Profession			**Conti-nuous**
	2.1 Professionalism			
Location 3	***Description 3***			
	a) Discuss the social and ethical responsibilities of engineers in society.	*CCO 1.2*	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.	*CCO 1.2*	8	

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	c) Explain the ethical standards and responsibilities of professional engineers as required by the HKIE.	*CCO 1.2*	8	
	d) Demonstrate the awareness to follow the codes of practice of professional engineers.	*CCO 1.2*	8	
	e) Demonstrate the awareness to uphold the dignity, standing and reputation of the engineering profession.	*CCO 1.2*	8	
	f) Demonstrate the awareness to protect the interests of the community including the environment, welfare, health and safety in conducting engineering activities.	*CCO 1.2*	8	
	2.2 Occupational Safety and Health			
Location 4	***Description 4***			
	a) Demonstrate an understanding of the statutory health and safety requirements.	*CCO 1.5*	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.	*CCO 1.5*	9	
	c) Apply the safety management system in accordance with the industry standards and regulatory requirements.	*CCO 1.5*	7	
	2.3 Environment			
Location 5	***Description 5***			
	a) Demonstrate an understanding of the relevant statutory environmental requirements related to the trainee's discipline.	*CCO 1.6*	9	
	b) Evaluate the inter-relationship of technology with the environment in the work place.	*CCO 1.6*	9	
	c) Demonstrate the awareness of the impact of technology on the environment in society.	*CCO 1.6*	9	
	3. Engineering Practice			**41**
	3.1 Basic Engineering Practice Workshop			4
Location 6	***Description 6***			
	a) Comprehend the use of processing technology / tools / equipment.	*CO 1.1*	1	
	3.2 Production / Manufacturing Processes OR Service Operations			12
Location 7	***Description 7***			
	<u>Minimum three items to be selected in 3.2.1 or 3.2.2</u>			
	3.2.1 Production / Manufacturing Processes			
	a) Appraise metal forming processes.	*CO 2.3*	1	
	b) Appraise metal removal processes.	*CO 2.3*	1	
	c) Appraise plastics processing.	*CO 2.3*	1	
	d) Appraise joining of materials.	*CO 2.3*	1	
	e) Appraise heat treatment processes.	*CO 2.3*	1	
	f) Appraise surface treatment processes.	*CO 2.3*	1	
	g) Appraise PCB/IC production.	*CO 2.3*	1	
	h) Appraise automated / mechanised processes.	*CO 2.3*	1	
	i) Appraise apparel manufacturing processes.	*CO 2.3*	1	
	j) Appraise other relevant production / manufacturing processes (please specify).	*CO 2.3*	1	
	3.2.2 Service Operations			
	a) Carry out operation / business process design.	*CO 2.4*	1	
	b) Formulate operation planning, scheduling and control.	*CO 2.4*	1	
	c) Support reliability, maintenance and service engineering.	*CO 2.4*	1	
	d) Carry out material sourcing and processing.	*CO 2.4*	1	

