1. INTRODUCTION

This postgraduate programme is conducted by the Department of Civil Engineering, University of Peradeniya. The course consists of 9 compulsory (6 core and 3 elective) taught subjects conducted through lectures, tutorials, assignments, laboratory and design classes and research or design projects. Students have a choice of specializing either in “Highway Engineering” or in “Traffic engineering” area by offering three elective taught subjects in their chosen area of specialization. The course will be conducted during November 2014 – May 2016.

Department of Civil Engineering, University of Peradeniya has excellent laboratory facilities and a team of highly qualified academic staff in Highway, Geotechnical and traffic Engineering. Facilities in the Engineering Library and Computing Centre are also available for research study.

2. COURSE STRUCTURE AND DURATION

The course consists of lectures on the nine taught subjects described under subject description below and research/ design projects. The taught subjects will be conducted over three terms on Fridays 1:00 p.m. to 5:30 p.m. and Saturdays 8 a.m. to 5:30 p.m. The research/ design projects shall be commenced within the first term and will be continued till the end of the program.

The course structure is as follows;

<table>
<thead>
<tr>
<th>Core Subjects</th>
<th>Elective Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For Highway Engineering speciality</td>
</tr>
<tr>
<td>CE 6440 Basic Soil and Rock Mechanics for Highway Engineering</td>
<td>CE 6441 Highway Planning</td>
</tr>
<tr>
<td>CE 6445 Traffic Engineering</td>
<td>CE 6443 Highway Construction Materials and Methods</td>
</tr>
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<td>CE 6448 Testing of Pavement Materials and Evaluation</td>
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</tr>
<tr>
<td>CE 6451 Road Safety and Environment</td>
<td>CE 6444 Highway Evaluation and Maintenance</td>
</tr>
</tbody>
</table>
The tentative time schedule of the programme is;

<table>
<thead>
<tr>
<th>Term</th>
<th>Start</th>
<th>End</th>
<th>Subjects</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1 (15 Weeks)</td>
<td>November - February</td>
<td>3 Subjects</td>
<td>CE 601</td>
<td></td>
</tr>
<tr>
<td>Term 2 (15 Weeks)</td>
<td>March - June</td>
<td>3 Subjects</td>
<td>CE601</td>
<td></td>
</tr>
</tbody>
</table>
| Term 3 (15 Weeks) | July - October       | 3 Subjects   | Finish CE601  
                |                      |            | Start CE602  |
| Term 4            | Finish CE602 within about 6 months part time | |

Examinations in respect of the subjects taught in a term will be held within the term, and the progress of the research projects are continuously evaluated during and at the end of each term.

**Postgraduate Diploma Programme**

Postgraduate Diploma students are required to sit for written examinations in the seven taught subjects (6 core and 1 elective) and submit a report on the research or design project (CE601) at the end of the third term. They may be required to face a viva-voce. A period of three terms (twelve months) from the beginning of the postgraduate course may be sufficient for the successful completion of the Postgraduate Diploma.

**MScEng Degree Programme**

Those who obtain good grades for the nine taught subjects and demonstrate satisfactory progress in CE601 may continue the course up to MSc.Eng degree. In addition to the requirements at the first three terms, the student has to register and get evaluation for CE602 in every term until he/she completes the MSc.Eng degree. The students who are registered for the MSc.Eng degree course are required to submit a dissertation on the project (CE602) with a substantial research component. They will also be required to give a seminar and face a viva-voce at the completion of the dissertation in the MSc.Eng programme. The candidates are also strongly encouraged to either present the research material at a national conference or submit a paper of such standard that is acceptable to be published in a refereed journal. A period of eighteen months from the beginning of the postgraduate diploma course may be sufficient for successful completion of the MSc.Eng degree.

3. SUBJECT DESCRIPTION

**CE 601 Independent Study (Core 3 Credits)**

Formulation and carrying out of an engineering research or design project under the guidance of a faculty member. Experience is gained in research or design by means of mathematical modelling, numerical analysis, and laboratory or field experimentation. At the completion of the project each student submits a technical report and presents the results orally.

**CE 602 Advance Research Project (Core 3 Credits)**

The research programme should cover aspects such as formulation of research proposal, literature review, research methodology, analysis of results and drawing conclusions,
presenting the research work leading to the thesis. The project may be an extension of CE601.

**CE 6440 Basic Soil and Rock Mechanics for Highway Engineering (Core, 3 Credits)**
Suitability of sites for hydraulic structures, highways, etc., construction materials, Engineering classification for rock masses, engineering properties of rocks, laboratory and Field testing of rocks, failure criterion, underground excavations, stereo net applications, Rock supports.

**CE 6641 Highway Planning (Elective, 3 Credits)**
Elements, functionality and performance and road classification/Road hierarchy: Network planning, Route planning criteria; design speed, access control, right of way: Data collection and map studies, Highway capacity design, level of service etc., design concepts of road elements, highway safety features & passing zones, Civil 3D application, Highway inventory, asset management, criterion of selection of roads for improvement or rehabilitation.

