



UNIVERSITY OF PERADENIYA
DEPARTMENT OF CIVIL ENGINEERING

**POSTGRADUATE PROGRAMMES IN ENVIRONMENTAL &
WATER ENGINEERING**

YEAR 2022

Applications are invited for the Postgraduate Programme in Environmental and Water Engineering for the year 2022. Programme will be commenced from February 2022.

1. INTRODUCTION

The postgraduate programmes in Environmental & Water Engineering conducted by the Department of Civil Engineering, University of Peradeniya are intended for graduates with engineering background and practicing civil engineers in the fields of Water Supply & Drainage, Irrigation, Water Resources Engineering, Hydraulics, Coastal Engineering, Sanitary Engineering and Environmental Engineering.

The objectives of the postgraduate courses are to provide the students with

- a) an advanced knowledge in the aspects of Water & Environmental Engineering applied to the industry.
- b) an exposure and hands-on experience in the use of information technology tools and various application oriented computer software packages in Water and Environmental Engineering.

Thus, the courses have been designed to enhance the capabilities of the students in analyzing, planning, construction, operation and management of water & sanitary engineering works with a particular reference to preserving the quality of the environment.

Facilities in the Laboratories: Computing Centre and the Library of the Faculty of Engineering are available for research and study. Staff of the Civil Engineering Department and Faculty of Engineering associated with the postgraduate programme is:

Prof. S.B. Weerakoon	BScEng, MEng, DEng, FIE(SL), CEng, Int.PE
Prof. K.D.W. Nandalal	BScEng, MEng, PhD, FIE(SL), CEng, Int. PE
Prof. K.P.P. Pathirana	BScEng, MEng, PhD, CEng, FIE(SL), MICE, Int.PE
Prof. J.J Wijetunge	BScEng, PhD
Prof. G.B.B. Herath	BScEng, MEng, PhD
Prof. K.B.S.N. Jinadasa	BScEng, M Eng., PhD
Prof. (Mrs.) K.G.N. Nanayakkara	BScEng, PhD
Dr. P.B.G. Dissanayake	BScEng, PhD
Dr. (Mrs.) H. K. Nandalal	BScEng, MSc, PhD, MIE(SL), CEng
Dr. (Mrs.) W.C.T.K. Gunawardana	BScEng, PGDip., PhD
Dr. R.M.L.D. Rathnayake	BScEng, MEng, PhD
Dr. (Mrs.) G.M.P.R. Weerakoon	BScEng, MSc, PhD

Dr. N.G.P.B. Neluwala	BScEng, MEng, PhD
Mr. D.D. Dias	BScEng, MSc
Dr. M.M.G.T. De Silva	BScEng, MPhil, PhD, AMIESL
Prof. D.G.G.P Karunaratne	BScEng, PhD
Prof. C.S. Kalpage	BScEng, PhD
Dr. S.B. Wijekoon,	BScEng, MEng, MBA, PhD, CEng, FIE(SL), MICE, Int.PE

In addition, visiting experts from the industry and from foreign and local universities will also be involved in the conduct of lectures, seminars, case studies and discussions.

2. PROGRAMME STRUCTURE AND COURSES

In order to obtain required credits per Term, it is required to conduct classes for at least 6 sessions. Accordingly, the proposed time table for the program is as follows;

Day	Time
Saturday	8.00AM to 11.00 AM
	12.00 PM to 3.00 PM
	3.00 PM to 5.00 PM
Sunday	8.00 AM to 11.00 AM
	12.00 PM to 3.00 PM
	3.00 PM to 5.00 PM

Note. In addition to above sessions, all students will complete an Independent Study/ Advanced Study/ Advanced Research Study of his/her choice related to the course. The discussions and meetings will be scheduled from time to time on Friday, Saturday or Sunday.

Accordingly, the proposed time schedule for the course is as follows;

Semester	Period of the year
Term I	February to June (5 months)
Term II	July to November (5 months)
Independent Study/ Advanced Study/ Advanced Research Study	Term I and Term II and then Continue after November

Examinations in respect of the subjects taught in a term will be held within the term, and the progress of the research/design projects are continuously evaluated during and at the end of each term. At the end of 2 semesters the student will complete taught courses as required.

