

# CA4623: MAINTENANCE TECHNOLOGY AND MANAGEMENT

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## Effective Term

Semester B 2024/25

## Part I Course Overview

### Course Title

Maintenance Technology and Management

### Subject Code

CA - Civil and Architectural Engineering

### Course Number

4623

### Academic Unit

Architecture and Civil Engineering (CA)

### College/School

College of Engineering (EG)

### Course Duration

One Semester

### Credit Units

3

### Level

B1, B2, B3, B4 - Bachelor's Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

BC4623/BC4623F/BC4623P Maintenance Technology and Management

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The Course aims to equip students with the knowledge and ability to appraise existing buildings and develop suitable schemes of maintenance, repair, refurbishment or rehabilitation as necessary; the knowledge of building defects' diagnosis and repair methodology; management of building maintenance projects; and statutory requirements for building repair and maintenance.

### Course Intended Learning Outcomes (CILOs)

| CILOs |                                                                                                                                                                                                                             | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------|--------|--------|
| 1     | Analyze the principles of building design to anticipate and prevent building component failure;                                                                                                                             | 25                  |        | x      |        |
| 2     | Justify and determine the condition of the structure, fabric and component materials and prepare maintenance plans for different building types and client needs including the management of building maintenance projects; | 25                  |        | x      |        |
| 3     | Identify the building defects diagnosis techniques and recommend different repair approaches;                                                                                                                               | 25                  |        |        | x      |
| 4     | Explain the statutory requirements relating to building repair and maintenance.                                                                                                                                             | 25                  | x      |        |        |

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

| LTAs |          | Brief Description                                                                                                                                                  | CILO No.   | Hours/week (if applicable) |
|------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| 1    | Lecture  | Student will engage to gain the key principles, theories and tools for maintenance technology and management                                                       | 1, 2, 3, 4 | 2 hours/week               |
| 2    | Tutorial | Students will engage in tutorial to discuss the concepts and solve the problems in construction management individually or in a group basis in the tutorial class. | 1, 2, 3, 4 | 1 hour/week                |

|   |         |                                                                                                                                                                                                                                             |         |  |
|---|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|
| 3 | Project | Students will engage to take on the role of a project manager for planning a series of tasks under a given scenario; and to create feasible time and resource management plans by application of suitable tools with reasonable assumptions | 1, 2, 3 |  |
|---|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|

**Assessment Tasks / Activities (ATs)**

| ATs | CILO No.      | Weighting (%) | Remarks (e.g. Parameter for GenAI use) |
|-----|---------------|---------------|----------------------------------------|
| 1   | Mid-term Test | 1, 2, 3, 4    | 20                                     |
| 2   | Project       | 1, 2, 3       | 30                                     |

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

3

**Additional Information for ATs**

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

**Assessment Rubrics (AR)****Assessment Task**

Mid-term Test

**Criterion**

1.1 CAPACITY to DISCUSS key principles, theories and tools for maintenance technology

1.2 ABILITY to USE the scientific techniques in solving the maintenance related problems

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

### **Assessment Task**

Project

### **Criterion**

2.1 ABILITY to APPLY suitable techniques to repair defect in existing structures

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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### **Assessment Task**

Examination

### **Criterion**

3.1 CAPACITY to RELATE and EXPLAIN the management theories and principles to maintenance technology, and DISCUSS the roles, functions and responsibilities of different parties in a building maintenance project

3.2 ABILITY to USE the scientific techniques in solving the maintenance and repair problems

**Excellent (A+, A, A-)**

High

**Good (B+, B, B-)**

Significant

**Fair (C+, C, C-)**

Moderate

**Marginal (D)**

Basic

**Failure (F)**

Not even reaching marginal levels

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## **Part III Other Information**

### **Keyword Syllabus**

- Maintenance technology; diagnosis of defects in materials, components, assemblies and elements; destructive & non-destructive testing; recognition of causes and selection of appropriate remedial methods.

- Maintenance inspection/ survey. Historical buildings repair/maintenance matters. Environmental issues in building maintenance.
- Maintenance management: Statutory requirements relating to building repair and maintenance; maintenance project management.

## Reading List

### Compulsory Readings

| Title |     |
|-------|-----|
| 1     | Nil |

### Additional Readings

| Title |                                                                                                                                                                                            |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | CIOB. (1990) 'Maintenance management : a guide to good practice', 3rd ed. CIOB. (TH3351 .C42)                                                                                              |
| 2     | Douglas J & Noy E.A. (2011) 'Building surveys and reports', 4th ed. Wiley-Blackwell. (TH439 .N68)                                                                                          |
| 3     | Douglas, J. & Ransom, B. (2007) 'Understanding Building Failures', 3rd ed. Taylor & Francis. (TH441 .D68)                                                                                  |
| 4     | Duncan, M. (2003) 'Understanding Housing Defects', 2nd ed. EG Books. (TH441 .M37)                                                                                                          |
| 5     | Emmons, P.H. (1993) 'Concrete Repair and Maintenance Illustrated', R.S. Means Co., Inc. (TA681 .E45)                                                                                       |
| 6     | Harris, S.Y. (2001) 'Building Pathology: Deterioration, Diagnostics, and Intervention', John Wiley & Sons, Inc. (TH441 .H295)                                                              |
| 7     | Ho, D.C.W., Lo, S.M. and Yiu, C.Y. (2005) 'A Study on the Causes of External Finishes Defects in Hong Kong', Structural Survey, 23(5), 386-402.                                            |
| 8     | Leung, A.Y.T. and Yiu, C.Y. (2004) 'Building Dilapidation and Rejuvenation in Hong Kong', Hong Kong: Joint Imprint of CityU Press and the Hong Kong Institute of Surveyors. (TH3351 .B835) |
| 9     | Riley, M. (2005) 'The technology of refurbishment and maintenance', Palgrave Macmillan. (TH4511 .R55)                                                                                      |
| 10    | Watt, D.S. (2007) 'Building Pathology: Principles and Practice', 2nd ed. Blackwell Science. (TH441 .W38)                                                                                   |
| 11    | Wordsworth, P. (2001) 'Lee's Building Maintenance Management', 4th ed. Blackwell Science. (TH3351 .L44)                                                                                    |
| 12    | Wood, B. (2009) 'Building Maintenance', Wiley-Blackwell. (TH3351 .W663)                                                                                                                    |
| 13    | Yiu, C.Y., Ho, C.W. and Lo, S.M. (2007) 'Weathering Effects on External Wall Tiling Systems', Construction and Building Materials, 21: 594-600.                                            |
| 14    | <a href="http://www.hkcra.com.hk">http://www.hkcra.com.hk</a>                                                                                                                              |
| 15    | <a href="http://www.bd.gov.hk">http://www.bd.gov.hk</a>                                                                                                                                    |
| 16    | <a href="http://www.hklii.hk">http://www.hklii.hk</a>                                                                                                                                      |