POSTGRADUATE INSTITUTE OF SCIENCE (PGIS)
UNIVERSITY OF PERADENIYA, SRI LANKA

Master of Disaster Management Degree Programme
(SLQF Level 9)

Master of Science (M.Sc.) in Disaster Management Degree Programme
(SLQF Level 10)

(Conducted jointly by the PGIS and the Faculty of Engineering, University of Peradeniya)

1. INTRODUCTION

During the last few decades, of the many natural hazards that are prevalent Sri Lanka, floods, landslides, droughts, cyclones and lightning have occurred more frequently causing severe damage to life and property. This situation has created awareness among policymakers that disaster management should emphasize risk identification and mitigation rather than the commonly practiced relief-oriented approach. The subject of disaster risk management has now assumed prime importance particularly in view of the devastating December 26th, 2004 tsunami that killed tens of thousands of people and destroyed several thousands of dwellings and other buildings.

Over the past several years, with the functioning of the Disaster Management Centre (DMC) under the Ministry of Disaster Management, disaster risk management infrastructure with an "All Hazards" approach has gradually got established. The capacity building process has been active at provincial, district and divisional administration levels, particularly in landslide and flood-prone areas. More recently these efforts are being directed also in tsunami affected areas. Short-term training and awareness programs are being periodically conducted by the DMC covering natural, technological and human-induced disasters.

This revised M.Sc. Programme proposes a value adding philosophy that allows graduates with different backgrounds to gain a focused understanding of disaster risk management and mitigation. The strategy is to train a broad base of professionals from diverse sectors that can integrate risk reduction appropriately in their practices. It also actively models the interdisciplinary aspect across natural, physical and social sciences as well as between practitioners and researchers. The programme reflects the notion that effective disaster risk management is an inter-sectoral activity requiring knowledge from a wide range of disciplines. These include an understanding of hazard processes, an appreciation of governance, poverty and household livelihoods as well as cognizance of health and illness on development potentials. The programme has, as its long-term objective, the sustainable training of well accomplished professionals who would be available to carry out a range of activities related to hazard, vulnerability, risk analysis and mitigation. This applies irrespective of whether they work in the state sector, private sector, nongovernmental organizations or research institutions. A possible outcome with wide-reaching

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Collaborating Institutions:

1. Institute for Disaster & Fragility Resilience (IDFR), The George Washington University, USA
2. Disaster Resilience Leadership Academy, Tulane University, USA
3. Asian Disaster Preparedness Center (ADPC), Thailand
4. University of Twenty (ITC), The Netherlands

consequences would be the appreciation that skilled professionals who can contribute to the effectiveness of disaster risk and its management. Their skills achieved in participatory risk assessment techniques, forecasting methods, environmental management and GIS applications should indeed satisfy the aspirations of Sri Lanka's Disaster Management Act approved by the Parliament.

2. OBJECTIVES OF THE PROGRAMME

The objective of this programme is to provide advanced and enhanced knowledge in Disaster Risk Management (DRM). At the completion of this course, the candidates will be able to fit into any DRM related enterprise or a research institute.

3. PROGRAMME ELIGIBILITY

Candidates should be proficient in English which will be the medium of instruction for the programme. The minimum requirements for enrolment

(a) Bachelor's degree in science-based disciplines.

or

(b) Bachelor's degree in other disciplines - Those applicants possessing a bachelor's degree in other disciplines should have at least 5 years of experience in disaster management activities, particularly in floods, landslides and tsunami affected and drought-stricken areas.

or

(c) any other equivalent qualifications acceptable to the PGIS.

4. PROGRAMME FEE

Category	**Programme Fee**	
	Master of Disaster Management degree programme	**M.Sc. in Disaster Management degree programme**
Local candidates	Rs. 200,000/-	Rs. 250,000/-
Foreign candidates	Rs. 400,000/-	Rs. 500,000/-

Students registered for the Master of Disaster Management degree programme shall pay the Programme fee in full or in two *(1/2 at the registration and the balance at the end of the first semester)* instalments. An additional payment of Rs. 50,000/- (or Rs. 100,000/- from foreign students) should be made at the end of the first year to continue for the M.Sc. in Disaster Management degree programme. Other payments including registration fee, medical fee, library subscription, examination fee and deposits (science and library) should be paid according to the procedure stipulated by the PGIS. (N.B. The Programme fees given above may be revised as per recommendation of the Board of Management of the PGIS.)

5. THE PROGRAMME STRUCTURE AND DURATION

The postgraduate degree programme in Disaster Management has following options for completion:

5.1 Master of Disaster Management Degree (SLQF Level 9)

The Master of Disaster Management degree can be obtained by completing course work only (without conducting any research project).

Course work, comprising of theory courses, and laboratory and/or fieldwork, shall be conducted over a period of two semesters of 15 weeks each. The total duration of the degree, including examinations, shall be about 12 months. Satisfactory completion of a minimum of 30 credits of course work with a GPA of not less than 3.00 is required for the successful completion of the Master of Disaster Management degree - SLQF Level 9 (Students who do not satisfy the above criteria but obtain a GPA in the range 2.75 to 2.99 for course work of 25 credits are eligible for the Postgraduate Diploma in Disaster Management - SLQF Level 8, and those who obtain a GPA in the range 2.75 to 2.99 for course work of 20 credits are eligible for Postgraduate Certificate - SLQF Level 7).

5.2 Master of Science (M.Sc.) in Disaster Management Degree (SLQF Level 10)

In addition to the requirements for the Master of Disaster Management Degree (Section 5.1), the M.Sc. Degree requires completion of a research project. The duration of the entire programme shall be 24 months inclusive of Section 5.1. Completion of all the requirements of Section 5.1 with a GPA of not less than 3.00 is a prerequisite for the M.Sc. Degree. The research project should be conducted on full-time basis during the second year. The research component is allocated 30 credits, totalling 60 credits for the entire programme. After successful completion of the programme, the student shall be eligible for the award of the M.Sc. in Disaster Management degree - SLQF Level 10 (Students who do not complete the research project within the stipulated time period shall be awarded the Master of Disaster Management degree - SLQF Level 9).