Item	Description	Number of credits
1	From core course (4 courses x 3 credits + 3 courses x 2 credits)	18
2	From elective courses	
	PG.Dip. (SLQF Level 8)	4
	M.Eng (SLQF Level 9)	7
	M.Sc. Eng. (SLQF Level 10)	12

2.1 Courses Offered (Subject to approval)

CE 6101 RESEARCH METHODS IN CIVIL ENGINEERING (Optional)

Fundamentals of Research: Definition and Objectives of Research; Qualitative vs Quantitative Research; The Scientific Research Process; Identification, selection, and formulation of research problems; Characteristics of good research problems; Review of literature. **Data Collection, Analysis and Presentation:** Methods and techniques of data collection; Design of Experiments; Sampling and sampling designs; Statistical modelling and analysis including introduction to statistical package; Probability Distributions; Multivariate methods; Concepts of correlation and regression, error analysis; Effective presentation of information using Tables, illustrations, graphs, etc. **Scientific writing and presentation:** Essential components of abstract, introduction, literature review, materials and methods, results, discussion, and conclusions; Formatting of contents; Methods of referencing and the use of referencing tools, Preparing and presenting a technical presentation.

CE 6201 ENVIRONMENTAL HYDRAULICS (Compulsory)

Fluid mechanics for environmental hydraulics: Governing equations of fluid flow, Applications to pipe flows and free surface flows. **Transport and mixing in fluids:** Mixing and transport processes, Fate & transport of pollutants, Wastewater disposal systems. **Environmental modelling:** Hydrodynamic modelling, Pollutant transport and water quality modelling, Multi-dimensional and spatially averaged modelling, Modelling of aquatic systems, Application of water quality models.

CE 6202 ADVANCED HYDROLOGY (Compulsory)

Hydrological processes: Physical principles governing hydrological processes, rainfall-runoff relationship (Conceptual and Physics-based types), Instantaneous Unit Hydrograph (IUH), Synthetic Unit Hydrograph (Clark Method, SCS Method), Impact of Climate Change and Land-use Changes, Depth-Area-Duration relationship. **Hydrologic statistics:** Probability concepts, Probability density functions and Cumulative distribution functions, Hydrologic data handling, Fitting probability distributions testing the goodness of fit. **Frequency analysis:** Extreme value distributions and probability plotting, Frequency factors, Confidence limits, IDF Relationships. **Hydrologic designs:** Risk, Design criteria, Derivation of design storms and design flows, Storm sewer design, Drainage design.

CE 6203 SOFTWARE APPLICATION IN WATER AND ENVIRONMENTAL ENGINEERING (Compulsory)

Software packages related to: Hydrology (eg. HEC-HMS); Hydraulics (eg. HEC-RAS/ FLO2D); Irrigation engineering (eg. Cropwat/WEAP); Water supply and sewer networks (eg. WaterCAD/ SewerGems); Storm water drainage (eg. SWMM); Wastewater treatment plant design (eg. STOAT); Water quality modelling (eg. WASP).

CE 6204 WASTEWATER TREATMENT AND REUSE
(Compulsory)

Introduction to wastewater treatment: Quantity and quality, Characterization, Status, Trends and Needs for wastewater treatment and Reuse. **Wastewater management systems :** Decentralized Vs centralized systems, Collection and transport. **Wastewater treatment plant planning and design:** Volume, Design period, Demand calculation, Biological systems, (Conventional, on-site and high-efficiency/high rate), Introduction to Chemical processes (coagulation, oxidation etc), Residuals management. **Wastewater reuse options:** Standards, Treatment options and application, Tertiary treatment options.

