

**THE HONG KONG INSTITUTION OF ENGINEERS
ENGINEERING GRADUATE TRAINING SCHEME “A”**

MODEL TRAINING GUIDE

BIOMEDICAL ENGINEERING

Model Training Guide (MTG)

The Model Training Guide is a guide to Companies on the practical experiences considered relevant in the formal training of potential Professional Engineers.

Training Programme (TP)

The Training Programme is the plan prepared by a Company which is designed to meet the experiences listed in the MTG and to meet the objectives set out in the Record of Objectives. This ‘plan’ is presented for approval on Form TD1 Part 2 as a part of the Assessment/Reassessment procedures.

Training Period - Nominally 2 years

The length of the training is based on meeting the objectives and not determined by time. The times shown below are indicators only of the time that a trainee would normally take to meet the relevant objectives.

Training Aim

It is important to note that the Scheme “A” Graduate Training is designed to be a fast track by which a graduate can obtain full professional status. The training therefore covers both Technical and Professional matters.

Continuing Professional Development (CPD)

An implicit part of the Scheme “A” training is related to CPD which should be an integral and relevant part of the development of the graduate trainee.

Training Programme Content

*(C=Core, D=Desirable; * =Items which may be incorporated into Objective Training to make a total of 70 weeks of such training)*

1. Introduction (2 weeks C)

1.1 Information about the company

Size, history, subsidiaries, products, services, markets, competitors, management structure, management functions, people communications, locations of facilities and their layout, health & welfare of employees, joint management-staff consultation arrangements etc.

- 1.2 Information about training programme, prospects and career development
Specialist skills, taxonomy, work of related discipline, management techniques, sources of guidance, sources of information, Web Page address etc.
 - 1.3 Appreciation of role of biomedical engineers in healthcare system of Hong Kong such as public / private hospitals, clinics, equipment suppliers / manufacturers, service providers or consultants.
 - 1.4 Appreciation of international standards commonly used in Hong Kong and local legislations.
2. Biomedical Engineering in Healthcare Environment (11 months in total)
- 2.1 Workshop Practice (4 weeks C)
To teach the trainee basic engineering practice appropriate to the employer's activities; knowledge and use of relevant hand, power, and machine tools together with relevant corporate and legislative environmental and safety requirements; biological, electronic and mechanical aspects of biomedical equipment, choice of materials, strength, and durability; casting and moulding and machining; wiring, connecting, fastening, soldering, welding, brazing. Hands-on experience should be provided where possible, and this training may be provided in a specialized training school where appropriate and available.
 - 2.2 Biomedical Equipment or Clinical Services Specifications (8 weeks C)*
To teach the trainee how an equipment function, product or service is defined; what is required, for what purpose, by whom, in what time scale, where and how it is to be used and who is to use it or maintain it; literature / product / technology survey of what is presently available; feasibility study, cost, time scale; service life and maintainability considerations; market review, marketability, level of demand, duration, production scheduling.
 - 2.3 Biomedical Engineering Design (20 weeks C)*
To teach the trainee how an equipment function, product or service is defined in details: computer aided design; appreciation of clinical research results; drawing office practice, reading and preparation of schematic and working drawings, planning, scaling and layout; theoretical considerations; breadboarding and functioning testing; component specification; worst case analysis and thermal design; preparation of prototypes, tolerances, reliability, maintainability, ergonomics, safety, health and environmental considerations, standards and regulations.
 - 2.4 Production Engineering (8 weeks D)*
To teach the trainee how engineering designs and prototypes are used to prepare for full scale production; process methods and work specifications, choice of technologies; design of test equipment and product testing; fault analysis; manpower estimates; productivity and costing; automation and numerical control.

2.5 Safety Standards, Quality Control and Risk Management (8 weeks C)

In-depth appreciation of definition, requirements and applicability of various international safety standards commonly used, in-service applications and verification of compliances with the standards; product testing and quality control, burn in, environmental tests, acceptance standards, clinical operational test requirements, automated test, use of computers; risk management theories and applications in industrial and clinical environments; these trainings may be provided in a specialized training school where appropriate and available.

3. Biomedical Engineering Administration, Management and Supporting Functions (6.5 months in total)

3.1 Project Management (minimum 14 weeks C)*

To teach the trainee the benefits of teamwork and a logical approach to design and production; consultancy; materials, manpower, budgets, programmes, critical path, contingency, supervision of subordinates, progress monitoring; use of computers.

3.2 Material and Service Procurement (minimum 6 weeks C)

To teach the trainee how materials and services are procured and stored; material and component specifications and quality control, international specifications and standards; commercial terms; pre-qualification of suppliers; tender document preparation, tendering, tender security; tender evaluation, financing costs, deferred terms, credit guarantees, letters of credit, loans, loan scheduling and drawdown; delivery schedules and monitoring; shipping and material handling, stores procedures, material requirement planning, issue procedures; quality control, stock maintenance, shelf-life; use of computer systems.

3.3 Product Liability and Servicing (4 weeks D)

To teach the trainee about legal liability, local and foreign legislations, liability insurance; service support and maintenance arrangements, foreign dealer / supplier / manufacturer negotiation and control; availability of spares, product life; defect monitoring, documentation and feedback to product design and production engineering; safety case investigation and following up action, recalls.

3.4 Management & Commercial Activities (4 weeks D)

To teach the trainee other aspects of the employer's management and commercial activities not covered in other areas of training; employee recruitment, interviewing, review procedures, negotiations, progression scheme, staff motivation, performance reviews; timekeeping, holidays, labour legislation, personnel relations; insurance (product, machinery, buildings, consequential loss); banking, financial and management accounting, treasury; marketing and market research; corporate planning; communications; computing.

4. Objective Training – Project on Engineering Design / Production Engineering / Consultancy / Quality Control (6 months in total C)
 - 4.1 To allow the trainee to put to use, under supervision, a wide range of the knowledge and experience gained in academic studies and in the course of the training programme. The trainee should be given responsibilities and commensurate authority and should render a useful and productive service.

N.B.

1. The minimum training period must not be less than 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 Membership Admission Requirements booklet.
4. During their training, each trainee is required maintain to a Graduate Training Log Book, CPD Logbook and Record of Objectives.