

**MCE01-3 Engineering Drawing**

工程繪圖

**Unit Aim**

To teach learners how to create professional-quality drawings and to introduce to learners the principles and techniques in engineering drawing.

**Unit Introduction**

In this unit, learners are guided to understand the techniques used in the production of graphical information and apply the drawing practice used in engineering and construction. Emphasis is given on the understanding of basic engineering production information.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Understand the theory of orthographic projection and practice
- LO-2 Use the constructive imagination and to visualize objects in space
- LO-3 Apply the general principles for the preparation of working drawings
- LO-4 Produce typical civil, structural, and building services engineering drawings

**Reference Readings**

- Simmons, C. (2012) Manual of Engineering Drawing, Butterworth-Heinemann.
- Madsen, D.A. and Madsen, D.P. (2012) Engineering Drawing and Design, 5<sup>th</sup> edition, Cengage Learning.
- Frederick, E. G., Alva, M. and Henry, C.S. (2016) Technical Drawing with Engineering Graphics, 15<sup>th</sup> edition, Peachpit Press.
- Standard Drawings, HKSAR Government.

**MCE02-3 Engineering Materials**

工程材料

**Unit Aim**

To provide basic knowledge in engineering materials and the techniques used to produce such materials.

**Unit Introduction**

In this unit, learners are guided to understand the principal properties, behavior, merits and drawbacks of common materials in engineering and construction. Emphasis is given on the understanding of the techniques used to prevent the materials' deterioration. This unit also introduces the common testing methods for construction materials.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Understand the properties and behavior of common materials in construction
- LO-2 Evaluate the performance of common materials in construction
- LO-3 Apply the techniques used to prevent the materials' deterioration
- LO-4 Develop the ability to test and select materials for construction

**Reference Readings**

- Marotta, T.W. (2010) Basic Construction Materials, 8<sup>th</sup> edition, Prentice Hall.
- Gambhir, M.L. (2014) Building and Construction Materials, McGraw Hill.
- Spence, W.P. and Kultermann, E. (2011) Construction Materials, Methods and Techniques, 3<sup>rd</sup> edition, Cengage Learning.
- Construction Standards, HKSAR Government.

**MCE03-3 Structural Mechanics**

結構力學

**Unit Aim**

To introduce the general principles of structural analysis in statically determinate structures and to develop learners' skills to carry out structural design.

**Unit Introduction**

In this unit, learners are guided to understand and apply the fundamental principles of mechanics of structures including statically determinate structures. This unit intends to develop learners' ability to apply theories and principles to solve basic engineering problems.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

LO-1 Understand the behavior of statically determinate structures

LO-2 Analyze common structural form

LO-3 Calculate forces and moments acting on a structural member by an external force system

LO-4 Determine deflection for statically determinate beams

**Reference Readings**

- Hibbeler, R.C. (2016) Mechanics of Materials, 10<sup>th</sup> edition, Pearson.
- Gere, J.M. and Goodno, B.J. (2012) Mechanics of Materials Brief, SI edition, Cengage Learning.
- Kassimali A. (2014) Structural Analysis, 5<sup>th</sup> edition, CL Engineering.

**MCE04-3 Structural Design**

結構設計

**Unit Aim**

To introduce the philosophy of limit state design and to develop learner's skills to carry out structural design of reinforced concrete and steel structures.

**Unit Introduction**

In this unit, learners are guided to understand and apply the philosophy of limit state design. This unit intends to introduce the theories and behavior of reinforced concrete and steel structures and how to carry out structural design accordingly.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Understand the philosophy of limit state design
- LO-2 Acquire the knowledge on reinforced concrete and steel that serves as a common structural material
- LO-3 Carry out structural design for various reinforced concrete elements
- LO-4 Carry out structural design for various steel elements

**Reference Readings**

- Bill Mosley, John Bungey & Ray Hulse (2012). Reinforced Concrete Design, 7<sup>th</sup> edition, Macmillan Publishers Limited.
- Lam, D., Ang, T.C. and Chiew, S.P. (2013) Structural Steelwork: Design to Limit State Theory, 4<sup>th</sup> edition, CRC Press.
- B.D. (2011). Code of Practice for Structural Use of Steel, Buildings Department, Government of HKSAR.
- B.D. (2013). Code of Practice for Structural Use of Concrete, Buildings Department, Government of HKSAR.

**MCE05-3 Environmental Engineering and Management**

環境工程及管理

**Unit Aim**

To provide the knowledge in the interdisciplinary study of environmental problems, as well as their causes and why they are of concern. This unit also introduces the principles of environmental system and mechanism of control system.