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	e) Design or operate logistics / transportation system.	*CO 2.4*	1	
	f) Plan inventory control.	*CO 2.4*	1	
	g) Develop services level / capacity design.	*CO 2.4*	1	
	h) Support research and development.	*CO 2.4*	1	
	i) Plan motivation and incentive system.	*CO 2.4*	1	
	j) Appraise cost control /financial engineeing.	*CO 2.4*	1	
	k) Appraise EDI and communication.	*CO 2.4*	1	
	l) Appraise e-commence technology/applications	*CO 2.4*	1	
	m) Support IT system or operation control systems	*CO 2.4*	1	
	3.3 Quantitative Method, Systems Measurement and Data Analysis			6
Location 8	***Description 8***			
	Minimum two items to be selected in 3.3			
	a) Assess the results of operation research.	*CO 4*	5	
	b) Assess the results of statistics / probability / forecasting.	*CO 4*	5	
	c) Assess the results of simulation/optimisation.	*CO 4*	5	
	d) Assess the results of systems modelling.	*CO 4*	5	
	e) Examine the applications of database system / management.	*CO 4*	5	
	f) Carry out reliability analysis / measurement.	*CO 4*	5	
	g) Carry out system performance measurement.	*CO 4*	5	
	h) Examine the applications of big data / data analytic / AI / IOT.	*CO 4*	5	
	i) Carry out testing and certification.	*CO 4*	5	
	j) Carry out data intensive computing	*CO 4*	5	
	3.4 Production / Manufacturing/Systems Engineering Practice			12
Location 9	***Description 9***			
	Minimum three items to be selected in 3.4			
	a) Develop process methods, work specification and facilities layout.	*CO 2.2*	4	
	b) Plan the sourcing and use of materials.	*CO 2.2*	4	
	c) Construct material handling process.	*CO 2.2*	4	
	d) Design tooling solutions.	*CO 2.2*	4	
	e) Develop work study, job evaluation and rate fixing methods.	*CO 2.2*	4	
	f) Plan the preparation of testing and commissioning.	*CO 2.2*	4	
	g) Develop CAD/CAM/CAE applications.	*CO 2.2*	4	
	h) Apply digital techniques / system.	*CO 2.2*		
	i) Carry out product development and analysis.	*CO 2.2*	4	
	j) Plan the applications of environmental engineering.	*CO 2.2*	4	
	k) Plan the applications of bio-medical engineering.	*CO 2.2*	4	
	l) Develop robotisation and automation applications.	*CO 2.2*	4	
	m) Develop 3D printing applications.	*CO 2.2*	4	
	n) Develop or apply decision analytics	*CO 2.2*	4	
	o) Develop or apply smart technology	*CO 2.2*	4	
	3.5 Industrial Management and Commercial Activities			7
Location 10	***Description 10***			
	Minimum three items to be selected in 3.5			
	a) Appraise the organisation structure.	*CO 6*	2	
	b) Appraise human resources management.	*CO 6*	2	
	c) Plan purchasing activities.	*CO 6*	2	
	d) Plan data processing activities.	*CO 6*	2	
	e) Plan dispatch and transportation activities.	*CO 6*	2	
	f) Plan sales and marketing processes.	*CO 6*	2	
	g) Plan plant engineering / maintenance processes.	*CO 6*	2	
	h) Develop staff training activities.	*CO 6*	2	

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	i) Appraise the legal intellectual properties regulations and requirements in Hong Kong.	*CO 6*	2	
	j) Appraise the importance of innovation management.	*CO 6*	2	
	k) Develop applications on wireless and mobile applications, and e-technologies.	*CO 6*	2	
	l) Plan systems modeling / integration processes.	*CO 6*	2	
	m) Plan the industrial management and commercial activities by taking into considerations the impacts of health, safety and security.	*CO 6*	2	
	n) Apply financial technologies in industrial management and commercial activities.	*CO 6*	2	
	4. Functional Specialist Training			**34**
	4.1 Basic Knowledge and Practice on Process / System			12
Location 11	***Description 11***			
	a) Discuss production / manufacturing system.	*CO 2.1*	1	
	b) Perform process design / planning, controlling and analysis.	*CO 2.1*	1	
	c) Comprehend basic product / service design.	*CO 2.1*	4	
	d) Implement quality control, inspection and measurement.	*CO 2.1*	5	
	e) Discuss management information system.	*CO 2.1*	1	
	4.2 Industrial/Systems Engineering			
Location 12	***Description 12***			
	Minimum two items to be selected in 4.2			
	a) Evaluate work design.	*CO 3*	3	
	b) Analyse the ergonomic / human factors in engineering process.	*CO 3*	3	
	c) Examine quality engineering / inspection processes.	*CO 3*	3	
	d) Examine reliability engineering.	*CO 3*	3	
	e) Assess production planning / work scheduling.	*CO 3*	3	
	f) Examine production operation and control processes.	*CO 3*	3	
	4.3 Engineering Management			
Location 13	***Description 13***			
	Minimum two items to be selected in 4.3			
	a) Plan project management	*CO 5*	12	
	b) Plan operation management.	*CO 5*	12	
	c) Plan supply chain management.	*CO 5*	12	
	d) Plan logistics management.	*CO 5*	12	
	e) Plan material management.	*CO 5*	12	
	f) Plan quality management and implementation of TQM/ISO system.	*CO 5*	12	
	g) Derive engineering economics / costing parameters.	*CO 5*	12	
	h) Plan knowledge management.	*CO 5*	12	
	i) Plan data management	*CO 5*	12	
	j) Plan risk management	*CO 5*	12	
	k) Plan safety and health management	*CO 5*	12	
	5. Objective Training			**28**
	This section covers training in any activities related to manufacturing and industrial 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 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.			

