

## Subject Description Form

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| <b>Subject Code</b>                                   | CSE562                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Subject Title</b>                                  | Traffic Engineering and Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Credit Value</b>                                   | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Level</b>                                          | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Pre-requisite/<br/>Co-requisite/<br/>Exclusion</b> | <u>Recommended background knowledge:</u><br>It is expected that students will have a fundamental understanding of mathematics, statistics, and physics consistent with undergraduate level study in science/ engineering.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Objectives</b>                                     | To provide knowledge of fundamental traffic flow characteristics and associated analytical methods in the planning, design, and control of transport systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Intended Learning Outcomes</b>                     | Upon completion of the subject, students will be able to: <ul style="list-style-type: none"><li>a. visualize the applications of theories and practical concepts on topics of the traffic engineering and control;</li><li>b. apply the theories and practical measures on solving the encountered traffic problems;</li><li>c. convey the ideas and proposed traffic control schemes to others with the support of logical concepts and survey data; and</li><li>d. work independently and collaborate with others with minimal supervision.</li></ul>                                                                                                                                                                                                                                                                                                                                          |
| <b>Subject Synopsis/<br/>Indicative Syllabus</b>      | <u><b>Keyword Syllabus</b></u> <ul style="list-style-type: none"><li>a. <u>Traffic Engineering Fundamentals</u><br/>Elements of traffic engineering; the road user, the vehicle, the road and geometric design; speed-flow-density relationship; traffic stream and capacity; level of service concept.</li><li>b. <u>Traffic Studies and Analysis</u><br/>Volume studies; speed studies; travel time and delay studies; capacity analysis; data collection technique.</li><li>c. <u>Analytical Methods</u><br/>Traffic stream characteristics; headway and gap distributions; traffic simulation; traffic flow theories: shock wave analysis, car following theory, queuing theory.</li><li>d. <u>Junction Design and Control</u><br/>Types of at-grade junction; design of priority junctions, roundabouts, and signal controlled junctions; coordination of traffic signal systems.</li></ul> |

|                                                                 | <p>e. <u>Traffic safety and control devices</u></p> <p>Traffic control devices: pretimed, semi-actuated, actuated; accident studies and safety measures.</p> <p>f. <u>Traffic management techniques</u></p> <p>Urban transportation problems; Intelligent Transportation Systems (ITS): Transportation System Management (TSM), Travel Demand Management (TDM), emerging technologies.</p> <p>g. <u>Laboratory</u></p> <p><b>Two</b> Laboratories: calibration of traffic stream model, signal controlled junction.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                   |             |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
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| Teaching/Learning Methodology                                   | <p>Lectures will cover the general traffic engineering models, traffic theories, traffic control methods and applications;</p> <p>Assignments, such as traffic signal control, junction design or traffic modeling will be given to students. Students need to conduct the traffic survey, data analysis and model formulation.</p> <p>Presentations and discussions in tutorials provide students a ground for polishing their presentation and communication skills.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                   |             |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| Assessment Methods in Alignment with Intended Learning Outcomes | <table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>1. Continuous Assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>1.1. Mid-term</td><td>10%</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>1.2. Assignments</td><td>15%</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>1.3. Lab reports</td><td>15%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>2. Final Examination</td><td>60%</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>Total</td><td>100%</td><td colspan="4"></td></tr></table> <p><b>Students must pass the final examination and achieve a passing overall score/ grade to pass the subject.</b></p> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Continuous assessment will be based on lab reports and written assignments.</p> | Specific assessment methods/tasks | % weighting | Intended subject learning outcomes to be assessed |   |  |  | a | b | c | d | 1. Continuous Assessment | 40% | ✓ | ✓ | ✓ | ✓ | 1.1. Mid-term | 10% | ✓ | ✓ |  |  | 1.2. Assignments | 15% | ✓ | ✓ |  |  | 1.3. Lab reports | 15% | ✓ | ✓ | ✓ | ✓ | 2. Final Examination | 60% | ✓ | ✓ |  |  | Total | 100% |  |  |  |  |
| Specific assessment methods/tasks                               | % weighting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |             | Intended subject learning outcomes to be assessed |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | a                                 | b           | c                                                 | d |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| 1. Continuous Assessment                                        | 40%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓                                 | ✓           | ✓                                                 | ✓ |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| 1.1. Mid-term                                                   | 10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓                                 | ✓           |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| 1.2. Assignments                                                | 15%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓                                 | ✓           |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| 1.3. Lab reports                                                | 15%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓                                 | ✓           | ✓                                                 | ✓ |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| 2. Final Examination                                            | 60%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓                                 | ✓           |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |
| Total                                                           | 100%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                   |             |                                                   |   |  |  |   |   |   |   |                          |     |   |   |   |   |               |     |   |   |  |  |                  |     |   |   |  |  |                  |     |   |   |   |   |                      |     |   |   |  |  |       |      |  |  |  |  |

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| <b>Student Study Effort Expected</b> | Class contact:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |
|                                      | ▪ Lectures and tutorials                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 39 Hrs.  |
|                                      | Other student study effort:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |
|                                      | ▪ Self-study, homework assignments, and computer labs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 78 Hrs.  |
|                                      | Total student study effort                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 117 Hrs. |
| <b>Reading List and References</b>   | <p>Dowling, R., Holland, J., and Huang, A. (2002) California Department of Transportation Guidelines for Applying Traffic Microsimulation Modeling Software.</p> <p>May, A.D. (1990) <i>Traffic Flow Fundamentals</i>, Prentice-Hall, Englewood Cliff, New Jersey.</p> <p>Roess, R.P., Prassas, E.S., McShane, W.R. (2011) <i>Traffic Engineering (4th Edition)</i>, Prentice-Hall, Englewood Cliff, New Jersey.</p> <p>Spiegelman, C.H., Park, E.S., Rilett, L.R. (2010) Transportation Statistics and Microsimulation. Chapman &amp; Hall/CRC.</p> <p>Transport Planning and Design Manual, Hong Kong Transport Department</p> |          |