CE 6205 WATER RESOURCES PROJECT PLANNING
(Compulsory)

Water resources systems analysis and modelling: General concepts of systems analysis, planning, designing and operation of water resources systems, Application of simulation, optimization and multi-criteria decision analysis models. **Multipurpose river basin planning:** Inter-basin and inter-provincial water resources planning and management, Shared water resources and conflict management. **Water policy and governance:** Water law and policy, Water rights, Institutional aspects, Water allocation laws. **Economic analysis and project financing:** Economic and financial evaluations, Financial models, benefit cost analysis, risk and uncertainty, multipurpose development and cost allocations. **Project planning:** Feasibility studies, Planning techniques and project scheduling, Environmental and social aspects, Environmental audit, Project monitoring and post project evaluation, Commissioning and follow-up action.

CE 6206 WATER SUPPLY ENGINEERING
(Compulsory)

Water quality parameters and standards: Source water quality and safety, Drinking water standards. **Conventional drinking water treatment:** Unit processes, Treatment mechanisms, Troubleshooting at the drinking water treatment plant. **Design of water treatment unit processes:** Design of the conventional unit processes, Design of the advanced unit processes (plate/tube settlers, filter under drain systems etc.), Selection of pumps and internal plumbing systems, Wash water collection systems. **Distribution networks:** Design of pipe networks (Storage reservoirs, Break pressure tanks, Pipes and Valves), Online measuring techniques, Non-revenue water (NRW) management systems. **Advanced water treatment processes:** Membrane technology, Desalination, Water softening, Precipitation methods, Adsorption, Ion exchange, UV irradiation.

CE 6207 CLIMATE CHANGE IMPACTS AND ADAPTATION IN WATER SECTOR
(Optional)

Science of climate change: Climate system, Drivers of climate change, Climate modelling and climate change projections, GCMs. **Impacts of climate change:** Impacts on hydrologic cycle, Impacts on regional climate and water resources, Impacts on water infrastructure, agriculture, food security, health and other sectors. **Adaptation for resilience:** Exposure, vulnerability and risk of climate change, Regional and local adaptations in water sector, Resilience and traditional systems, Governance and policy framework. **Climate projection downscaling:** Statistical downscaling, Dynamic downscaling, Applications in designs of hydraulic structures and water management.

**CE 6208 COASTAL ENGINEERING AND COASTAL ZONE MANAGEMENT
(Optional)**

Wave Mechanics: Wave measurements, Analysis and non-linear wave theories. **Coastal Processes:** Nearshore wave, Hydrodynamic and sediment transport processes; Physical modeling of coastal processes, Mathematical modeling. **Coastal Zone Management:** Coastal environment and landforms. Problems and issues in the coastal zone, Coastal interventions- hard and soft structures, Coastal hazards, Integrated Coastal Zone Management with particular reference to Sri Lanka.

**CE 6209 ENVIRONMENTAL TECHNOLOGY
(Compulsory)**

Global Environmental issues and sustainability: Global Warming, Discharges of Hazardous air pollutants, Inhabitability of Modern Urban Habitat (heat Island Effect, Noise pollution, Sick building syndrome etc.), Introduction to sustainability, Sustainable development goal, Material Life Cycle. **Instrumentation:** Working mechanism behind water quality measuring instruments, Spectrophotometric techniques, Chromatographic techniques, Potentiometric techniques, Mass spectrometry; Laboratory demonstration of instruments, Field level experiments. **Environmental Biotechnology:** Role of microorganisms in geochemical cycles, Application of Environmental Biotechnology in Production of biogas, bioethanol, biodiesel and biohydrogen, Molecular approaches in Environmental Engineering and biotechnology.

**CE 6210 GEOGRAPHIC INFORMATION SYSTEMS AND REMOTE SENSING IN
WATER RESOURCES
(Optional)**

Introduction to GIS and software: Raster data, Vector data, Data structures, Data manipulation, Exploring the interface and file management system. **Spatial data structures and sources:** Map projections/coordinate system, World and National datum and transformations, Web and other spatial data sources. **GIS analysis functions and operations:** Creating editing and GIS data, Spatial and overlay analysis, Distance analysis, Application of Hydrology tools. **Layouts, reports, graphs and data interoperability:** Preparing and presenting maps and tables and exporting them to different online formats, Exporting and importing data to and from different formats. **Remote Sensed Data and Image processing techniques:** Use of Elector Magnetic Spectrum in RS, Active and passive remote sensing, Supervised and unsupervised classification, remote sensing application in water resources. **Introduction to Geographic Positioning Systems:** GNSS for GIS data capture, importing and exporting GPS data.

