

## Annexe A: New/Revised Course Content in OBTL+ Format

### Course Overview

The sections shown on this interface are based on the templates [UG OBTL+](#) or [PG OBTL+](#)

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to [Data Transformation Status](#) for more information.

Expected Implementation in Academic Year	
Semester/Trimester/Others (specify approx. Start/End date)	
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Transportation Engineering
Course Code	CV3014
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

## Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

## Course Aims

This course is open to Year 3 students. By the end of the course, you shall be equipped with essential knowledge of land transportation planning, traffic engineering and highway engineering. This knowledge is applied in planning, design and construction of land transport infrastructure.

## Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	identify the variety and complexity of land transportation as a system and as an engineering discipline;
ILO 2	apply the four-step process in transportation planning;
ILO 3	define the traffic flow parameters by various methods of measurement;
ILO 4	apply the principles of traffic flow theory to calculate performance measures;
ILO 5	apply the key principles of geometric design for vertical and horizontal alignments of highways;
ILO 6	determine earthwork quantities for highway construction;
ILO 7	describe the functions of road pavement as a civil engineering structure; and
ILO 8	apply pavement design concepts to design a road pavement.

## Course Content

S/N	Topic	Lecture	Tutorial
1	Land transportation systems	2	1
2	Transportation planning	6	3
3	Traffic flow theory and studies	4	2
4	Geometric design of highways	5	2.5
5	Earthworks	3	1.5
6	Structural design of highways	6	3
	Check for Hours	26	13

## Reading and References (if applicable)

Text

Banks, J.H., "Introduction to Transportation Engineering", 2nd ed., McGraw-Hill, 2002.

Supplementary reading materials are provided by instructors.

## Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Module 1: Land Transportation Systems: Introduction. Introduction to transportation planning process and transportation systems. Data and surveys for planning studies.	1, 2			Lecture & Tutorial
2	Module 2: Transportation Planning: Travel demand modelling.	2			Lecture & Tutorial
3	Module 2: Transportation Planning: Trip generation, trip distribution, modal split. Network analysis. Trip assignment.	2			Lecture & Tutorial
4	Module 2: Transportation Planning: Trip generation, trip distribution, modal split. Network analysis. Trip assignment.	2			Lecture & Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
5	Module 3: Traffic Flow Theory and Studies: Traffic flow characteristics: flow, speed, density. Volume, speed and travel time surveys.	3			Lecture & Tutorial
6	Module 3: Traffic Flow Theory and Studies: Relationships among flow, speed and density.	4			Lecture & Tutorial
7	Module 4: Geometric Design of Highways: The design process and standards. Design speed and sight distances. Design documentation. Vertical alignment	4, 5			Lecture & Tutorial
8	Horizontal alignment. Super-elevation. Intersections and Interchanges.	5			Lecture & Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
9	Module 4: Geometric Design of Highways: Horizontal alignment. Super-elevation. Intersections and Interchanges.	5			Lecture & Tutorial
10	Module 5: Earthworks: Earthwork. Mass diagrams.	6			
11	Module 6: Structural Design of Highways: Components of flexible and rigid pavements. Design factors.	7			Lecture & Tutorial
12	Module 6: Structural Design of Highways: Components of flexible and rigid pavements. Design factors. Structural design of flexible pavement.	7, 8			Lecture & Tutorial

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
13	Module 6: Structural Design of Highways: Stresses in rigid pavement. Joints and reinforcement. Structural design of rigid pavement.	7, 8			Lecture & Tutorial

## Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Lecture sessions are conducted to a large group in lecture theatre, and all lectures are recorded. Instructors take questions at end of lectures. Instructors may provide on-the-spot clarifications, and during review of taught materials in class. Individual students can confer with instructors via emails or appointed face-to-face consultations. All these enhance the achievement of targeted learning outcomes.
Tutorials	Students are given problems related to prevailing lectures, and are to solve them in advance before the weekly face-to-face tutorial sessions conducted in small groups, in smart tutorial rooms. Students pose queries to tutor who share solution pointers in an interactive manner. Tutors also translate applied problems to the wider context of industry developments. Such practices serve to enhance the students' learning experience.
Team projects	Students work on team projects over the span of a semester. Each team project entails a problem related to course aims. Each team comprises 5-6 students who shall co-operatively participate to scope the problem, collect and analyse the data, write a short report and make a presentation. Project teams are supervised by the tutor in his/her tutorial group, which allows weekly project consultation. Solving a real problem in a team setting strengthens the learning outcomes.



# Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Final exam(Final exam)	All (in above ILO section)	CVE SLO (2018): a, b, c	60	Individual	Holistic	Relational
2	Continuous Assessment (CA): Test/Quiz(Continuous Assessment: Quiz)	1,2,3,4, 5 (in ILO section)	CVE SLO (2018) : a, b	25	Individual	Analytic	Relational
3	Continuous Assessment (CA): Project(Continuous Assessment: Team-based project)	1, 2, 3, 4, 5 (in ILO section)	CVE SLO (2018): a, b, c, d, i, j	15	Team	Analytic	Multistructural

Description of Assessment Components (if applicable)

\*CVE SLO (2018)

a) Engineering Knowledge: Apply the knowledge of mathematics, natural science, engineering fundamentals, and civil engineering specialisation to the solution of complex civil engineering problems.

b) Problem Analysis: Identify, formulate, research literature, and analyse complex civil engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

c) Design/development of Solutions: Design solutions for complex civil engineering problems and design system components or processes with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

d) Investigation: Conduct investigations of complex problems using research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

e) Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex civil engineering activities with an understanding of the limitations.

f) The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g) Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and the need for the sustainable development.

h) Ethics: Apply ethical principles and commit to professional and moral responsibilities in the civil engineering practice.

i) Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

j) Communication: Communicate effectively on complex civil engineering activities with the engineering community and with society at large, be able to comprehend and write effective reports and design documentation, and make effective presentations.

k) Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to work, as a member and leader in a multidisciplinary team.

l) Life-long Learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological evolution.<http://www.ntu.edu.sg/tlpd/tlr/obtl/4/Pages/41.aspx>

#### Formative Feedback

Instructors take questions at end of lectures, and provide on-the-spot clarifications or at review in next lecture. Students also confer with instructors at tutorials, at appointed consultations or via email.

Students are assessed on one 45-minute Quiz consisting of MCQ and True/False questions; feedbacks are given for the quiz in terms of summary quiz scores and instructors go through (in the lecture) common mistakes made by students.

Students are assessed by a team project; feedbacks on projects are given as and when required, and particularly at project presentation.

## NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Care for Environment	Basic
Collaboration	Basic
Decision Making	Basic
Problem Solving	Basic
Critical Thinking	Basic

# Course Policy

## Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

## Policy (General)

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct. The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of mental health and wellbeing. These policies and codes concerning students can be found in the following link.  
<http://www.ntu.edu.sg/SAO/Pages/Policies-concerning-students.aspx>

## Policy (Absenteeism)

## Policy (Others, if applicable)

Last Updated Date: 02-07-2024 08:46:38

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