



UNIVERSITY OF PERADENIYA
DEPARTMENT OF CIVIL ENGINEERING

**POSTGRADUATE PROGRAMMES IN SUSTAINABLE BUILT
ENVIRONMENT**

YEAR 2024

1. INTRODUCTION

Conventional practices of global development have caused many issues such as climate change due to Green House Gas emissions, and reduction in limited natural resources. The built environment and operation of associated industrial activities have been identified as the main consumer of resources and the major contributor to the climate change and other environmental issues. As such, a significant improvement of global environmental conditions could be achieved through effective interventions at planning, design, construction and operation stages of built environment. Accordingly sustainable built environment has been identified as a global trend in the infrastructure development.

This course focuses on introducing the concepts and methods of reducing the environmental burden of activities related to the built environment. The students of this programme will have an opportunity to expose themselves to the concept of “Green Building Techniques” applicable in many disciplines of engineering. The main objective of this programme is the capacity building in the area of sustainable built environment. Further, the graduates will be capable of practicing the concepts of green building techniques in their respective areas of specializations. In addition, they will be eligible to apply to become a Green Building Certified Professional (GBCP) who is authorized by the Green Building Council Sri Lanka (GBCSL) to assess buildings for the award of “Green Building Rating” in Sri Lanka.

This postgraduate programme is conducted by the Department of Civil Engineering, University of Peradeniya. The students have the option of registering either for a postgraduate diploma or a master degree. The course consists of taught courses, industrial assignments, laboratory and design exercises and a research project. The Faculty of Engineering, University of Peradeniya, has excellent physical facilities and a team of highly qualified academic staff to conduct the programme. Further, visiting national and international experts from industry and academia will contribute as resource personnel.

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. K. D. W. Nandalal	BScEng, MEng, PhD, FIE(SL) , CEng
Prof. P. B. R. Dissanayake	BScEng, MEng, PhD, CEng, FIE (SL)
Prof. K. P. P. Pathirana	BScEng, MSc, PhD, CEng, FIE(SL), MICE, Int.PE
Prof. G. B. B. Herath	BScEng, MEng, PhD
Prof. D. G. G. P. Karunaratne	BScEng, PhD
Prof. K. G. N. Nanayakkara	BScEng, PhD

Prof. C. S. Kalpage	BScEng, PhD, AMIChemE, AMIESL
Prof. S. D. G. S. P. Gunawardena	BScEng, PhD
Prof. D. A. A. C. Rathnaweera	BScEng, PhD
Prof. C. K. Benaragama	BSc, PGCTm, MSc, MPhil, PhD
Prof. M. Danthurebandara	BScEng, PhD
Prof. K.M.A.K. Kulathunga	BScEng, PhD, CMILT, MIEEE, AP-GBCSL AMIESL
Prof. C. S. Bandara	BScEng, MScEng, PhD, CEng, MIE (SL)
Ms. K.K.K. Sylva	BScEng, MEng, MBA
Dr. H. A. D. S. Buddhika	BScEng, MEng, PhD
Dr. T. D. C. M. K. Gunawardena	BScEng, PhD
Dr. P. J. Binduhewa	BScEng, PhD, MIEEE
Mr. D. D. Dias	BScEng, MSc
Mr. Nirodha Gunadasa	B.Sc.(B.E.)(Hons.),M.Sc.(Arch.), AIA(SL),GREENSL@AP
Mr. S.S. Kosgolla	BSc, MSc

2. PROGRAMME STRUCTURE, DURATION 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	June to October 2024 (5 months)
Term II	November 2024 to March 2025 (5 months)
Independent study/ Advanced study/ Advanced Research Study	Term I and Term II and then Continue after March 2025

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 (6 courses x 3 credits)	18
2	From elective courses:	
	PG. Dip. (Level 8)	4
	Masters (Level 9)	7
	M.Sc. (Level 10)	12