5.3 Extension of the programme for M.Phil. (SLQF Level 11) or Ph.D. (SLQF Level 12)

After conducting research for a period of six months in the M.Sc. degree programme (Section 5.2), students who have demonstrated exceptional progress may apply for upgrading the degree status to M.Phil. The student should continue the research project and any additional research work/assignments recommended by the PGIS for a total of two years (60 credits of research) to qualify for the award of the M.Phil. degree (SLQF Level 11).

During the second year of research, students who have demonstrated exceptional and continuous progress may apply for upgrading the degree status from M.Phil. to Ph.D. The student should continue the research project and any additional research work/assignments recommended by the PGIS for another year on full-time basis (additional 30 credits) to qualify for the award of the Ph.D. degree (SLQF Level 12).

Master of Disaster Management Degree Programme (SLQF Level 9)
Master of Science (M.Sc.) in Disaster Management Degree Programme (SLQF Level 10)

Programme Summary

Course Code[+]	*Course Title*	*Lecture hrs.*	*Practical/Field work hrs.*	*No. of Credits*
Preliminary Courses[++]				
EDM 401	Preliminary Courses in Earth Sciences	15	-	1
EDM 402	Preliminary Courses in Climate Sciences	15	-	1
EDM 403	Preliminary Courses in Engineering	15	-	1
EDM 404	Applications in Statistics	10	10	1
General Courses				
	Semester I			
EDM 501	Concepts of Disaster Risk Management	45	-	3
EDM 502	Introduction to Natural Hazards, Characteristics, Causes and Effects	45	-	3
EDM 503	Introduction to Climate Change	30	-	2
EDM 504	Coastal Hazards*	25	10	2
EDM 505	Hydro Meteorological Hazards in Sri Lanka*	10	10	1
EDM 506	Industrial Hazards*	15	-	1
EDM 507	Fire Hazards*	10	10	1
EDM 509	Public Health*	30		2
EDM 510	Agriculture and Veterinary Hazards*	15		1
	Semester II			
EDM 515	Applications of GIS & Remote Sensing in Disaster Risk Management	30	30	3
EDM 517	Landslide Occurrence, Causes, Identification and Mitigation in Sri Lanka*	15	-	1
EDM 519	Emergency Response Planning and Contingency Planning	40	10	3
EDM 520	Executive Leadership and Administrative Skills*	15	-	1
EDM 521	Need Assessment for Rehabilitation, Reconstruction and Recovery	25	10	2
EDM 599	Independent Study	500 notional hours		5
Specialized Courses[+++]				
CE 638	Urban/ Rural Planning and Hazard Mapping*	30	-	2
CE 639	Design of Structures for Cyclones and High Winds*	15	-	1
CE 668	Hazard Forecasting and Mitigation*	30	-	2
CE 669	Advanced Course on Landslides and Seismic Hazards*	30	-	2
CE 697	Advanced Course on Coastal and Hydrological Hazards*	30	-	2
CE 698	Mitigation of Industrial Hazards*	15	-	1
EDM 699/ CE 699	Research Project**	3000 notional hours (one-year duration)		30

[+] *Course Code changed from ESD to EDM.*

[++] *Preliminary courses are compulsory for those without sufficient background knowledge and they are not considered in the computation of the GPA.*

[+++]*CE 6XX courses will be offered by the Faculty of Engineering, University of Peradeniya.*

** Optional courses*

*** Compulsory for M.Sc. in Disaster Management degree* (*SLQF Level 10*)

6. PROGRAMME CONTENTS

Preliminary courses

Code	EDM 401
Title	**Preliminary Courses in Earth Sciences**
Credits	1
Compulsory/ optional/etc.	Compulsory for those who have not studied geology as a subject area at the degree level
Prerequisites	None
Aims	The aim of this course is to provide basic knowledge about Earth Sciences
Intended learning outcomes	Students who successfully complete this course will be able to, 1 explain basic concepts of geology. 2 apply basic geology knowledge in related courses offered under this M.Sc. programme.
Time allocation	Lectures: 15 hrs.
Content	Earth's structure and composition, development of continents and oceans, Theory of Plate Tectonics, Introduction to rocks and minerals, rock cycle, different types of rocks and their modes of formation; Methods of identification of rocks and minerals; Geology of Sri Lanka.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Understanding Earth, Frank Press and Raymond Siever (1998), 2nd Edition, W.H. Freeman & Company, UK
2. Environmental Geology (9th Edition), C.W. Montgomery (2011) McGraw Hill, USA
3. Arthur Holmes (1978) Principles of Physical Geology, Van Nostrand Reinhold, UK

Code	EDM 402
Title	**Preliminary Courses in Climate Sciences**
Credits	1
Compulsory/ optional	Compulsory for those who have not studied climate related courses at the degree level
Prerequisites	None
Aims	The aim of this course is to develop fundamental ideas of climate Sciences
Intended learning outcomes	Students who successfully complete this course will be able to, explain basic concepts of climate science.
Time allocation	Lectures: 15 hrs.
Content	Introduction to Atmosphere, climate parameters, Atmospheric circulation, Weather, Climatology and Meteorology.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Introduction to Climatology For the Tropics, J. O Ayoada, 1983, John Wiley and Sons, New York.
2. Essentials of Meteorology, D.H McIntosh and A. S. Thom, 1981, Taylor & Francis Ltd., London.
3. The Earth's Atmosphere: Its physics and Dynamics, K. Saha, 2008, Springer

