



## M.Sc. / PG Diploma

in

## Geotechnical Engineering



Department of Civil Engineering

University of Moratuwa

### Eligibility Requirements

Candidates should possess either a recognised degree in Civil Engineering (or equivalent); or Associate Membership of a recognized professional Engineering Institute with a minimum of one year's relevant industrial experience.

### Intake

Limited to 40 students

### Course Fees

Tuition Fee: Rs. 350,000/=

Other fees:

Rs. 1500/= Registration fees, Rs. 5000/= refundable deposit (library facilities) and Rs. 500/= Exam Fees

(All fees should be paid during registration)

### Duration of Course

- Master of Science - 2 years Part Time
- PG Diploma - 1 year Part Time
- All Lectures, assignments, seminars, field trips etc., will be conducted normally on Fridays and Saturdays.
- Those who proceed to do the M.Sc. will be requested to do a research project on part time or full-time basis in the second year.

### Application and Inquiries

Application forms can be found from <http://bitly.ws/dZL4>



For further details, contact:

Course coordinators: Dr (Mrs.) Ashani Ranathunga

Dr. Nalin De Silva

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### Geotechnical Engineering Course Team

#### University of Moratuwa

#### Department of Civil Engineering:

Prof U.G.A. Puswewala

*B.Sc. Eng. Hons (Moratuwa), M Eng. (AIT), Ph.D. (Manitoba), C.Eng., FIE(SL)*

Prof S.A.S. Kulathilaka

*B.Sc. Eng. Hons (Moratuwa), Ph.D. (Monash), C.Eng., MIE(SL)*

Dr U.P. Nawagamuwa

*B.Sc. Eng. Hons (Moratuwa), M.Eng. (AIT), Dr.Eng. (YNU), C.Eng., FIE(SL)*

Dr L.I.N. De Silva

*B.Sc. Eng. Hons (Moratuwa), M.Eng (Tokyo), Ph.D. (Tokyo), C.Eng., MIE(SL)*

Prof. M.T.R. Jayasingha

*B.Sc. Eng. (Hons) (Moratuwa), Ph.D. (Cambridge), C.Eng., MIE(SL), MSSE (SL)*

Dr (Mrs) M.A. Pallewatta

*B.Sc. Eng. Hons (Moratuwa), Ph.D. (Wollongong), C.Eng., MIE(SL)*

Dr. (Mrs) A.S. Ranathunga

*B.Sc. Eng. Hons (Ruhuna), Ph.D. (Monash), AMIE(SL)*

#### Department of Earth Resources Engineering:

Dr A.M.K.B. Abeyasinghe

*B.Sc. Eng. Hons (Peradeniya), M.Eng. (AIT), Ph.D. (Saga)*

#### Visiting Staff

Prof B.L. Tennekoon - Emeritus Professor, University of Moratuwa

*B.Sc. Eng. (Cey), Ph.D. (Cambridge), C.Eng., FIE (SL)*

Prof M. Gunaratne, - Professor, University of South Florida, USA

*B.Sc. Eng. (Peradeniya), M.Sc. (British Columbia), Ph.D. (Purdue)*

Prof H. S. Thilakasiri - Dean, Faculty of Engineering, SLIIT

*B.Sc. Eng. (Hons) Moratuwa, DIC & MSc. (UK), PhD. (USA), CEng, FIE(SL), IntPE(SL)*

