

# CA3707: MODELLING FOR SMART DIGITAL INFRASTRUCTURE SYSTEM

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## Effective Term

Semester A 2022/23

## Part I Course Overview

### Course Title

Modelling for Smart Digital Infrastructure System

### Subject Code

CA - Civil and Architectural Engineering

### Course Number

3707

### 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

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

This course aims to first introduce students with concepts of classical four-step modelling, which contains trip generation, trip distribution, mode choice and traffic assignment. Fundamental knowledge about the O-D (origin-destination) pair, road network, TAZ (traffic analysis zone) will be mentioned. Students will also learn microscopic transportation modelling approaches. To do so, this course will contain the following contents: the concept of traffic flow modelling and how to simulate and visualize traffic flows. In addition, this course will address how to carry out transportation infrastructure modelling. To this end, students will learn the fundamental concepts required for transportation infrastructure modelling and Building Information Modeling (BIM) as well as how to apply BIM to transportation infrastructure development projects.

### Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Realize the relevant examples (Hong Kong, world-wide) of transportation modelling;	20	x		
2	Understand the fundamental concepts of O-D pair, road network, as well as four-step modelling;	20	x		
3	Understand the recent development in transportation modelling, such as: activity-base model, cloud application, cell phone data application;	20	x		
4	Develop skills in data analysis, model development, and result visualization;	20		x	
5	Develop ability to interpret the model result and explain its implication in transportation planning and policy.	20		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.

### Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Introduce key issues, sources, applications, and techniques related to transportation modelling	1, 2, 3, 4, 5	2 hours/week

2	Tutorial	Handle actual datasets and learn how to use software and analytical techniques in practical ways	3, 4, 5	1 hour/week
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**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	In-class quiz	1, 2, 3	20
2	Term project	1, 2, 3, 4, 5	20
3	Assignments	1, 2, 3, 4, 5	10

**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**

In-class quiz

**Criterion**

Comprehensive and unconventional understandings of basic concepts of transportation modelling

**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**

Term project

**Criterion**

Ability to develop transportation model and interpret the modelling results with visualization.

**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**

Assignments

**Criterion**

Ability to create multiple transportation infrastructure models based on BIM.

**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**

Ability to understand the fundamental concept of demand modelling, and to use the concept for simple calculation.

**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

## Part III Other Information

**Keyword Syllabus**

Classical Four-step Modelling; Traffic Flow Modelling; Transportation Infrastructure Modelling, Building Information Modelling (BIM) for Transportation Systems; Visualization

**Reading List****Compulsory Readings**

Title	
1	Nil

**Additional Readings**

Title	
1	User Manual of Cube® (Citilabs)
2	Ben-Akiva, Moshe and Lerman, Steven R. (1985) Discrete Choice Analysis: Theory and Application to Travel Demand, MIT Press.
3	ITE Trip Generation Manual