**Unit Introduction**

In this unit, learners are guided to understand and analyze the environmental protection issues, as well as the important issues in Hong Kong and their causes and effects. This unit gives an overview on legislation and regulations relating environmental protection, assessment and planning.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Identify the environmental protection issues
- LO-2 Apply the basic principles of environmental engineering to construction projects
- LO-3 Understand the environmental legislation and regulations
- LO-4 Perform environmental assessment and planning

**Reference Readings**

- Blewitt, J. (2014) Understanding Sustainable Development, 2<sup>nd</sup> edition, Routledge.
- Kibert, C.J. (2016) Sustainable Construction: Green Building Design and Delivery, 4<sup>th</sup> edition, Wiley.
- Vesilind, P.A., Morgan, S.M. and Heine, L.G. (2010) Introduction to Environmental Engineering, 3<sup>rd</sup> edition, Cengage Learning.
- Environmental Protection Department, HKSAR Government.

**MCE06-3 Sustainable Construction**

可持續發展建築

**Unit Aim**

To provide knowledge in the urban influence on the environment and climate and the importance of using sustainable construction. This unit introduces the study of environmental issues and problems.

**Unit Introduction**

In this unit, learners are guided to understand causes and consequences of the pollution generated from construction and the built environment. Techniques in design, project management and sustainable construction are introduced to stimulate learners to have a basic awareness of the energy options, green building and sustainable development and construction.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Identify the causes and consequences of the problems generated from the built environment
- LO-2 Propose mitigation measures to the major environmental issues
- LO-3 Understand worldwide trend in sustainable development
- LO-4 Apply the green materials and sustainable construction techniques and technologies

**Reference Readings**

- Technical Circular (TCW No.19/2005), Development Bureau, HKSAR Government.
- Blewitt, J. (2014) Understanding Sustainable Development, 2<sup>nd</sup> edition, Routledge.
- Kibert, C.J. (2016) Sustainable Construction: Green Building Design and Delivery, 4<sup>th</sup> edition, Wiley.
- Vesilind, P.A., Morgan, S.M. and Heine, L.G. (2010) Introduction to Environmental Engineering, 3<sup>rd</sup> edition, Cengage Learning.

**MCE07-3                      Engineering Mathematics I**

工程數學 I

**Unit Aim**

To introduce the basic theories and some applications of engineering mathematics and to develop learners' ability in applying mathematical knowledge to solve engineering and practical construction problems.

**Unit Introduction**

In this unit, learners are guided to understand and apply mathematics theories to basic engineering and practical construction problems. Worked examples will be used to explain the mathematical methods and theories for the fundamentals of more advanced studies and this develops learners' ability for logical thinking.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1     Acquire fundamental knowledge in engineering mathematics
- LO-2     Use graphical and numerical methods to solve engineering and practical construction problems
- LO-3     Use algebra to solve engineering and practical construction problems
- LO-4     Use trigonometry and geometry to solve engineering and practical construction problems

**Reference Readings**

- Kreyszig, E. (2011). Advanced Engineering Mathematics, 10<sup>th</sup> edition, John Wiley & Sons.
- Bird, J. (2014) Basic Engineering Mathematics, Routledge.
- Walpole, R.E., Myers, S.L. and Ye, K.E. (2011) Probability and Statistics for Engineers and Scientists, 9<sup>th</sup> edition, Prentice Hall.
- Young, H.D. and Freedman, R.A. (2016) University Physics with Modern Physics, 14<sup>th</sup> edition, Pearson.

**MCE08-3                  Engineering Mathematics II**

工程數學 II

**Unit Aim**

To introduce the basic theories and some applications of engineering mathematics and to develop learners' ability in applying mathematical knowledge to more advanced topics in solving engineering and practical construction problems.

**Unit Introduction**

In this unit, learners are guided to understand and apply mathematics theories to basic engineering and practical construction problems. Worked examples will be used to explain the mathematical methods and theories for the fundamentals of more advanced studies and this develops learners' ability for logical thinking.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1     Apply arithmetical techniques to solve engineering and practical construction problems
- LO-2     Use calculus to solve engineering and practical construction problems
- LO-3     Use statistics to solve engineering and practical construction problems
- LO-4     Apply the mathematical skills to solve more complex engineering problems

**Reference Readings**

- Kreyszig, E. (2011). Advanced Engineering Mathematics, 10<sup>th</sup> edition, John Wiley & Sons.
- Bird, J. (2014) Basic Engineering Mathematics, Routledge.
- Walpole, R.E., Myers, S.L. and Ye, K.E. (2011) Probability and Statistics for Engineers and Scientists, 9<sup>th</sup> edition, Prentice Hall.
- Young, H.D. and Freedman, R.A. (2016) University Physics with Modern Physics, 14<sup>th</sup> edition, Pearson.



**MCE09-3 Construction Safety & Health I**

建築安全及健康 I

**Unit Aim**

To introduce the major occupational safety and health legislation and regulations and their applications in building and construction industry.