Code	EDM 403
Title	**Preliminary courses in Engineering**
Credits	1
Compulsory/ optional/etc.	Compulsory for those who have not studied engineering courses at the degree level
Prerequisites	None
Aims	The aim of this course is to give elementary knowledge in Engineering
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain basics concepts in physics and engineering. 2. describe and discuss engineering practices.
Time allocation	Lectures: 15 hrs.
Content	Forces and Equilibrium, Stresses and Strains, Strength and Failure, Dynamics, Momentum, Hydrostatics, Water Flow, Materials and their Engineering Behaviour, Engineering Solutions, Engineering Design and use of Codes of Practice

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Materials Science and Engineering: An Introduction, William D. Callister, David G. Rethwisch, John Wiley & Sons Canada, Limited, 2009
2. Engineering Fundamentals: An Introduction to Engineering, 4th Edition, S. Moaveni, 2010, Amazon

Code	EDM 404
Title	**Applications in Statistics**
Credits	1
Compulsory/ optional/etc.	Compulsory for those who have not studied statistics at the degree level
Prerequisites	None
Aims	The aim of this course is to develop basis knowledge in application of statistics
Intended learning outcomes	Students who successfully complete this course will be able to, 1. design scientific experiments. 2. analyse both qualitative and quantitative data. 3. derive valid conclusions and present the outcome. 4. use common statistical packages for analysing data.
Time allocation	Lectures: 10 hrs. Practical: 10 hrs.
Content	Population and sample; Measures of central tendency and dispersion; Introduction to probability; The Rules of probability, Independence and Conditional Probability; Normal distribution and calculation of probabilities; Distribution of sample mean and the sample variance; Confidence Intervals; Principles of hypothesis testing, Two sample paired and non-paired 't' test; Simple Linear Regression and Multiple Linear Regression; Analysis of 2-dimensional categorical tables (chi-square test).

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Introduction to Statistics - J.S. Milton, J. Susan, J.J. Corbet, P.M. McTeer Published by McGraw Hill, Boston, MA, 1997
2. Statistics - R.S.N. Pillai, V. Bagavath, S Chand Limited, 2008
3. https://people.richland.edu/james/lecture/m113/ Introduction to Applied Statistics: Lecture Notes

General Courses

Code	EDM 501
Title	**Concepts of Disaster Risk Management(DRM)**
Credits	3
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	The aim of this course is to introduce concepts of disaster risk management
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain common terms used in disaster risk management. 2. outline the historical development of disaster risk management concept. 3. describe selected models for disaster risk management. 4. explain the risk management process. 5. discuss activities to be undertaken during before, during and after disaster impact. 6. describe the concept of resilience and discuss community resilience building. 7. explain policy and institutional framework for disaster risk management in Sri Lanka. 8. discuss the necessity to mainstream disaster risk reduction into development planning.
Time allocation	Lectures: 45 hrs.
Content	Concepts and Terminology in Disaster Management; Historical Perspective of Disaster Management; Global Initiatives and Partnerships for Disaster Risk Management, past, Present and Future (HFA, MDGs, Millennium Ecosystem Assessment, Post HFA); Disaster Management (DM), Disaster Risk Reduction (DRR) and Disaster Risk Management(DRM); Hazard Assessment; Vulnerability Assessment; Risk Assessment, Risk prioritization; Risk indicators and risk profiles; Risk Perception; Prevention and Mitigation; Preparedness, Early Warning; Relief and Response; Understanding Resilience and application of the concept; Post disaster Rapid Appraisal of damage (introduction); Post Disaster Recovery Needs Assessment (PDNA) (introduction); Rehabilitation, reconstruction and recovery (introduction); Models of Disaster Management; Models of Disaster Risk Management (DRM) ; Policy, Legal and Institutional Framework for Disaster Management in Sri Lanka; Development and prospective risks ; Mainstreaming DRM into Development; Communication for DRM; Implications of Governance; Community based risk reduction strategies

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1 Characteristics of a Disaster Resilient Community, DFID Twigg, John. (2007).

2 At Risk: Natural Hazards, People's Vulnerability and Disasters, Ben Wisner, Piers Blaikie, Terry Cannon and I Davis, Pieter van Gelder, 2004.

3 UN/ISDR (International Strategy for Disaster Reduction) (2004) Living with Risk: A Global Review of Disaster Reduction Initiatives, Geneva: UN Publications

4 Natural Disasters, Abbott, P. L. (2004). Fourth Edition. New York: Mc Graw Hill.

Code	EDM 502
Title	**Introduction to Natural Hazards, characteristics, causes and effects**
Credits	3
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	The aim of this course is to identify natural hazards, causes and their impacts.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. describe a classification of natural hazards. 2. explain hazard specific characteristics, causes, effects and potential for secondary hazards. 3. outline the hazard profile of Sri Lanka
Time allocation	Lectures: 45 hrs.
Content	Classification of natural hazards, Historical trends and geographical distribution, Impact on natural and built environments, Hazard specific study of characteristics, Hazard profile of Sri Lanka, Causes and effects of Geophysical hazards, Hydro meteorological hazards and Biological hazards

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1 Bollin, C., C. Ca´ rdenas, H. Hahn and K.S. Vatsa (2003) Natural Disaster Network; Disaster Risk Management by Communities and Local Governments, Washington, D.C.: Inter-American Development Bank, available at http://www.iadb.org/sds/doc/GTZ%2DStudyFinal. pdf.