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	6. Other Common Core Outcomes for Continuous Development			**Continuous**
	6.1 Leadership and Management			
Location 14	***Description 14***			
	a) Discuss the various leadership qualities required of a leader including accountability, conflict management and resources management etc.	*CCO 1.9*	6	
	b) Explain the importance of accountability and responsibility required by a leader for making decisions on engineering activities.	*CCO 1.9*	6	
	c) Apply various management skills in engineering projects.	*CCO 1.9*	6	
	d) Distinguish the relationship between good leadership and good management skills.	*CCO 1.9*	6	
	e) Demonstrate an understanding of the importance of teamwork and partnering skills in engineering projects.	*CCO 1.9*	6	
	6.2 Development of Personal Qualities			
Location 15	***Description 15***			
	a) Identify appropriate innovative approach and/or tools for professional development.	*CCO 1.4*	11	
	b) Demonstrate interpersonal skills for professional development.	*CCO 1.4*	10	
	c) Demonstrate negotiating skills required for various engineering activities.	*CCO 1.4*	10	
	d) Demonstrate sound time management skill for professional development.	*CCO 1.4*	11	
	e) Demonstrate a commitment to continuous development and enhancement.	*CCO 1.4*	11	
	6.3 Communication			
Location 16	***Description 16***			
	a) Communicate ideas orally in an accurate and clear manner under various situations (including presentations and meetings).	*CCO 1.7*	10	
	b) Formulate an oral presentation of complicated data and information in an effective and persuasive manner.	*CCO 1.7*	10	
	c) Produce grammatically correct, clear and concise documents (including memos, letters, instructions, reports, resumes and technical papers) which meet the business objectives.	*CCO 1.7*	10	
	d) Evaluate the needs of the intended readers to design appropriate technical contents for communication.	*CCO 1.7*	10	
	6.4 Human Resources Management			
Location 17	***Description 17***			
	a) Demonstrate the awareness of the duties and employment criteria for different job positions in an engineering project.	*CCO 1.8*	6	
	b) Demonstrate an understanding of the relevant legal requirements and regulatory issues of labour employment and management.	*CCO 1.8*	6	
	c) Discuss the appropriate staff training and development programmes in the organisation.	*CCO 1.8*	6	
	6.5 Business Operations			
Location 18	***Description 18***			
	a) Recognise the importance of intellectual property to business operations.	*CCO 1.11*	11	
	b) Describe the legal requirements in Hong Kong relevant to intellectual property rights.	*CCO 1.11*	11	

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	c) Identify appropriate tools and method to measure and improve the productivity of business operation.	*CCO 1.11*	11	
	d) Identify appropriate information technology applications to manage business information and to facilitate business operation.	*CCO 1.11*	11	
	e) Recognise the importance of research and development towards business operations.	*CCO 1.11*	11	
	f) Demonstrate the awareness of financial considerations in operation business.	*CCO 1.11*	11	
	g) Recognise the importance of business development in business operations.	*CCO 1.11*	11	

N.B.

1. The training period must not be less than 104 weeks (24 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 M4 Routes to Membership.
4. During the training, each trainee is required to maintain Training Log Book, Record of Continuing Professional Development and Record of Training Outcomes.