**CE 6211 GROUND WATER HYDROLOGY
(Optional)**

Movement of Groundwater: Steady state and transient groundwater flow in confined and unconfined aquifers. **Well Hydraulics:** Steady and unsteady radial flow, Multiple well systems, Wells near aquifer boundaries, Pump tests. **Groundwater contamination and remediation:** Groundwater quality, Contamination sources, Mechanisms of contamination, Remediation technologies, Groundwater basin management. **Saline water intrusion:** Occurrence of saline water intrusion; Fresh-Saline water interface, Upconing, Control technologies. **Computer-Assisted groundwater flow modeling:** Modeling process, Computer models, Model calibration and

parameter estimation. **Hydrogeology:** Surface investigation of groundwater, Subsurface investigation of groundwater, Artificial recharge of groundwater.

CE 6212 HYDRAULIC STRUCTURES
(Optional)

River engineering: River hydraulics, River morphology, River training, dredging & bank protection, Physical and mathematical models, Environmental aspects in river management. **Inland hydraulic structures:** Water retaining, water conveyance and drainage structures and their designs, Flow regulators, Sediment management, Environmental implications of hydraulic structures. **Coastal structures:** Physical features of coasts and near shore processes, Shore protection structures, Land reclamations.

CE 6213 INDUSTRIAL WASTE MANAGEMENT
(Optional)

Introduction to industrial waste management : Industrial processes, Industrial waste characterization/testing, Basic industrial waste management concepts and national, regional and international rules and agreements. **In-plant waste management:** Waste Minimization, Life cycle assessment, Cleaner Production, Reclamation and Reuse, Environmental Management Systems and related case studies, ISO standards. **Industrial waste management:** Primary, secondary and tertiary wastewater treatment unit processes for industrial wastewater treatment (with special emphasis on physical and chemical unit processes) Industrial solid and sludge management (Control of sludge generation and industrial sludge treatment and reuse). **Air Pollution Monitoring and Control:** Sources of air pollution, Technologies for monitoring and control of air pollution.

CE 6214 INTEGRATED WATER RESOURCES MANAGEMENT
(Optional)

Basic concepts: Components and dimensions of IWRM. **Protection of water resources:** Demand and supply management, Catchment management and recycling and reuse. **Gender in IWRM:** Mainstreaming gender and IWRM nexus, Gender differential roles. Climate change and impacts on water. **Water governance:** Regulations and policy, Management of shared water resources. **Water and ecosystems:** Ensuring water quality, Water supply, Sanitation and health, Pollution control and prevention of waterborne diseases.

CE 6215 IRRIGATION AND DRAINAGE ENGINEERING
(Optional)

Irrigation Project Planning: Project identification, Water availability, Performance and economic aspects of irrigated agriculture, Performance indicators. **Irrigation Methods and Design:** Crop water requirement, Irrigation water requirement, Infiltration characteristics of soils for irrigation designs, Design of surface, overhead and drip irrigation systems. **Irrigation Water Management:** Water delivery systems, Yield response to water, Irrigation scheduling techniques, Deficit irrigation strategy, Modern irrigation systems. **Sustainable Irrigation Systems:** Ancient irrigation systems, Recycling of irrigation water, Environmental aspects of irrigation projects, Ground water pollution control. **Drainage Requirements and Systems:** Causes of water logging, Types of drainage systems, Layout and design of drainage systems and their operation and maintenance.

