Subject Description Form

Subject Code	CSE561
Subject Title	Public Transport: Operations and Service Planning
Credit Value	3
Level	5
Pre-requisite/ **Co-requisite/** **Exclusion**	Recommended background knowledge: It is expected that students will have a fundamental understanding of mathematics and physics consistent with undergraduate level study in science/ engineering.
Objectives	a. To present innovative methods and advance technologies which have significant potential for improving the cost – effectiveness of public transport planning. b. To compare between traditional operations and service planning, including scheduling procedures, and system analysis approaches, which are now beginning to be applied for improvements of public transport operations. c. To deal with and to find solutions for persistent and realistic public transport problems.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to understand the public transport planning inputs and data required for transit line headway determination and timetable development; b. to utilize mathematical models and computer tools for predicting passenger demands and assessing the impacts of alternative public transport improvement measures; c. to apply optimization and analytical techniques for resource allocation and transit network design problems; and d. to exercise professional judgement and engineering sense in design and evaluation of public transit improvement measures.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Overall Framework, Public Transport Planning Overview on Public transport operations and planning process; public transport planning studies. ii) Public Transport Modes Public transport modes: technology, service characteristics, performance. Comparison and selection of public transport modes.

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<tr><td></td><td>iii) <u>Performance Measures and Data Collection Methods</u>

Performance measures: Quality of service, Operators' performance. Data collection for transit planning and performance evaluation: Manual and automated data collection techniques; passenger volume studies, transit speed and delay studies.

iv) <u>Costs and Financial Performance of transit services</u>

Types of costs. Economics concepts: cost elasticity, return to scale, production function, marginal return. Cost allocation models, fare policy.

v) <u>Transit Demand Modeling</u>

Elasticities, Econometric Models, Urban Transport Modelling System.

vi) <u>Transit planning</u>

Network planning, frequency and headway determination, timetable development, vehicle scheduling, service reliability. Transit oriented development.

vii) <u>Laboratory</u>

This course will be augmented by <u>two</u> laboratories: public transport network building and demand assignment; timetabling and vehicle scheduling.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The underlying principles and techniques relating to public transport planning will be dealt with in lectures. However, it is important that the students are exposed to the interdependence between theories and practice in public transport planning. Students will therefore be required to attempt exercises in the tutorials in order to understand the associated techniques in practice. Individual assignments will consist of numerical problems on public transport modelling and system analysis, while computer laboratory sessions will be held to demonstrate the applications of mathematical models and to provide opportunity for students to appreciate the difference between manual calculation and computer modelling. Professionals from government or industry may also be invited to give lectures on current issues of public transport planning in Hong Kong.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td></tr>
<tr><td>1. Continuous Assessment</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Written 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>
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	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. Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Continuous assessment will be based on written assignments, lab reports and a test.
Reading List and References	**<u>Textbooks</u>** Ceder, A., *Public Transit Planning and Operation: Theory, Modeling, and Practice*, Butterworth-Heinemann (2007). Lam, W.H.K. and Bell, M.G.H., *Advanced Modeling for Transit Operations and Service Planning*, Pergamon, Elsevier Science Ltd., Oxford (2003). Ahuja, R.K., Magnanti, T.L., Orlin, J.B., Network Flows, Prentice Hall (1993). ReVelle, C.S., Whitlatch, E.E., Wright, J.R., Civil and Environmental Systems Engineering, 2nd Edition, Prentice Hall (2004). Vuchic V.R., *Urban Transit: Operations, Planning and Economics*, John Wiley & Sons, Inc. (2005). Wilson, N.H.M. and Nuzzolo, A., *Schedule-based Dynamic Transit Modeling: Theory and Applications*, Kluwer Academic Publishers, London (2004). **<u>Reference Books</u>** Meyer, M.D., Miller, E.J., Urban Transportation Planning, 2nd Edition, McGraw Hill (2001). Anderson, D.R., Sweeney, D.J., Williams, T.A., Camm, J.D., Martin, K., An Introduction to Management Science: Quantitative Approaches to Decision Making. Revised 13th Edition, South-Western Cengage Learning, Mason, OH, USA (2012). Ortúzar, J.de D. and Willumsen, L.G., Modelling Transport. 4th Edition, Wiley (2011) **<u>Reports</u>** Transport Planning and Design Manual, Hong Kong Transport Department Transportation Research Records, Transportation Research Board TRRL reports, Transport and Road Research Laboratory