

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

Course Overview

Expected Implementation in Academic Year (New format)	AY2020-2021
Semester/Trimester/Others (specify approx. Start/End date)	Semester 2
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
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Course Title	Highway Engineering
Course Code	CV4113
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

Course Requisites (if applicable)

Pre-requisites	CV3014 Transportation Engineering
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

This course aims to:

Provide you with the knowledge on the analysis and design and management of flexible and rigid pavements;
Equip you with the knowledge to apply various types of highway appurtenances to enhance the operations and safety of road users;
Provide you with the knowledge of the impacts of traffic on transportation such as traffic noise and vehicular tail-pipe emissions, and their control measures.

Course's Intended Learning Outcomes (ILOs)

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

ILO 1	Analyse and design of flexible and rigid pavements;
ILO 2	Propose a Pavement Management System framework;
ILO 3	Design highway appurtenances and highway drainage facilities;
ILO 4	Design measures to attenuate traffic noise and apply controls of vehicular emissions.

Course Content

S/N	Topic
1	Design Factors
2	Classification Systems and Properties of Pavement Layers
3	Flexible Pavement Analysis and Design
4	Rigid Pavement Analysis and Design
5	Pavement Management Systems
6	Environmental Aspects of Transportation
7	Elements of Highway Design
8	Highway Drainage

Reading and References (if applicable)

1. Yoder, E.J. and Witczak, M.W., Principles of Pavement Design. 2nd edition, John Wiley, New York, 1975.
2. Croney, D., Design and Performance of Road Pavements. HMSO, London, 1977.
3. Haas, R. and Hudson, W.R., Pavement Management Systems. McGraw-Hill, New York, 1978.
4. Shell Pavement Design Manual (including the Addendum, 1985). Shell International Petroleum Co Ltd, London, 1978.
5. Calculation of Road Traffic Noise. Department of Transport. Welsh Office, HMSO, London, 1988.
6. O'Flaherty, C.A (ed) Transport Planning and Traffic Engineering. Arnold, London, 1997.
7. Wright, P.H. and Dixon, K.K., Highway Engineering. 7th edition, John Wiley & Sons, New York, 2004.
8. Linsley, R.K., Franzini, J.B., Freyberg D.L. and Tchobanoglous, G., Water Resources Engineering. 4th edition, McGraw-Hill Inc., New York, 1992.

Planned Schedule

Week or Session	Topics or Themes	ILO	Delivery Mode	Activities	Readings
1	Design Factors / Classification Systems	1		Lectures & Tutorial	
2	Pavement Layer Properties	1		Lectures & Tutorial	
3	Flexible Pavement Analysis and Design	1		Lectures & Tutorial	
4	Flexible Pavement Analysis and Design	1		Lectures & Tutorial	
5	Flexible Pavement Analysis and Design, Rigid Pavement Analysis and Design	1		Lectures & Tutorial	
6	Rigid Pavement Analysis and Design	1		Lectures & Tutorial	
7	Pavement Management Systems	2		Lectures & Tutorial	
8	Environmental Aspects of Transportation	3		Lectures & Tutorial	
9	Environmental Aspects of Transportation, Elements of Highway Design	3		Lectures & Tutorial	
10	Elements of Highway Design	3		Lectures & Tutorial	
11	Highway Drainage	4		Lectures & Tutorial	
12	Highway Drainage	4		Lectures & Tutorial	
13	Highway Drainage	4		Lectures & Tutorial	

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Weekly lectures to provide you with the specific knowledge and techniques to achieve the learning outcome stated above.
Tutorials	Weekly tutorials to enable you to apply the knowledge to solve structured problems. We encourage you to explore alternative approaches and techniques.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Description of Assessment Component	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Others([final examination])	All	EAB SLOs (a), (b), (c)	60		Individual	Holistic	Relational
2	Continuous Assessment (CA): Others([quiz/test])	1, 2	EAB SLOs (a), (b), (c)	20		Individual	Analytic	Multistructural
3	Continuous Assessment (CA): Others([quiz/test])	3, 4	EAB SLOs (a), (b), (c)	20		Individual	Analytic	Multistructural

Description of Assessment Components (if applicable)

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Formative Feedback

Feedback will be through the dissemination of your performance in quizzes as well as review of the quiz questions in class.

We encourage you to initiate an Individual consultation sessions on your particular learning needs.

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
Creative Thinking	Basic
Decision Making	Basic
Problem Solving	Intermediate

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)

Policy (Absenteeism)

Policy (Others, if applicable)

The standing university policy governing student responsibilities shall apply.
No special policy for this course.

This course will adopt NTU's policy on the use of AI for take-home assignments and reports, and project reports and presentation slides. More details could be found via the link
[https://entuedu.sharepoint.com/sites/Student/dept/ctlp/SitePages/Exploring-the-Impact-of-Generative-Artificial-Intelligence-\(GAI\)-Tools-on-Education.aspx#1-proper-citations-and-acknowledgements](https://entuedu.sharepoint.com/sites/Student/dept/ctlp/SitePages/Exploring-the-Impact-of-Generative-Artificial-Intelligence-(GAI)-Tools-on-Education.aspx#1-proper-citations-and-acknowledgements)

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