**CE 6216 PUBLIC HEALTH ENGINEERING
(Optional)**

Global sanitation and health : Safe water, sanitation and health consequences in the world, Major water, sanitation and hygiene related diseases, their modes of transmission and appropriate options for breaking the transmission routes. **Good WASH practices :** Multi barrier approach for safe water (select and design low cost water supply systems), Safe water storage and handling, Hygiene promotion, Sanitation ladder. **Sanitation safety plans :** Principles of excreta management, Fecal sludge management (e.g. pond systems, anaerobic digestion). Introduction to water safety plans and Emergency water supply systems (disasters) Quantitative microbial risk assessment techniques.

**CE 6217 SOLID WASTE MANAGEMENT
(Optional)**

Introduction to Solid Waste Management: Waste quantity and quality, Classification of waste, Waste generation rates, Legislation, regulation and control. **Waste Collection & Transport:** Collection of mixed waste or of source separated waste, Collection logistics (route planning etc.), Transfer stations, Case study. **Treatment/disposal Technologies:** Dumping, Sanitary landfills, Mechanical-biological treatment, Incineration, Anaerobic digestion, Composting; Reduce, reuse and recycling. **Green House Gas emission:** Clean Development Mechanism, Energy recovery, Hazardous waste management.

3. ADMISSION REQUIREMENTS FOR THE PROGRAMMES

The postgraduate programmes leading to the following qualifications are available in the postgraduate programmes in Environmental & Water Engineering,

Postgraduate Diploma (SLQF L8) : *PG.Dip. (Environmental and Water Engineering)*

Degree of Master of Engineering (SLQF L9) : *M.Eng. Env&Water*

Degree of Master of the Science of Engineering (SLQF L10) : *M.Sc.Eng. (Environmental and Water Engineering)*

The minimum qualifications required of a person for admission to a postgraduate programmes leading to the SLQF L8, SLQF L9 and SLQF L10 are as follows:

3.1 Postgraduate Diploma (SLQF L8): PG.Dip. (Environmental and Water Engineering)

- (a) A first Degree in Engineering/Science (SLQF L5) acceptable to the Faculty Higher Degrees Committee or
- (b) Such other qualification equivalent to a first Degree in Engineering/Science (SLQF L5) as may be recommended by the Faculty Higher Degrees Committee as suitable for candidature for PG.Dip., in a field related to the programme of study.

3.2 Degree of Master of Engineering (SLQF L9): M.Eng. Env&Water

- (a) A first Degree in Engineering of at least 120 credits (SLQF L6) with First or Second Class Honours or
- (b) A first Degree in Engineering of at least 120 credits (SLQF L6) with acceptable postgraduate qualifications or a minimum of one year's experience after obtaining the Degree, in a field related to the programme of study or
- (c) Such other qualification equivalent to a first Degree in Engineering of at least 120 credits (SLQF L6) as may be recommended by the Faculty Higher Degrees Committee as suitable for candidature for the M.Eng. Degree with a minimum of one year's experience, after obtaining such qualification, in a field related to the programme of study.

3.3 Degree of Master of the Science of Engineering (SLQF L10): M.Sc.Eng. (Environmental and Water Engineering)

- (a) A first Degree in Engineering of at least 120 credits (SLQF L6) with First or Second Class Honours or
- (b) A first Degree in Engineering of at least 120 credits (SLQF L6) with acceptable postgraduate qualifications or a minimum of one year's experience after obtaining the Degree, in a field related to the programme of study or
- (c) Such other qualification equivalent to a first Degree in Engineering of at least 120 credits (SLQF L6) as may be recommended by the Faculty Higher Degrees Committee as suitable for candidature for the M.Sc.Eng. Degree with a minimum of one year's experience, after obtaining such qualification, in a field related to the programme of study.

4. COURSE REQUIREMENTS AND THE DURATIONS

4.1 Postgraduate Diploma (SLQF L8): PG.Dip. (Environmental and Water Engineering)

4.1.1 Course requirements

In order to be eligible for the award of the Postgraduate Diploma in Environmental and Water Engineering, a student shall have satisfied the following requirements.

A total of 25 credits earned with at least 2.75 GPA from prescribed courses including an independent study of at least 3 credits.

4.1.2 Minimum and Maximum Duration

The duration of the PG.Dip. programme shall be ten (10) months (minimum).