2.1 COURSES OFFERED (Subject to approval)

		Compulsory Subjects		
Course Code	Course Title		Credits	
CE690	Fundamentals of Architecture and Economics for Sustainable Planning		3	
CE691	Infrastructure Planning for Sustainable Cities		3	
CE692	Global Environmental Issues and Built Environment		3	
CE693	Building Services Engineering		3	
CE694	Green ^{SL} Rating System for Built Environment		3	
CE696	Sustainable Construction		3	
		Optional Courses		
Course Code	Course Title		Credits	
CE 6101	Research Methods in Civil Engineering		2	
CE 6205	Water Resources Project Planning		3	
CE 6207	Climate Change Impact and Adaptation in Water Sector		2	
CE 6210	GIS and Remote Sensing in Water Resources		2	
CE 6214	Integrated Water Resource Management		2	
CE 6314	Mitigation and Control of Natural Geo-hazards		2	
CE 666	Road Safety and Environment		3	
Research Courses				
SLQF Level	Course Code	Course Title	Credits	Diploma/Degree
SLQF Level 8	CE6102	Advanced Study	3	PG Diploma in Sustainable Built Environment
SLQF Level 9	CE6103	Research Study	5	Master of Sustainable Built Environment
SLQF Level 10	CE6104	Advanced Research Study	30	Master of the Science

3. ADMISSION REQUIREMENTS FOR THE PROGRAMMES

The postgraduate programmes leading to the following qualifications are available in the postgraduate programmes in Sustainable Built Environment.

Postgraduate Diploma (SLQF L8) : *PG.Dip. (Sustainable Built Environment)*

Degree of Master of Science (SLQF L9) : *MSustBlEnv (Sustainable Built Environment)*

Degree of Master of the Science (SLQF L10) : *M.Sc.(Sustainable Built Environment)*

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.

- (a) A first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management (SLQF L5) acceptable to the Faculty Higher Degrees Committee or
- (b) Such other qualification equivalent to a first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management (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 Science (SLQF L9): MSustBlEnv (Sustainable Built Environment)

- (a) A first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management (SLQF L5) with First or Second Class Honours or
- (b) A first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management (SLQF L5) 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/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management (SLQF L5) as may be recommended by the Faculty Higher Degrees Committee as suitable for candidature for the Masters 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 (SLQF L10): M.Sc. (Sustainable Built Environment)

- (a) A first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management of at least 120 credits (SLQF L6) with First or Second Class Honours or

- (b) A first Degree in Engineering/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management 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/Science, Architecture, Town & Country Planning, Building Economics and Transport and Logistics Management 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. 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. (Sustainable Built Environment)

4.1.1 Course requirements

In order to be eligible for the award of the Diploma in Sustainable Built Environment, 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 advanced 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 Masters Degree (SLQF L9): MSustBltEnv (Sustainable Built Environment)

4.2.1 Course requirement

In order to be eligible for the award of the Masters 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 Masters Degree, 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 Faculty Higher Degrees Committee (FHDC) under special circumstances.

4.3 Degree of Master of Science (SLQF L10): M.Sc. (Sustainable Built Environment)

4.3.1 Course requirement

In order to be eligible for the award of M.Sc. 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., 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

	M.Sc.Eng. (SLQF L10)	M.Eng. (SLQF L9)	PG.Dip. (SLQF L8)
Local candidates	Rs. 575,000.00	Rs. 500,000.00	Rs. 450,000.00
SAARC countries	USD 3000	USD 2500	USD 2000
Other countries	USD 5000	USD 4000	USD 3000

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 through

<https://pgciviladmissions.eng.pdn.ac.lk/login> on or before **26th of April 2024**.

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)

Hard copies of documents (a) – (e) above **should be posted to the Coordinator/ PG Programmes in Civil Engineering, Department of Civil Engineering, University of Peradeniya, Peradeniya.**

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.

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

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.

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 Course Secretary, Postgraduate Unit. (Tel- 0717691566
e-mail: pg.civil@eng.pdn.ac.lk)

COURSE DETAILS

CE 690 **FUNDAMENTALS OF ARCHITECTURE AND ECONOMICS OF SUSTAINABLE PLANNING** (Compulsory)

Fundamentals of Architecture: Sustainable architecture, sustainable landscape practices. **Economics for Sustainable Planning:** economic appraisal methods, lifecycle costing, asset management, value engineering, Environmental economics, sustainability and economics.
Discussion of Case Studies

CE 691 **INFRASTRUCTURE PLANNING FOR SUSTAINABLE CITIES** (Compulsory)