2 www.unisdr.org/publications

3 Disaster management: International Lessons in Risk Reduction, Response and Recovery. 2014 Publisher(s): Routledge

Code	EDM 503
Title	**Introduction to Climate Change**
Credits	2
Compulsory/ optional	Compulsory
Prerequisites	EDM 402
Aims	The aim of this course is to introduce the concepts of climate change
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain terminology used in the study of climate risk management. 2. describe the causes and effects of climate change. 3. discuss the influence of Climate Change and ENSO on hydro meteorological hazards and the convergence of climate risk management and disaster risk management. 4. discuss global initiatives to combat climate change.
Time allocation	Lectures: 30 hrs.
Content	Terminology in Climate Risk Management (CRM); Science of Climate change; Climate scenarios and modeling: Climate change impacts; Global Approaches to Climate Risk Management; Convergence between CRM and DRM; ENSO; Adaptation to climate change

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Venton, Paul and La Trobe, Sarah. (2008). *Linking Climate Change Adaptation and Disaster*. Teddington, UK: Tearfund
2. Mitchell T, van Aalst M and Villanueva PS (2010) Assessing progress on integrating Disaster Risk Reduction and Climate Change Adaptation in Development

Processes, Strengthening Climate Resilience Discussion Paper 2, Institute of Development Studies, UK.
3. www.ipcc.ch

Code	EDM 504
Title	**Coastal Hazards in Sri Lanka**
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide detailed knowledge on coastal hazards
Intended learning outcomes	Students who successfully complete this course will be able to, 1. describe and discuss different coastal hazards and their impacts. 2. explain potential mitigation measures for coastal hazards. 3. discuss forecasting of Coastal Hazards.
Time allocation	Lectures: 25 hrs. Particles 10 hrs
Content	Causes, locations, modes of occurrence of different coastal hazards such as Storm Surges, Coastal Flooding, Coastal Erosion, Tsunamis, Oil Spills, Marine Pollution and Sea Level Rise. Their causes and impacts, Forecasting and Modelling studies for coastal hazards.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Coastal Hazards, Charles W. Finkl, (Ed.), 2013, Springer
2. Costal Environments, Focus on Asian Coastal Regions,
V. Subramanian, (Ed.), jointly published with Capital Publishing Company, 2012
3. The Causes of Social Vulnerability to Coastal Hazards in Southeast Asia, Lele Zou and Frank Thomalla, book chapter; Organisation: Macquarie University, 2010
4. UNEP. (2004). Assesing Coastal Vulnerability: Developing A Global Index for Measuring Risk. The United Nations Environment Programme.

Code	EDM 505
Title	**Hydro-meteorological Hazards in Sri Lanka**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide detailed knowledge on Hydrological Hazards
Intended learning outcomes	Students who successfully complete this course will be able to, 1. describe the different types of hydro meteorological hazards and their secondary hazards that occur in Sri Lanka, their impacts. 2. discuss Forecasting and modelling of hydro meteorological hazards. 3. explain Mitigation of hydro meteorological hazards.
Time allocation	Lectures: 10 hrs. Particles 10 hrs
Content	Types of floods and their causes, physical characteristics and occurrence. Flood Forecasting, Hydraulic and hydrological modelling, Flood inundation modelling, Mitigation of floods. Cyclones/High Winds/Tornados, Their characteristics, Occurrence Impacts, Forecasting and Mitigation Frost, its occurrence and impacts Types of Droughts: Drought Indices, Their causes and Impacts, Drought Mitigation Impact of Climate Change on occurrence of hydro meteorological hazards

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Hydrologic Hazards Science at the U.S. Geological Survey by Geological Survey (U. S.) and National Research Council (U. S.), 1999
2. Handbook of Engineering Hydrology: Modeling, Climate Change, and Variability Published: 2014 Editor(s): Saeid Eslamian, CRC Press.
3. Linking Climate Change Adaptation and Disaster. Venton, Paul and La Trobe, Sarah. (2008). Teddington, UK: Tearfund

Code	EDM 506
Title	**Industrial Hazards**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to educate students about hazards connected with industries
Intended learning outcomes	Students who successfully complete this course will be able to, 1. identify possible accidents in factories and chemical plants and protection against contamination of the environment from leaking of toxic chemicals. 2. explain industrial pollution, effluent contamination and acid rain 3. identify risk involve in toxic materials and plan protective and safe toxic waste disposal technologies.
Time allocation	Lectures: 15 hrs.
Content	Accidents in factories and chemical plants. Protection against contamination of the environment from leaking of toxic chemicals. Industrial pollution, effluent contamination and acid rain. Monitoring and protective measures. Safe toxic waste disposal technologies.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Recognition of Health Hazards in Industry: A Review of Materials Processes, 2nd Edition , 1995 William A. Burgess.
2. Industrial Hazards and Plant Safety, Sanjoy Banerjee, 2002, CRC Press

Code	EDM 507
Title	**Fire Hazards**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide knowledge on fire hazards
Intended learning outcomes	Students who successfully complete this course will be able to, 1 identify different types of fires and describe fire hazards 2. identify risk involve in fire and plan safety measures, drills and evacuation procedures
Time allocation	Lectures: 10 hrs. Particles 10 hrs
Content	Fires due to natural, technological and human-induced causes. Bush fires: control and safety measures, evacuation, fire fighting procedures and relevant training programmes and drills.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Fire Hazard and Fire Risk Assessment, M. M. Hirschler
   ASTM International, 1992
2. Industrial Fire Hazards Handbook: A Guide to Fire Protection in Industry, Gordon P. McKinnon, Paul S. Tasner, Mary L. Hill, National Fire Protection Association, 1979

Code	EDM 509
Title	**Public Health**
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide fundamental knowledge of public health in relation to DRM
Intended learning outcomes	Students who successfully complete this course will be able to, 1 identify different types of epidemics and plan protective measures 2. identify human disasters due to air accidents and bomb explosions 3. develop victim identification capability and improve forensic pathology capabilities
Time allocation	Lectures: 30 hrs.
Content	Outbreak of Dengue and Malaria epidemics, contagious diseases e.g. AIDS. Protection and awareness. Ground water contamination; Water-borne diseases affecting bowels/kidney. Human disasters due to air accidents and bomb explosions, chemical and biological hazards/warfare development of field disaster victim identification capability and enhancement of forensic pathology capabilities

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Manual for the Public Health Management of Chemical Incidents, World Health Organization, 2009
2. Safety measures for use in outbreak of communicable diseases - Donald. J. Dunsmore
3. Management of dead bodies after disasters: A field manual for first responders. Pan American Health Organisation 2006. (can be down loaded)