**CE 6442 Highway Design (Core, 3 Credits)**
Geometric design, design control criteria, design of curves, pavement design concepts / TRL method, Pavement design ASSHTO, concrete technology & mix design, Rigid pavement design, Pavement joint design, Pavement overlay design, rigid pavements, Block paving / composite pavements, Design of sidewalks, pedestrian crossings, cycle lanes, road lighting and road furniture.

**CE 6443 Highway Construction Materials and Methods (Elective, 2 Credits)**
Construction materials; aggregate and bitumen, Construction techniques; sub grade, sub base, base and shoulders, asphalt mix design. Asphalt production, asphalt delivery, placement and & compaction.

**CE 6444 Highway Evaluation and Maintenance (Elective, 2 Credits)**
Super pave technology, Types of failures and condition assessment, pavement evaluation – non-destructive testing, surface treatments, overlay construction consideration, Maintenance programme, pavement management system.

**CE 6445 Traffic Engineering (Core, 3 Credits)**
Traffic flow theory, traffic flow models, traffic flow analysis, Intersection controls/interchanges, Roundabout design, Traffic signal design, Traffic signal coordination Incident analysis, queuing theory

**CE 6446 Traffic Measurements, Analysis and Design (Core, 3 Credits)**
Speed, volume, density measurements and data analysis methods, traffic surveys, Pedestrian flow counts and facility design, accident analysis, Parking measurements and design

**CE 6447 Traffic Management (Elective, 2 Credits)**
Introduction to traffic management, travel demand management, urban traffic management techniques, parking management, HOV promotion, junction control, local area traffic management, intelligent traffic management systems. Road signs and markings, traffic calming and speed control, Traffic demand management and road pricing, Parking management and its applications, User information systems, managing non- motorizes transport, bus priority theorem
CE 6448 Testing of Pavement Materials and Evaluation (Lab Course) (Elective, 1 Credit)
Collection of standards, tests on aggregates, tests on asphalt, mix design, short and long term aging, high, intermediate and low temperature testing, recovery of asphalt, mix design of specialized mixes such as stone matrix asphalt and open graded friction course

CE 66449 Traffic Impact Assessment (Elective, 1 Credit)
Traffic data collection, high inventory, parking counts, capacity estimations at junctions, parking standards and regulations, traffic forecasting and impact assessment.

CE 6450 Quantitative methods in Traffic Engineering (Elective, 3 Credits)
Probability theory, Statistics, random variables and expected values, discreet probability distributions, continuous probability distributions, sampling distributions, Hypothesis testing, regression analysis, transport data collection, sampling techniques and analysis, statistical software applications

CE 6451 Road Safety and Environment (Core, 2 Credits)
Human factors and driver behaviour, Road safety audit and & conflict studies, accident data collection & analysis, Accident investigations & safety management, road safety appurtenance, EIA process in sri lanka, Environment issues related to transport projects : Social, ecological & economic. EIA methods & evaluation of alternatives, air pollution 7 control, Planning & design for natural disasters and case studies.

CE 6452 GIS for Highway and Transportation Engineering (Elective, 2 Credits)
Introduction to Geographical Information Systems & it’s engineering applications, Use of GIS software in data analysis, Decision making & presentation, Preparation of maps and geographical databases using aerial photogrammetry, remote sensing GPS & ground surveying techniques, Use of GIS in the feasibility and EIA studies in planning new transportation routes, Use of spatial analysis capabilities in transportation planning, Solutions for transport networks using GIS.

CE624 Construction Management (Elective, 2 Credits)
Estimating and tendering; contract administration; project management; cash flow forecasting and cost control; economic appraisal of projects; financial management; human resource management.

CE625 Construction Planning, Methods and Equipments (Elective, 2 Credits)
Advanced planning techniques; resource analysis; material management; optimization techniques; construction methods; equipments acquisition and selection; plant management; computer applications in construction planning.

CE626 Bridge Engineering (Elective, 2 Credits)
Design consideration, alternative structural systems and materials, Codes of Practice and Bridge Design guidelines, design of substructure, design of superstructure, maintenance of bridges

CE 649 Slope Stability and Earth Retaining Structures (Elective, 3 Credits)
Classification of mass movements, landslides; investigation control and prevention
Methods, stability of natural and man-made slopes, limit equilibrium method, use of
Stability charts, earth and rock fill dams, lateral earth pressure, retaining walls, case
Histories.

