

## Subject Description Form

<b>Subject Code</b>	CSE40407
<b>Subject Title</b>	Design of Transport Infrastructure
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Pre-requisites: CSE304/ CSE312/ CSE30312 and CSE30390/ CSE38300/ CSE39300/ CSE30284/ CSE39284 Exclusion: CSE407
<b>Objectives</b>	<ol style="list-style-type: none"><li>1. To enable students to acquire basic knowledge of design principles for transport infrastructure development;</li><li>2. To enable students to design major transport infrastructures including road drainage, road pavement, road junction, railways and airport runway;</li><li>3. To enable students to assess engineering judgment on alternative transport infrastructure designs.</li></ol>
<b>Intended Learning Outcomes</b>	Upon completion of the subject, students will be able to: <ol style="list-style-type: none"><li>a. Have the basic knowledge of the design principles of transport infrastructure including roads, railways and airport runways as well as the skills to plan and design transport elements such as road, railway and airport layout and structures;</li><li>b. Be familiar with the common design computer packages as well as manual calculations for road drainage, junction and pavement designs as well as railway station and airport layout designs and be able to exercise professional judgments on design parameters;</li><li>c. Able to carry out and evaluate proper material tests for road pavements as well as tests on railway civil element requirements;</li><li>d. Able to formulate and design cost-effective transport infrastructure;</li><li>e. Able to write formal laboratory test reports and project report as well as analyze and present data in a logical way;</li><li>f. Able to work in groups and share responsibility in the required group works;</li><li>g. Able to understand the current transport infrastructure development issues and contribute to discussion on these contemporary issues.</li></ol>

<b>Subject Synopsis/ Indicative Syllabus</b>	<ol style="list-style-type: none"> <li>1. <u>Introduction</u> (0.5 week) Basic consideration of transport infrastructure developments. Current development programmes. Design concept.</li> <li>2. <u>Highway Drainage</u> (1.5 weeks) General considerations. Types of drainage structure. Design and construction of surface drainage and sub-soil drainage. Effects on pavement support. Filter layer design.</li> <li>3. <u>Pavements</u> (2.5 weeks) Design principles for flexible and rigid pavements. Loading on pavements. Theoretical and empirical design methods. Pavement evaluation and rehabilitation.</li> <li>4. <u>Junction Design</u> (3.5 weeks) Types of at-grade junction. Design of signal controlled junctions, priority junctions and rotary junctions. Co-ordination of traffic signal systems.</li> <li>5. <u>New Technology for Transport Infrastructure</u> (1 week) Introduction to intelligent transportation systems (ITS), Elements of ITS, Basic considerations of sensor deployment and system architecture.</li> <li>6. <u>Railway Design</u> (2 weeks) Railway development. Railway capacity. Railway alignment. Rail joints and ballast.</li> <li>7. <u>Airport Design</u> (2 weeks) Airport activity systems. Airport planning procedure. Runway orientation. Runway length and layout design.</li> <li>8. <u>Project and Laboratory</u> Laboratory work will include: skid-resistance; pavement conditions studies; junction studies; and railway studies. Field data collection exercises will be undertaken and case studies will augment this course.</li> </ol>																																											
<b>Teaching/Learning Methodology</b>	<p>Fundamental knowledge will be covered in lectures. Tutorials will provide opportunities for discussion of lecture materials; examples and problem-solving discussion session will supplement the lectures. Laboratory work will help students appreciate the basic principles and familiarize themselves with real-world problems.</p>																																											
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="7">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> <th>g</th> </tr> </thead> <tbody> <tr> <td>1. Project Assignment/ Quizzes</td> <td>20%</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Laboratory reports</td> <td>20%</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>3. Final Examination</td> <td>60%</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed							a	b	c	d	e	f	g	1. Project Assignment/ Quizzes	20%	✓	✓		✓	✓	✓	✓	2. Laboratory reports	20%		✓	✓		✓	✓		3. Final Examination	60%	✓	✓		✓			✓
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	Total	100%	
<p><b>Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.</b></p> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>The project assignment will involve assessment of transport infrastructure projects. Students will be asked to appreciate the critical issues (e.g. background, scope, features, benefits and delays) of the projects. Students will have to submit individual or group reports (no more than 5 students in a group) and present their arguments/ findings. The assessment will be based on the report and presentation. This element will achieve all the intended learning outcomes except c.</p> <p>There will be 4 laboratory sessions and students will be required to submit 2 individual reports and 2 group reports. This laboratory will enable students to acquire laboratory techniques and skill of laboratory report writing. Students will be asked to comment on the laboratory results. The assessment will be based on the laboratory reports and this element will achieve the intended learning outcomes b, c, e and f.</p> <p>The examination will help students consolidate knowledge learnt in lectures and tutorials and thus achieving intended learning outcomes a, b, d and g.</p>			
<b>Student Study Effort Expected</b>	Class contact:		Average hours per week
	<ul style="list-style-type: none"> <li>▪ Lectures/Tutorials/Laboratory</li> </ul>		3 Hrs.
	Other student study effort:		
	<ul style="list-style-type: none"> <li>▪ Reading and studying</li> </ul>		3 Hrs.
	<ul style="list-style-type: none"> <li>▪ Completion of project assignment/Lab reports</li> </ul>		3 Hrs.
	Total student study effort		9 Hrs.
<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. Roess R. P., Prassas E.S., and McShane W.R., Traffic Engineering, 4<sup>th</sup> Edition, Pearson, 2011.</li> <li>2. Mallick R.B. and Korchi T.E., Pavement Engineering: principles and practice, CRC Press, 2009.</li> <li>3. Ashford Norman., Airport Engineering: planning, design and development of 21st century airports, Wiley, 2011, 4th edition.</li> <li>4. Vuchic, Vukan., Urban Transit Systems and Technology, John Wiley, 2007.</li> <li>5. Wright, P., Highway Engineering-sixth edition, John Wiley &amp; Sons, 2004.</li> <li>6. Watson, J., Highway Construction &amp; Maintenance, Longman Scientific &amp; Technical, 1994.</li> <li>7. Transport Planning Design Manual, Transport Department, HKSARG.</li> <li>8. Guidance Note on Road Pavement Drainage Design, Highways Department,</li> </ol>		

RD/RN/035, 2010.

[http://www.hyd.gov.hk/eng/public/publications/road\\_notes/index.htm](http://www.hyd.gov.hk/eng/public/publications/road_notes/index.htm).

[https://www.td.gov.hk/en/publications\\_and\\_press\\_releases/publications/index.html](https://www.td.gov.hk/en/publications_and_press_releases/publications/index.html)

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[http://www.pland.gov.hk/pland\\_en/p\\_study/comp\\_s/hk2030/](http://www.pland.gov.hk/pland_en/p_study/comp_s/hk2030/)

<https://www.hongkongairport.com/eng/future/index.html>

July 2021