Code	EDM 510
Title	**Agriculture and Veterinary Hazards**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to educate students on hazards associated with agriculture and veterinary
Intended learning outcomes	Students who successfully complete this course will be able to, 1, identify major problems associated with soil and remediation measures. 2. identify different spreadable diseases associated with plants and animals. 3. plan control and remedial methods.
Time allocation	Lectures: 15 hrs.
Content	Soil erosion and conservation measures, leaching of agricultural inputs to ground and surface waters, soil salinity, origin of heavy metals in soils and theri remediation, acidity alkalinity and their remediation, Locust outbreaks and their management. Brown plant hopper attacks in paddy, Foreign animal and plant species invasion, monitoring/forecasting. Coconut mite and beetle attacks. Salt water intrusion into crop fields. Remedial measures. Birds' Flu epidemics and protection and awareness measures. Foot and Mouth/Mad Cow disease. Educating Farmers.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Natural Disasters and Extreme Events in Agriculture: Impacts and Mitigation, M. V. K. Siva Kumar, Mannava VK Sivakumar, Raymond P. Motha, Haripada P. Das, Springer Science & Business Media, 2005
2. Veterinary Disaster Response, Wayne E. Wingfiel and Sally B. Palmer (Editors), 2009

Code	EDM 515
Title	**Applications of GIS & Remote Sensing in Disaster Risk Management**
Credits	3
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	To provide knowledge of principles and applications of GIS and Remote Sensing related to disaster risk management.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain theoretical basis of GIS and remote sensing as an analytical tool 2. develop competence of applying GIS and remote sensing as an analytical tool in disaster management
Time allocation	Lectures: 30 hrs. Practical: 30 hrs.
Content	Overview of concepts of Remote Sensing (RS) technology; Visual interpretation of aerial photographs and satellite imagery for land use, land pattern analysis, geological and structural analysis etc.); Basics of photogrammetric studies; Overview, history and concepts of GIS; Scope and application areas; Mapping Concept and Map/Projection Data Structure; Input of geospatial data; Concept of Spatial data base; Data acquisition, manipulation and analysis; Introduction to GPS and basic concepts. Integration of RS, GIS techniques and thematic map data and interpretation; Application of GIS for Risk Mapping

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1 Fundamentals of Remote Sensing, Canada Centre for Remote Sensing (can be downloaded)
2 Brian Tomaszewski, 2014 Geographic Information Systems (GIS) for Disaster Management, CRC Press,

Code	EDM 517
Title	**Landslide occurrence, causes, identification and mitigation in Sri Lanka**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide detailed knowledge on landslides
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain the scientific basis for the occurrence of landslides 2. discuss structural and non structural mitigation of landslides
Time allocation	Lectures: 15 hrs.
Content	Causes, Types and processes involved in landslide occurrence, Methodology for identification of slope movement. Non-structural and structural mitigation measures for landslides disaster management.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Hillslope Materials and Processes, M. J. Selby, Oxford University Press, Oxford.
2. Landslides- Investigation and Mitigation, Special report 247, A. Keith Turner, Robert L. Schuster, Transportation Research Board, National Research Council, National Academy Press, Washington, D. C. 1996.
3. Landslides- processes, prediction, and Landuse, Roy C. Sidle, Hirotaka Ochiai, American Geophysical Union, Washington, DC.

Code	EDM 519
Title	**Emergency Response Planning and Contingency Planning**
Credits	3
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	The aim of this course is to provide essential knowledge in emergency management planning and contingency planning
Intended learning outcomes	Students who successfully complete this course will be able to, 1. describe the components of an Emergency Response Plan 2. explain Incident Command system 3. discuss the difference between an Emergency Response Plan and a contingency Plan 4. explain what a Standard Operation Procedure is (SOP) 5. list and explain different levels of Contingency Planning 6. explain the step by step process of contingency planning 7. list the content areas that should go into a contingency plan
Time allocation	Lectures: 40 hrs. Practical: 10 hrs.
Content	Emergency Response activities; Response Planning Process; Emergency Operations Management and Incident Command Systems; Humanitarian Coordination, Logistics and Supply; Standard Operation Procedures; SPHERE Standards, Psycho-social counselling (trauma counselling); Humanitarian Accountability, Contingency Planning Process, Components of a Contingency Plan; Livelihood Support during response

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Response and Contingency Planning Guide by the International Federation of Red Cross and Red Crescent Societies (IFRC).
2. Inter Agency Planning Guide for Humanitarian Assistance compiled by the Inter-Agency Standing Committee (IASC)
3. Principles of Emergency Planning and Management, David Alexander, 2002

Code	EDM 520
Title	**Executive Leadership and administrative skills**
Credits	1 credit
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to provide necessary knowledge to improve their leadership and administrative skills
Intended learning outcomes	At the end of successful completion of the course, students will be able to, 1. explain leadership qualities and skill 2 .identify the strengths and weaknesses of leadership styles 3. analyse the impact of economic, social and technological issues and provide public safety from a strategic leadership perspective
Time allocation	Lectures: 15 hrs.
Content	Leadership qualities, capacity and decision making skills, problem solving skills, executive management to meet the needs of police, law enforcement and public safety organisations; Analysis of policing and public safety from a strategic leadership perspective, and the impact of economic, social and technological issues; understanding of the strengths and weaknesses of leadership styles.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. The Secrets of Resilient Leadership: Essential Characteristics for Leading in Adversity George S. Everly, Douglas A. Strouse, George S. Everly
2. Disaster Management Handbook, Jack Pinkowski, Editor, 2008, CRC Press
3. Northouse, G. (2007). Leadership theory and practice (3rd ed.) Thousand Oak, London, New Delhi, Sage Publications, Inc.