CE 653 Productions of Aggregates in Construction (Elective, 2 Credits)
Selection of quarry sites, quarry planning, overburden removal, design of a bench blast,
Rock drills, rock blasting, safe use, transport and storage of explosives, safety and
Environmental consideration of quarrying operations, loading and mucking equipment for
Quarries, selection of crushers, screening, testing aggregates, stream deposits, sand mining

CE 656 Problematic Soils and Ground Improvements (Elective, 2 Credits)
Types and identification of problematic soils, properties of problematic soils, concepts of
ground improvement, improvement techniques (compaction: surface and deep, reinforced
earth, granular piles, geotextiles, preloading and vertical drains, dynamic consolidation,
admixtures, etc.), case examples, commercially available machines and materials.

CE 672 Environmental technology and Management (Elective, 2 Credits)
Importance of ground water flow and seepage control in geotechnical engineering,
occurrence of ground water, regional ground water flow, fundamentals of ground water
flow, use of principles of well hydraulics in dewatering, analysis of ground water flow,
water pressure and piping failure, seepage control in dams, seepage flow through rocks,
analysis of water flow through unsaturated soils, dewatering techniques and dewatering
equipment.

COURSE SUMMARY

<table>
<thead>
<tr>
<th>Course No</th>
<th>Course Title</th>
<th>Credit units</th>
<th>Core/Elective</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 6440</td>
<td>Basic Soil and Rock Mechanics for Highway Engineering</td>
<td>3</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td>CE 6441</td>
<td>Highway Planning</td>
<td>3</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>CE 6442</td>
<td>Highway Design</td>
<td>3</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td>CE 6443</td>
<td>Highway Construction Materials and Methods</td>
<td>2</td>
<td>Elective</td>
<td></td>
</tr>
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<td>Highway Evaluation and Maintenance</td>
<td>2</td>
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<td>CE 6445</td>
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<td></td>
</tr>
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<td>3</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td>CE 6447</td>
<td>Traffic Management</td>
<td>2</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>CE 6448</td>
<td>Testing of Pavement Materials and Evaluation (Lab Course)</td>
<td>1</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>CE 6449</td>
<td>Traffic Impact Assessment</td>
<td>1</td>
<td>Elective</td>
<td></td>
</tr>
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<td>CE 6450</td>
<td>Quantitative methods in Traffic Engineering</td>
<td>3</td>
<td>Elective</td>
<td></td>
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<td>2</td>
<td>Core</td>
<td></td>
</tr>
<tr>
<td>Course Code</td>
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<td>Credits</td>
<td>Type</td>
<td>Notes</td>
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<tr>
<td>CE 6452</td>
<td>GIS for Highway and Transportation Engineering</td>
<td>2</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>CE 601</td>
<td>Independent Study</td>
<td>3</td>
<td>Core</td>
<td>Already Delivering in PG courses in the Department of Civil Engineering</td>
</tr>
<tr>
<td>CE 602</td>
<td>Advanced Research Project</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE 624</td>
<td>Construction Management</td>
<td>2</td>
<td>Elective</td>
<td></td>
</tr>
<tr>
<td>CE 625</td>
<td>Construction Planning, Methods and Equipments</td>
<td>2</td>
<td>Elective</td>
<td></td>
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<td>CE 626</td>
<td>Bridge Engineering</td>
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<td></td>
<td>Elective</td>
<td></td>
</tr>
</tbody>
</table>

4. **ELIGIBILITY**

(1) BSc.Eng degree in Civil Engineering with first or second class honours.

or

(2) A Civil Engineering degree or equivalent qualification with minimum one year experience in a related field.

MSc.Eng, total of 24 credits (min GPA 3.0) and complete both independent study CE601 (pass/fail) and a project with substantial research component CE602, equivalent to 4 months full time study or 6 months part time study.

PGDip, total of 20 credits (min GPA 2.75) and Pass Independent Study CE601 (pass/fail)

7. **PANEL OF TEACHERS:**

S.B.S. Abayakoon, BScEng, MSc, PhD, CEng, FIE (SL), Int.PE
K.G.H.C.N. Seneviratne, BScEng, PhD, CEng, FIE(SL)
P. B. R. Dissanayake, BScEng, MEng, PhD, CEng, MIE (SL)
H. Abeyruwan, BScEng, MPhil, CEng, MICE, MIE Aust, CPEng Australia, MIEEE
A. G. H. J Edirisinghe, BScEng, MEng, PhD
I. M. S. Sathyparasad, BScEng, MEng, DEng
U. I. Dissanayake, BScEng, PhD, CEng, MIE (SL)
L.C. Kurukulasooriya, BScEng, MEng, PhD
P. B. G. Dissanayake, BScEng, PhD, MIE Aust, MPMI, AMIE (SL)
S. B. Wijekoon, BScEng, MEng, MBA, CEng, FIE(SL), MICE, Int.PE
K. Perera, BSc, MA, PhD
W. M. V. S. K. Wickramasinghe, BScEng, MEng, PhD
K.A.S. Susantha, BSc Eng, MEng, PhD
D.I.B. Randeniya, BScEng, MSc, PhD
Rajib B. Malick, PhD, PE

In addition, visiting experts will also conduct some lectures.