Fundamentals of Infrastructure Planning. Concept of Sustainability as applied to Infrastructure Planning, **Land-Use Planning and Urban Form for Energy-Efficiency;** Urban Growth Patterns. **Urban and Rural Transport Planning;** Sustainable Accessibility for Cities and Communities. **Social Infrastructure Planning;** Shelter Health, Education, Employment, Administration, Safety, Recreation and Cultural. **Utility Networks and Facility Location. Infrastructure Planning for Emergencies. Social Organisation and Urban Psychology. Discussion of case studies**

CE 692 **GLOBAL ENVIRONMENTAL ISSUES AND BUILT ENVIRONMENT** (Compulsory)

Global Environmental Issues: Global warming & climate change, Acid rains, Ozone layer depletion, overconsumption of resources, Loss of biodiversity. **Environmental Impact from Construction Industry:** Direct and indirect impacts, evaluation of overall impacts through LCA and carbon footprint. **Mitigation of impacts:** introduction to sustainable construction industry. **Management and treatment of waste in built environments:** Sustainable resource consumption, Prevention and reduction of waste generation, Wastewater and sewage treatment, Solid waste management. **Mitigation of indoor air pollution:** causes of indoor air pollution, health effect and mitigation of indoor air pollution. **Environmental Management systems:** ISO14001 in construction industry.

CE 693 **BUILDING SERVICES ENGINEERING** (Compulsory)

Introduction to building services engineering: HVAC Systems and thermal comfort, Fire and safety, Acoustics, Lighting, Electromechanical systems, Building Management Systems (BMS), Preventive Maintenance for sustainable operations. **Building energy:** New energy saving techniques, Renewable energy, Energy storages. **Energy management systems:** ISO50001 in built environment, Introduction to energy auditing methods. **Industrial case studies.**

CE 694 GREEN^{SL} RATING SYSTEM FOR BUILT ENVIRONMENT (Compulsory)

Management of building systems. Sustainable sites of building systems. Water efficiency. Energy and atmosphere. Materials and resources. Indoor environmental quality. Innovation and design process. Society and Cultural awareness. Industrial case studies

CE 696 SUSTAINABLE CONSTRUCTION (Compulsory)

The principles of sustainable construction. Management of construction waste. Occupational health and safety. Modular construction. Lean construction techniques. Understanding government procurement procedures, Working with the supply chain to develop sustainable solutions. Mitigation of environmental impacts due to construction. Renovation and retrofitting of structures. Case studies.

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 6205 WATER RESOURCES PROJECT PLANNING (Optional)

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 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 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 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 6314 MITIGATION AND CONTROL OF NATURAL GEO-HAZARDS
(Optional)**

Introduction to Geo-hazards: Different types of geo-hazards, causes for geo-hazards, case studies. **Rock falls and Landslides:** Classification of mass movements of soils and rocks, failure mechanisms, Investigation and instrumentation, Prevention, control and mitigation, Early warning systems. **Land Subsidence and Sinkholes:** Sinkholes, ground water depletion. **Volcano and Earthquakes :** Theory of plate tectonics, Volcanoes and Earthquakes. **Salinity intrusion:** Types, causes, mitigation methods. **Manmade hazards:** Eg. - Underground storage of hazardous waste, spill of hazardous materials, mining, land fills.

**CE 666 ROAD SAFETY AND ENVIRONMENT
(Optional)**

Introduction to road safety. Importance of road safety. Local and global statistics of road traffic crashes. **Crash reporting and collision diagrams.** Different crash reporting systems Concepts of collision diagrams Extracting important data for analysing. **Basics of crash Statistics.** Basic statistics to treat crash data. Data presentations. Predictions, regression analysis. **GIS applications in road .safety** Basics of GIS. GIS applications. **Factors that influence safety and analysis of safety data.** Identify reasons for crashes. Introduce accident blackspots. Introduce spatial distribution, time distribution and mad user group distribution. **Safety countermeasures.** Introduction to various countermeasures Selection of suitable countermeasures. Effectiveness of safety countermeasures. Implementing safety countermeasures. **Highway geometry and safety** Horizontal and vertical curve designs Access road Junctions. **Road signing and marking.** Standard road signings and marking. Effect of road signing and marking for safety and convenience Modifications necessary to meet local conditions. **Road safety audits.** Basic concepts in road safety auditing Different stages in road safety auditing. **Issues related to pedestrian safety** Introduction to Pedestrian facilities. Knowledge and Attitudes towards pedestrians facilities of different road user groups. Possible improvements to enhance the safety of pedestrians. Road Safety Management.