Code	EDM 521
Title	**Need Assessment for Rehabilitation, Reconstruction and Recovery**
Credits	2
Compulsory/ optional	Compulsory
Prerequisites	None
Aims	The aim of this course is to impart knowledge on different phases of rehabilitation and recovery
Intended learning outcomes	Students will be able to 1. explain the purpose of damage and need assessment. 2. distinguish between initial and detailed assessments. 3. describe and list the things that undergo assessment. 4. discuss features that contribute to a good assessment. 5. distinguish between the terms DANA, DaLA and PDNA.
Time allocation	Lectures: 25 hrs. Practical: 10 hrs.
Content	Process of rapid and detailed assessments and their purpose, Contents of rapid and detailed assessments, Damage Assessment and Needs Analysis (DANA), Damage and Loss Assessment (DALA) and Post Disaster Needs Assessment (PDNA); Linking Recovery and Reconstruction to Development;

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. South Pacific Disaster Reduction Programme (SPDRP), A Guide to Successful Damage and Needs Assessment, 1999.
2. http://www.em.gov.au/Documents/Manual27-DisasterLossAssessmentGuidelines.pdf
3. Review of Post Disaster Recovery Needs Assessment Methodologies, UNDP and IRP, (2007)

Course code	EDM 599
Course title	**Independent Study**
Credits	05
Compulsory/optional	Compulsory
Prerequisites	None
Time allocation	500 notional hrs.
Aims	Aims: The broad aim is to familiarize students with concepts and methods involved in scientific research **Specific aims:** 1. To explain the scientific process in the conduct of research. 2. To develop skills to write a review paper and a scientific research proposal.

	3. To develop skills to make a presentation. 4. To master the application of statistical methods on quantitative scientific data.
Intended learning outcomes	At the end of the successful completion of the course, students will be able to, 1. Understand the scientific method. 2. Conduct an independent review of literature on a selected topic in the area of disaster management.. 3. Write a formal scientific report conforming to the guidelines provided. 4. Transfer the knowledge gained through (2) and (3) above in the form of a presentation. 5. Complete a research proposal conforming to the guidelines provided. 6. Perform statistical analysis of quantitative data.
Content	*Review paper*: Review of literature; Development of the review paper in concise and professional manner and logical presentation of results that have been reported, writing the abstract, compilation of the list of references. *Proposal writing*: Interpretation and critical evaluation of results of published research; Formulation of a research problem: Concise literature review, justification, time frame, identification of resources, budgeting, etc. *Project*: Collection and statistical analysis of data on a topic associated with the review paper. *Seminar*: Presentation of literature and data collected on a given topic; Preparation of an abstract, preparation of slides.

Assessment criteria: Continuous Assessment

Components	Review paper	Proposal writing	Project	Seminar
%marks	20%	10%	40%	10%

Recommended Texts:

1. Backwell, J. and Martin, J. (2011) A Scientific Approach to Scientific Writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for Writing M.Sc. Project Report/M.Phil. Thesis/Ph.D. Thesis
3. Creswell, J. W. (2003). Research design: Qualitative, quantitative and mixed methods approaches (2nd ed.), Thousand Oaks, CA: SAGE.

Specialized Courses

Code	CE 638
Title	**Urban/ Rural Planning and Hazard Mapping**
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to train on urban/ rural planning to reduce disaster risk
Intended learning outcomes	Students who successfully complete this course will be able to, 1. demonstrate the knowledge of integration of hazard loss considerations in urban infrastructure and facilities planning, hazard mapping and zoning, building regulations,, evacuation route planning, etc. 2. apply this knowledge in various situations connected with disaster management.
Time allocation	Lectures: 30 hrs.
Content	Integration of hazard loss considerations in urban infrastructure planning, Facilities location and planning, Hazard mapping and zoning, Building regulations, Building codes, Performance standards, Shelters, Evacuation route planning. Practice of Disaster Management: How disaster mitigation is practised in different institutions within the country and outside will be discussed; this will also include presentation of case studies covering all hazards.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Reyes, Marqueza L (2006) Mainstreaming disaster risk reduction through land use planning and enhancing risk management practices, Earthquakes and Megacities Initiative (EMI)
2. www.unep.org/documents/default.asp?DocumentID=52&ArticleID...
3. Planning and Urban Design Standards, 2006, American Planning Association publication

Code	CE 639
Title	**Design of Structures for Cyclones and High Winds**
Credits	1
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is to train students in design of structures for cyclones and high winds.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. analyse both qualitative and quantitative impacts of cyclones and high winds. 2. design structures for cyclones and high winds.
Time allocation	Lectures: 15 hrs.
Content	Effect of wind forces on buildings and other structures; Assessment of wind pressure; Requirements for structural adequacy; Use of design codes for wind resistant design of masonry, steel and timber structures; Improved resistance to cyclones and high winds; foundations, walls, frames and roofs

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Advanced Structural Wind Engineering, **Tamura**, Yukio, **Kareem**, Ahsan, 2014(can be downloaded)
2. Wind loading of structures, J.D. Holmes, (2001), Spon Press, London

Code	CE 668
Title	**Hazard Forecasting and Mitigation**
Credits	2
Compulsory/ optional	Optional
Prerequisites	None
Aims	The aim of this course is give necessary knowledge regarding hazard forecasting and mitigation
Intended learning outcomes	Students who successfully complete this course will be able to, 1. explain hazard specific forecasting methods. 2. describe Early Warning Procedures for specific hazards. 3. discuss applications of climate outlooks.
Time allocation	Lectures: 30 hrs.
Content	Hazard Forecasting and Early Warning Systems: Introduction and historical background, Forecasting techniques, Stochastic modelling of natural and man-made hazards, Reliability analysis involving random loads (exposure) and resistances (vulnerability), Extreme-value probability models, Early warning systems: requirements, reliability, level of penetration, human response, communication. assessment, Evaluation of failure modes, Vulnerability reduction, Disaster-resistant construction techniques, Structural mitigation measures for tsunamis and storm surges, Flood damage mitigation techniques, Earthquake-resistant structures, Slope stability, Rehabilitation and Re-construction, Technologies for post-disaster repair of lifeline damage.

