

<b>Subject Code</b>	CSE29357
<b>Subject Title</b>	Highway Engineering
<b>Credit Value</b>	3
<b>Level</b>	2
<b>Pre-requisite / Co-requisite/ Exclusion</b>	Exclusion: CSE20357 Highway Engineering
<b>Objectives</b>	This subject aims to enable students to acquire basic knowledge of highway engineering and design as well as pavement material properties. It also trains students with basic laboratory techniques in highway material studies and to participate in team work.
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>acquire basic concepts of highway structure, material properties, construction and design criteria; (1, IR)</li> <li>apply mathematical techniques and tools necessary in performing fundamental highway geometric design. (2, IA; 3; RA)</li> <li>attain basic techniques in conducting experiments in laboratory; (3, RA)</li> <li>communicate logically and lucidly in writing; (4, RA)</li> <li>work effectively in a team and take responsibility for an agreed area of a shared activity (5; IR)</li> <li>to recognize the need for, and to engage in life-long learning (8,A)</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<ol style="list-style-type: none"> <li><u>Introduction to Traffic Engineering</u> (0.5 weeks)</li> <li><u>Introduction to Highway Design</u> (1.5 weeks) Hierarchy of Roads, Design speeds, Cross Sectional Elements, Highway Design elements, Design Standard</li> <li><u>Elementary Geometric Design</u> (4 weeks) Sight distance, Horizontal alignment, Vertical alignment, Cross-sectional elements</li> <li><u>Highway Earthwork and Final Plan</u> (1 week) Cut and Fill volume, Highway Plans</li> <li><u>Road Structure</u> (3 weeks) Flexible and rigid pavement types. Functions of each layer and component of a flexible and rigid pavement. Comparison of flexible and rigid pavements.</li> <li><u>Highway Materials and Construction</u> (3 weeks) Basic properties of un-bound pavement materials. Bituminous mixtures; types, binder and aggregate properties. Design of Bituminous materials; Marshall test procedure. Construction of flexible and rigid pavements.</li> </ol>

<b>Teaching/Learning Methodology</b>	Fundamental knowledge will be covered in lectures. Tutorials will provide opportunities for discussion of lecture materials and will also be conducted in the form of example class and problem-solving session to supplement understanding from lectures. Laboratory work will help students appreciate the basic principles and familiarize themselves with basic instruments.																																																																					
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1" data-bbox="491 450 1390 808"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">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> </tr> </thead> <tbody> <tr> <td>1. Assignments</td> <td>11</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Group Project</td> <td>12</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>3. Lab Report</td> <td>12</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>4. Seminar Report</td> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>5. Final Examination</td> <td>60</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td colspan="6">100</td> </tr> </tbody> </table> <p data-bbox="491 808 1390 920"><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 data-bbox="491 954 1390 1025">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p data-bbox="491 1066 1390 1576">The students will be assessed with five components, i.e., written assignment, a group project, lab reports, seminar report and a final examination. The students will be required to attend laboratory sessions and submit group laboratory reports. Students' knowledge on the basic concepts in highway engineering, geometric design, and pavement materials (ILOs a, b) are assessed through the written assignment, group project, lab report and final exam. The lab session allows students to acquire basic technique in conducting basic material properties testing (ILO c) . Moreover, students can demonstrate their teamwork, ability to communicate effectively in written English (ILO d, e) through the lab reports and group project report. Students are required to attend 1 technical seminar to understanding the latest developments in the field of highway engineering (ILO f).</p>								Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed						a	b	c	d	e	f	1. Assignments	11	✓						2. Group Project	12	✓	✓		✓	✓		3. Lab Report	12	✓		✓	✓	✓		4. Seminar Report	5						✓	5. Final Examination	60	✓	✓					Total		100					
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<b>Student Study Effort Expected</b>	Class contact:				Average Number of Hours used per Week																																																																	
	▪ Lectures/Tutorials				2.5 Hrs.																																																																	
	▪ Laboratory Sessions				0.5 Hr.																																																																	
	Other student study effort:																																																																					
	▪ Reading and studying				4 Hrs.																																																																	
	▪ Completion of Assignments/Lab Reports				2 Hrs.																																																																	
	Total student study effort				9 Hrs.																																																																	

**Reading List and References**

Mannering, F., & Washburn, Scott S. (2013). *Principles of highway engineering and traffic analysis* (5th ed. / Fred L. Mannering, Scott S. Washburn. ed.). Hoboken, N.J: Wiley.

Garber, N., & Hoel, Lester A. (2015). *Traffic and highway engineering* (Fifth ed.). Stamford, Connecticut: Cengage Learning.

Roess, R., Prassas, Elena S, & McShane, William R. (2011). *Traffic engineering* (4th ed.). Upper Saddle River, N.J: Pearson.

Brockenbrough, R. (2009). *Highway engineering handbook : Building and rehabilitating the infrastructure* (3rd ed.). New York: McGraw-Hill.

Watson, J. (1994). *Highway construction and maintenance* (2nd ed.). Harlow, Essex, England: New York: Longman Scientific & Technical ; Wiley.

Huang, Y. (2004). *Pavement analysis and design* (2nd ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hong Kong. Transport Department (2011). *Transport Planning & Design Manual*.