Dr W. A. Karunawardena - Director General, NBRO

*B.Sc. Eng. (Moratuwa), M.Eng (Moratuwa), PhD (Kyoto), C.Eng, MIE (SL)*

Eng. Shiromal Fernando - Managing Director – CSEC

*B.Sc. (Moratuwa), MPhil (Moratuwa), C.Eng, MIE (SL)*

Dr J. S. M. Fowze - Specialist Engineer, Geotechnics and Foundations, CECEB

*B.Sc. Eng. (Peradeniya), M.Phil (Peradeniya), PhD (AIT)*

Dr N. H. Priyankara - Snr Lecturer, Faculty of Engineering, University of Ruhuna

*B.Sc. Eng. (Moratuwa), M.Sc (AIT), PhD (Tohoku), C.Eng, MIE (SL),*

Eng. Mahinda Ratnasiri - General Manager, ELS

*B.Sc. Eng. (Moratuwa), M.Sc (Moratuwa), C.Eng, MIE (SL)*

CE 5401	Engineering Properties of Soil	Credits: 4.5	CE 5406	Ground Improvement Techniques	Credits: 2.5	CE 5411	Design Project	Credits: 4.0
<b>Outline:</b>			<b>Outline:</b>			<b>Outline:</b>		
Mass volume relationships, clay minerals and plasticity, classification of soils, compaction, Effective stress concept, Flow of water through soils, Consolidation of soils, Shear strength of soils, critical state concepts, Behaviour of residual soils and peaty clay			Improvement of soft clay & peaty clay by; preloading, use of vertical drains, vacuum consolidation, electro osmosis, deep mixing, granular columns, dynamic compaction. Use of geosynthetics, vibrofloatation, overcoming problems in expansive soils, Recent innovations in ground improvement techniques.			An approved comprehensive design project done with a group of maximum of four candidates under the supervision of a staff member.		
CE 5402	Engineering Geology	Credits: 4.0	CE 5407	Design and Construction of Shallow Foundations	Credits: 3.0	CE 5412	Research Seminar	Credits: 2.0
<b>Outline:</b>			<b>Outline:</b>			<b>Outline:</b>		
Geological history & structure of the earth, Rock forming minerals, geological cycle, Igneous, sedimentary & metamorphic rock, Geological structures, discontinuities in rock-mass, exploration in rock, rock-mass classification, Sedimentary deposit types, hydrogeology			Types of foundations, failure mechanisms and estimation of bearing capacity under different conditions, Estimation of immediate and long-term settlements, Factor of safety and allowable bearing capacity, Plate bearing test, Estimation of modulus of subgrade reaction, foundations on unsaturated soils, Construction of shallow foundations			Active participation in specially arranged research seminars.		
CE 5403	Geotechnical Investigations	Credits: 3.0	CE 5408	Structural Design of Foundations	Credits: 2.5	CE 5414	Rock Mechanics	Credits: 3.0
<b>Outline:</b>			<b>Outline:</b>			<b>Outline:</b>		
Planning a site Investigation, Different methods of Exploration and sampling, conduct and interpretation of insitu tests; Standard Penetration Test, Cone penetration test, Vane shear test, Field Permeability tests, Pressuremeter test, Specifications for Site Investigations and Writing reports			Structural design of shallow foundations; footings, strip and raft foundations, Structural design of deep foundations; driven and cast insitu piles and pile caps, piles subjected to lateral loads, Structural design of retaining walls			Rock as an engineering material, rock mass classification, stereographic projections, Stability of rock slopes and exposed surfaces, Physical and mechanical properties of rock and determination in lab and insitu, correlations between properties, Stress-strain and deformation in rock, constitutive relations, Foundations on rock		
CE 5404	Design of Dewatering Systems	Credits: 2.0	CE 5409	Design and Construction of Deep Foundations	Credits: 4.0	CE 5415	Slope Engineering	Credits: 4.0
<b>Outline:</b>			<b>Outline:</b>			<b>Outline:</b>		
Introduction to Hydraulic modification, traditional dewatering methods, Fundamental soil-water relationships, pore pressures, Darcy's law, Hydraulics of slots and wells, interpretation of time-drawdown measurements, Design of dewatering systems			Types of deep foundations, Estimation of carrying capacity by; soil characteristics, insitu tests, wave equation and pile driving analyser, pile load tests, driving formulae. Negative skin friction, Design of single pile and pile groups, design of laterally loaded piles, construction of piles			Modes of Slope instability, Deterministic Methods of Stability Analysis, Time Dependence of Stability, Probabilistic Methods of analysis, Landslide Hazard Zonation, Effects of vegetation, Stabilization of slopes, Site Specific and global monitoring of Slopes		
CE 5405	Earth Retaining Systems	Credits: 4.0	CE 5410	Computer Applications in Design of Foundations and Earth Retaining Systems	Credits: 3.5	CE 5490	Dissertation (for M.Sc.)	Credits: 20.0
<b>Outline:</b>			<b>Outline:</b>			<b>Outline:</b>		
Earth Pressure Computation, Design of; Gravity Retaining Structures, Embedded Retaining Structures, soldier pile walls, Reinforced Concrete Retaining Structures, Reinforced Earth, Anchored Earth and Soil Nailing, Maintenance and Monitoring.			Boundary value problems, finite element method under small displacement & infinitesimal strain theory, Stress & strain analysis in a continuum, Constitutive relations for geo-materials, Seepage in soils, earth retaining systems, slope stability & foundation-soil interaction analysis by finite element software.			An approved individual research project, done under the supervision of a staff member, and to be evaluated by a dissertation and an oral examination.		