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Review the Existing Satellites, Early Warning Systems and Disaster Management Information System for Preparedness, Response and Recovery. Dutta, R. (2013).

2. Global Assessment Report on Disaster Reduction. Thematic Progress Review Sub-Component on Early Warning Systems, WMO (January, 2009).

Guidelines for Setting up a Community Based Flood Forecasting and Warning System (CBFFWS) Hernando, H.T. (2007).

Code	CE 669
Title	**Advanced Course on Landslides and Seismic Hazards**
Credits	2
Compulsory/ optional	Optional
Prerequisites	EDM 517
Aims	The aim of this course is to provide an advanced knowledge on landslide and seismic hazards.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. gain in-depth knowledge on different aspects of landslide and seismic hazards. 2. apply the knowledge to analyses landslides and seismic hazards and to take preventive, control, and remedial measures.
Time allocation	Lectures: 30 hrs.
Content	Basic characteristics of local soils/rocks, Permeability and seepage; Effective stress and shear strength; Mechanism and classification of landslides, Stability analyses; Preventive, control, and remedial measures; Seismic zonation; Seismic risk analysis; Soil liquefaction; Performance of infrastructure; Lifeline earthquake engineering

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Environmental hazards: assessing risk and reducing disaster, K Smith - 2013 – Can be down loaded

2. Landslides: processes, prediction, and land use, RC Sidle, H Ochiai - 2006 – Can be down loaded

Code	CE 697
Title	**Advanced Course on Coastal and Hydro meteorological Hazards**
Credits	2
Compulsory/ optional	Optional
Prerequisites	EDM 505
Aims	The aim of this course is to provide an advanced knowledge on costal and hydrological hazards.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. achieve necessary knowledge on different aspects of costal and hydrological hazards. 2. apply the knowledge to analyses and conduct research in the field of hydrological hazards.
Time allocation	Lectures: 30 hrs.
Content	Wave theories, Coastal environment and Coastal processes; Mechanics of near shore sediment transport; Hydrodynamics of tsunamis and storm surges; Numerical modeling of tsunamis and storm surges; Marine Pollution, Salinity intrusion, Oil slicks, Impact of sea level rise; Hydrological data analysis: extreme rainfall and runoff prediction, flood frequency analysis, flood flow regulation, real-time flood forecasting; General one-dimensional equations for unsteady flows: one-dimensional river flood routing, surge waves in canals, dam-break flood waves; Flood hazard and inundation modeling, urban flooding, flood control, Two-dimensional kinematic and diffusion wave models, contaminant transport modeling in surface and subsurface flow

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Coastal Hazards, Charles W. Finkl, (Ed.), 2013, Springer
2. Handbook of Engineering Hydrology: Modeling, Climate Change, and Variability

Published: 2014 Editor(s): Saeid Eslamian, CRC Press

Code	CE 698
Title	**Mitigation of Industrial Hazards**
Credits	1 credits
Compulsory/ optional	Optional
Prerequisites	EDM 506
Aims	The aim of this course is to provide knowledge on mitigation of industrial hazards.
Intended learning outcomes	Students who successfully complete this course will be able to, 1. gain knowledge on different aspects on mitigation of industrial hazards. 2. apply knowledge to mitigate of industrial hazards.
Time allocation	Lectures: 15 hrs.
Content	Hazard analysis at the design stage; Planning and Preparation of Response; Contingency plans for hazardous waste generators; Pollution incident prevention plan; Spill prevention, Control and countermeasure plan; Containment of hazardous spills; Sources of information

Assessment criteria

Continuous assessments	End-semester examination
50%	50%

Recommended texts:

1. Natural Hazard Mitigation, Alessandra Jerolleman, John J. Kiefer, November 26, 2012 by CRC Press
2. Industrial Hazards and Plant Safety, Sanjoy Banerjee, 27-Nov-2002 CRC Press,

Course code	EDM 699/ CED 699
Course title	**Research Project**
Credits	30
Compulsory/optional	Compulsory
Prerequisites	None
Time allocation	3000 notional hrs. (Twelve months, full-time)

Aims	To train students in collecting and evaluating scientific literature, generate hypothesis, planning and conducting of scientific research, analysing, handling and presenting scientific data and scientific writing.
Intended learning outcomes	Students will be 1. able to collect scientific literature related to a given topic. 2. able to generate hypothesis, plan and conduct scientific experiments, collect and analyse results and make inferences based on the results. 3. competent enough in oral presentation of scientific findings, report writing and preparation of manuscripts for publications. 4. Show a proficiency in knowledge in the subject area.
Content	The students will conduct sufficient amount of laboratory/field work on a chosen topic under the guidance provided by an assigned supervisor/s and produce a research report/thesis.

Assessment criteria

Thesis	Presentation
80%	20%

Recommended Texts:

1. Backwell, J. and Martin, J. (2011) A Scientific Approach to Scientific Writing, Springer.
2. Postgraduate Institute of Science (2016) Guidelines for Writing M.Sc. Project Report/M.Phil. Thesis/Ph.D. Thesis
3. Creswell, J. W. (2003). Research design: Qualitative, quantitative and mixed methods approaches (2nd ed.), Thousand Oaks, CA: SAGE.

7. PROGRAMME EVALUATION

Evaluation of Course work

Based on the scheme given below, the overall performance of a student in a given course shall be evaluated by the respective instructor(s) and a grade shall be assigned.

Evaluation Scheme

- For all courses a minimum of 80% attendance is expected.
- The evaluation of each course (except independent study and research project) shall be based on within course and end of course examinations, and assignments. The weightage of marks given below can generally be used as a guideline in the computation of the final grade, except for Independent Study and Research Project.

  End of course examination 50 - 60%
  Continuous assessments (mid-semester examination, assignments, etc.) 40 - 50%
- Courses with laboratory and/or fieldwork shall be evaluated, where applicable, on a continuous assessment basis.
- The minimum grade a student should achieve to pass a course is C.
- Students will be informed of the evaluation scheme by the instructor at the beginning of a given course.