**Unit Introduction**

In this unit, learners are guided to understand the health and safety legislation and associated regulations. The roles and duties in different positions in complying with their related legal obligations will be discussed. Basic knowledge and principles on occupational health and safety management are also introduced.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Understand the health and safety legislation and regulations and identify safety related offences in their workplaces.
- LO-2 Know the responsibilities of employers and employees under current health, safety and welfare legislation
- LO-3 Apply the knowledge on occupational health to construction and the built environment
- LO-4 Apply the principles of safety management to construction and the built environment

**Reference Readings**

- Construction Site Safety Handbook, 2000 edition, Development Bureau, HKSAR Government.
- Construction Site Safety Manual, 2008 edition, Development Bureau, HKSAR Government.
- Holt, A.S.J. and Allen, J. (2009) Principles of Health and Safety at Work: 8<sup>th</sup> edition, The Institution of Occupational Safety and Health.
- Dhillon, B.S. (2003) Engineering Safety: Fundamentals, Techniques, Applications, World Scientific.
- Alan, G. and Tim, H. (2001) Construction Health and Safety Management, Longman.

**MCE10-3 Construction Safety and Health II**

建築安全及健康 II

**Unit Aim**

To provide an overview of construction safety and occupational health in relation to construction practice and environmental issues for prevention of loss and accidents.

**Unit Introduction**

In this unit, learners are guided to understand hazard identification and risk assessment and focus will be put on its techniques and procedures. The accident and incidents investigation are also outlined and reporting procedures are introduced to gain knowledge in legal context.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Identify the occupational hazards in their workplaces and make recommendations to eliminate the hazards
- LO-2 Undertake risk assessment and identify control measures
- LO-3 Understand accident and incidents investigation and reporting procedures
- LO-4 Carry out the duties of safety supervisor under current legislation

**Reference Readings**

- Construction Site Safety Handbook, 2000 edition, Development Bureau, HKSAR Government.
- Construction Site Safety Manual, 2008 edition, Development Bureau, HKSAR Government.
- Holt, A.S.J. and Allen, J. (2009) Principles of Health and Safety at Work: 8<sup>th</sup> edition, The Institution of Occupational Safety and Health.
- Dhillon, B.S. (2003) Engineering Safety: Fundamentals, Techniques, Applications, World Scientific.

**MCE11-3 Civil Engineering Surveying**

土木工程測量

**Unit Aim**

To enable learners to develop skills in linear surveys, levelling surveys, traverse surveys and setting out processes.

**Unit Introduction**

In this unit, learners are guided to understand basic surveying techniques, be able to carry out simple surveying tasks and present the data, and understand the roles of surveying and setting out in the construction process.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Understand the fundamental principles in civil engineering survey
- LO-2 Perform linear survey, levelling survey and traverse survey to produce results from calculations
- LO-3 Perform linear survey, levelling survey and traverse survey to produce drawings
- LO-4 Perform the setting out processes.

**Reference Readings**

- Bannister, A., Raymond, S. and Baker, R. (1998) Surveying, 7<sup>th</sup> edition Prentice Hall.
- Kavanagh, B. (2013) Surveying: Principles and Applications, 9<sup>th</sup> edition, Pearson.
- Holley, P.W. (2005) Surveying and Layout Fundamentals for Construction, John Wiley & Sons, Inc.

**MCE12-3 Civil Engineering Construction**

土木工程建築

**Unit Aim**

To provide the knowledge in different types of construction methods and contemporary technologies in civil engineering construction. This unit provides knowledge and practical professional skills required to work in civil engineering projects.

**Unit Introduction**

In this unit, learners are guided to understand the construction processes of civil engineering infrastructures. Emphasis is given on the understanding of the construction methods, technologies and techniques of different infrastructure elements, as well as the use of materials, plant and equipment. Constrains in construction will be discussed to develop learners' abilities in problem solving.

**Learning Outcomes**

After successful completion of this unit, the learners should be able to:

- LO-1 Illustrate the construction methods of various types of civil engineering infrastructures and elements
- LO-2 Apply advanced and innovative techniques and technologies to construction of infrastructure
- LO-3 Select and specify proper materials, plant and equipment for civil engineering construction projects
- LO-4 Discuss the constrains in civil engineering infrastructures construction

**Reference Readings**

- Nunnally, S.W. (2011) Construction Methods and Management, 8<sup>th</sup> edition, Prentice Hall, Pearson Education.
- Blankenbaker, E.K. (2013) Construction and Building Technology, Goodheart-Willcox Publisher.
- Spence, W.P. (2017) Construction Materials, Methods and Techniques, 4<sup>th</sup> edition, Cengage Learning.
- Standards and Drawing, HKSAR Government