To be eligible for the award of the Postgraduate Diploma, a student shall fulfill all stipulated requirements within 2 years from the date of registration on a full-time basis (3 years on a part-time basis) or as decided otherwise by the Faculty Board on the recommendation of FHDC under special circumstances.

4.2 Degree of Master of Engineering (SLQF L9): M.Eng. Env&Water

4.2.1 Course requirement

In order to be eligible for the award of M.Eng. Env&Water Degree a student shall have a total of 30 credits earned with at least 3.0 GPA from the prescribed courses including an advanced study of at least 5 credits.

4.2.2 Minimum and Maximum Duration

The duration of the prescribed programme shall be twelve (12) months (minimum).

In order to be eligible for the award of the Degree of M.Eng., a student shall fulfill all stipulated requirements within 3 years from the date of registration on a full-time basis (4.5 years on a part-time basis) or as decided otherwise by the Faculty Board on the recommendation of FHDC under special circumstances.

4.3 Degree of Master of the Science of Engineering (SLQF L10): M.Sc.Eng. (Environmental and Water Engineering)

4.3.1 Course requirement

In order to be eligible for the award of M.Sc.Eng. Degree a student shall have;

- (i) earned a total of 30 credits from the prescribed courses with at least 3.0 GPA And
- (ii) successfully completed a research study of 30 credits.

4.3.2 Minimum and Maximum Duration

The duration of the prescribed programme shall be 2 years (minimum).

In order to be eligible for the award of the Degree of M.Sc.Eng., a student shall fulfill all stipulated requirements within 4 years from the date of registration on a full-time basis (6 years on a part-time basis) or as decided otherwise by the Faculty Board on the recommendation of FHDC under special circumstances.

5. COURSE FEE

- Rs. 350,000.00 for Postgraduate Diploma (SLQF L8)
- Rs. 400,000.00 for Degree of Master of Engineering (SLQF L9)
- Rs. 475, 000.00 for Degree of Master of the Science of Engineering (SLQF L10)

In addition to above fee a refundable library deposit of Rs. 10,000.00 and Standard Library Deposit of Rs. 4,000.00 should be paid at the time of the registration for the postgraduate programme.

6. APPLICATION PROCEDURE

Applications for enrolment must be submitted online through <https://pgciviladmissions.eng.pdn.ac.lk/login> on or before **22nd of November 2021**.

The following documents should be uploaded along with the duly completed application:

- a) Degree/Diploma/Professional membership certificates and Academic Transcript.

- b) Two Referee Reports (Online). At least one should be from the applicant's teacher at the University.
- c) Birth certificate and National Identity Card.
- d) Letter of consent on granting leave to engage in PG study from the employer (where applicable).
- e) Application processing fee - Proof of payment (deposit slip)
- f) Recent colour photograph (passport posture)

Originals of documents of which the scanned copies are submitted should be produced before admission, on request. Also, applicant should arrange to send the official transcripts directly by the educational institutions concerned to the **Assistant Registrar, Faculty of Engineering, University of Peradeniya, Peradeniya.**

In the event of any discrepancy between the name appearing in the applicant's academic/professional/birth certificates and the name given by the applicant in the application, an affidavit to the effect that the applicant is the one and the same person known by all such names should be sent together with the application form.

Documents submitted in support of an application shall become the property of the University. The applicants will be informed of their acceptance/non-acceptance to the particular programme for which admission has been sought.

A payment of Rs. 2,000.00 has to be done to the below account as the non-refundable application processing fee.

Bank : Bank of Ceylon

Branch : Peradeniya

Name of Account : Research and Fund Account

Account Number : 001274688

Applications which are received late/or are incomplete in any respect are liable to be rejected. **Only shortlisted applicants will be called for an interview.**

The University may at its discretion refuse admission to any applicant.

For inquiries please contact the Coordinator of the programme Dr.(Mrs.) Chandima Gunawardana, Dept. of Civil Eng., Univ. of Peradeniya, Tel: 081 239 3569 e-mail: chandimag@pdn.ac.lk