Grade Points and Grade Point Average (GPA)

The Grade Point Average (GPA) will be computed using the grades earned for core courses and optional courses, taken for credit. Preliminary courses, industrial training, research project and seminar will be evaluated on a pass/fail basis.

On completion of the end of course examination, the instructor(s) is/are required to hand over the grades of a given course to the programme coordinator who will assign the Grade Points using the following table:

Grade	Grade Point
A+	4.0
A	4.0
A^-	3.7
B^+	3.3
B	3.0
B^-	2.7
C^+	2.3
C	2.0
F	0.0

The Grade Point Average (GPA) will be computed using the formula:

$$GPA = \frac{\Sigma c_i g_i}{\Sigma c_i},$$ where c_i = number of credit units for the i^{th} course, and g_i = grade point for the i^{th} course

Make-up Examinations
'Make-up' examinations may be given only to students who fail to sit a particular examination due to medical or other valid reasons acceptable to the PGIS.

Repeat Courses
If a student fails a course or wishes to improve his/her previous grade in a course, he/she shall repeat the course and course examinations at the next available opportunity. However, he/she may be exempted from repeating the course, and repeat only the course examinations if recommended by the teacher-in-charge or M.Sc. Programme Coordinator. The student may repeat the same course or a substituted (new) optional course in place of the original course. A student is allowed to repeat five credits of coursework free-of-charge. The maximum number of credits a candidate is allowed to repeat is fifteen. The maximum grade, a candidate could obtain at a repeat attempt is a B and he/she is allowed to repeat a given course only on two subsequent occasions.

Evaluation of Research Project

Research project will be evaluated on the basis of a written report (M.Sc. Thesis) and oral presentation (see PGIS website for the format of the Thesis).

7. PANEL OF TEACHERS

Prof. K.G.A. Dahanayake, Professor Emeritus, Department of Geology, University of Peradeniya
(Sedimentology)
Ph.D. (Ecole Nationale Superieuere de Geologie appliquee et de prospection miniere, France)

Prof. B.S.B. Karunaratne, Professor Emeritus, Department of Physics, University of Peradeniya (Materials Science)
Ph.D. (University of Warwick, UK)

Dr. S.W. Nawaratne, Deveni Rajasinghe Mw, Gatambe, Peradeniya (Economic Geology)
Ph.D. (University of Linz, Germany)

Dr. Rathnayake M. Abeyrathne, Department of Sociology, University of Peradeniya (Health and Medicine)
Ph.D. (University of London, UK)

Dr. A.A.J.K. Gunatilake, Department of Geology University of Peradeniya (Engineering Geology, GIS &RS)
Ph.D. (Saga University, Japan)

Prof. K. D. W. Nandalal, Department of Civil Engineering, University of Peradeniya (Water Resources Engineering)
Ph.D. (University of Wageningen, The Netherlands)

Prof. K.P.P. Pathirana, Department of Civil Engineering, University of Peradeniya (Coastal Engineering)
Ph.D. (Katholieke Universiteit Leuven, Belgium)

Dr. A.G.H.J. Edirisinghe, Department of Civil Engineering, University of Peradeniya (Slope stability analysis)
Ph.D. (Ehime University, Japan)

Dr. P.B.G. Dissanayake, Department of Civil Engineering, University of Peradeniya (Hydrology)
Ph.D. (University of Hong Kong, Hong Kong)

Dr. W.M.V.S.K. Wickramasinghe, Department of Civil Engineering, University of Peradeniya (Transportation Engineering)
Ph.D. (Hokkaido University, Japan)

Dr. D.G.G.P. Karunaratne, Department of Chemical Engineering, University of Peradeniya (Air pollution)
Ph.D. (University of Nova, Portugal)

Dr. Sachith P. Abeysundara, Department of Statistics, University of Peradeniya (Mathematics with concentration on Statistics)
Ph.D. (Texas Tech University, USA)

Dr. (Mrs) K. Pethiyagoda, Dept. of Community Medicine, University of Peradeniya (Occupational Health) MBBS.(Perad.), PhD (Birmingham),

Dr. H.A.G. Jayathissa, National Building Research Organization, 99/1 Jawatte Road, Colombo 05, (Engineering Geology)
Ph.D. (University of Tuebingen, Germany)

Dr. B.M.K. Perera, Talagolla, Dikkohupitiya, Hettimulla (Biology, Human Resource Management and Leadership)
M.Sc. (Peoples Friendship University, USSR), Ph.D. (Moscow Agricultural Academy)

Mr. K.R. Abhayasinghe, Former Director, Department of Meteorology, 94, Subhavasa, Kotaligoda, Menikdiwela (Atmospheric Physics)
M.Phil. (University of Colombo)

Ms. Anoja Senevirathne, Director, Disaster Management Centre, Colombo (Water Resources and Environment Management)
M.Sc. (ITC, Netherlands)

Mr. Malika Gunawardena, Nanuoya Rd, Kribathkumbura, Peradeniya (GIS)
M.Sc. (University of Peradeniya)

Mr. Dinudu Jayalath, Hatharaliyadde Rd, Mawathagama (GIS)
M.Sc. (University of Peradeniya)

Ms. Sanjeevani Nilmini Bandara Thaldena, Geophysicist, Geological Survey & Mines Bureau, No.569, Epitamulla Road, Pitakotte (Disaster Management, Seismology and Earthquake Engineering)
M.Sc. (Building Research Institute, Tokyo, Japan), Postgraduate Diploma (International Institute of Japan)

Outside Experts

Mr. P.N.R. Fernando, Chief Fire Officer, Fire Department, T B Jayah Mawatha, Colombo 10
Graduate & Corporate Member of the Institution of Fire Engineers U.K.
Diploma in Occupational Safety & Health - National Institute of Occupational Safety & Health

COORDINATORS

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