CURRICULUM REVISION PROGRAM
Enhancing Academic Program Quality by Integrating OBE-LCT
Funded by ELTA-ELSE -AHEAD Project
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka

Faculty of Social Sciences and Humanities

Rajarata University of Sri Lanka

Curriculum of

Bachelor of Arts Honours in Environmental Management

Department of Environmental Management

2020-2025

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Basic details of the degree program

	Degree Program			
1	**1.1**	Name of Degree Program	(English)	Bachelor of Arts Honours
			(Sinhala)	ශාස්ත්‍රවේදී ගෞරව
			(Tamil)	கௌரவ இளங்கலைமானி
	1.2	Name of Qualification	(English)	Bachelor of Arts Honours in Environmental Management
			(Sinhala)	පාරිසරික කළමනාකරණය-ශාස්ත්‍රවේදී ගෞරව
			(Tamil)	சூழலியல் முகாமைத்துவத்தில் கௌரவ இளங்கலைமானி
	1.3	Abbreviated Qualification	(English)	BAHons (Env Mgt)
2		Program Offering Entity		
	2.1	University	Rajarata University of Sri Lanka	
	2.2	Faculty	Faculty of Social Sciences and Humanities	
	2.3	Department	Department of Environmental Management	
3		**Details of the Degree Program**		
	3.1	Introduction to the program This program has been offered since 1996 as one of the 'special' degree programs of the Faculty of Social Sciences and Humanities. Since then, particularly from 2004 the program was reviewed by introducing course units relevant to the demand of the society. This review process enriched the quality and relevance of the program each year as annual minor revision for which Faculty Board and Senate approval was received. As a result, at the stage of the present major revision, the program consisted of most courses providing sufficient knowledge, skills and attitudes. This is one of the popular programs of the Faculty followed by a large number of students. However, systematic major curriculum revision has not been conducted. Meanwhile, AHEAD-ELTA-ELSE Project of the Faculty provided an opportunity to strengthen outcome based learning (OBE) and Learner Centered Teaching (LCT). Accordingly, The present curriculum of the program has been reviewed to meet the needs of the present and near future needs of the graduate level environmental managers. Further, the present program includes natural sciences, social sciences, management, and engineering aspects of environmental management capable of catering national and global needs. Purpose of this program is to provide a broad education in environmental management in order to equip graduates with knowledge, practice and methodology that enable them to obtain appropriate qualification and prepare them for research and practical oriented postgraduate studies. This qualification facilitates to consolidate and strengthen the student's knowledge in environmental management and to develop research capacity and skills in environmental management. This qualification demands a high level of theoretical engagement and intellectual independence. Further, this program includes a research component in the field of specialization carried out under the guidance and supervision of a qualification holder of level 10, 11 or 12 and reporting in a manner of a dissertation, which will be assessed. The research component is allocated 6 credits meeting the requirement of		

		SLQF level 6.
	3.2	**Methodology** By employing the below mentioned methodology, curriculum of the degree programme on BA (Hons) in Environmental Management offered by the Department of Environmental Management, Faculty of Social Sciences, Rajarata University of Sri Lanka was prepared with the consultation of Prof. Sunethra Thennakoon, Department of Geography, University of Sri Jayewardenepura and all the staff members of the department of Environmental Management including Dr.JMSB Jayasundara (HoD), Dr. PSK Rajapakshe (HoD) (Annexture 1: List of contributors). As the first step of the curriculum review process, all the staff members and the consultant were requested to attend a workshop in order to obtain a better understanding of the OBE (Outcome based Education) & LCT (Learner Centered Teaching) principles. The workshop was organized by the AHEAD ELTA ELSE grant and held 29th June 2020 at the Faculty of Social Sciences, Rajarata University with the service of resource person, Prof. Deepthi Bandara. Two formats received from the CQA were delivered among the staff members and the consultant through emails. With the proper understanding of the curriculum review process, two stakeholder workshops along with a questionnaire survey was conducted at two levels such as one in the University and the other in Colombo. A Regional Stakeholder workshop was held on 28th of August 2020 from 9.00 a.m. to 2.00 p.m. at the Environmental Management Laboratory in the departmental premises. The second stakeholder workshop (Colombo) was conducted on 7th September 2020 from 9.00 a.m. to 2.00 p.m. at the National Institute of Plantation Management (NIPM), Athurugiriya. The main aim of these workshops were to improve the existing curriculum by incorporating stakeholder views in order to achieve the OBE LCT principles and objectives. The specific objectives were to re-visit the course structure of the degree programme, identify highly demanding innovative courses which are required by the job market in Environmental management and to identify the most important socio-emotional (SE) and 21st century skills which are required by the potential employers. As per the schedule, the Acting Head of the Department, Dr. Sisira Rajapakse welcomed all the participants and explained the objectives of the workshop in detail. Then, in session 1 of two workshops, all participants were requested to express their common views on the existing curriculum and it was moderated by OBE-LCT AHEAD curriculum consultant Prof. Sunethra Thennakoon and HoD Dr. Jayasundara. In the second session, all participants were grouped into 4 and let them discuss the course structure and existing details in course specifications and the skills. At the third session on discussion and concluding remarks, all groups were presented their views and it was moderated by the same people. (Annexure 2: Programmes &List of Stakeholders). All stakeholders have reviewed the pre- circulated curriculum through emails and expressed their views, comments and suggestions towards the improvement of the existing curriculum of Environmental Management. The suggested views, comments, suggestions on course structure, course specifications, learning outcomes, and assessment methods were listed (Annexure 3: Views of Stakeholder workshops). Simultaneously, a questionnaire survey was undertaken to get their individual ideas on the existing curriculum specially related with the relevant institutions (Annexure 4: Questionnaire). Simultaneously, the Department conducted two stakeholder surveys to cover graduates and students of the same program. This was aimed at clarifying relevancy of courses offered at present and to analyze students' views and their satisfaction results of which were

		incorporated into the review process (Annexure: 05). At the third stage, comments, views, ideas and suggestions received from the two stakeholder workshops and questionnaire survey was reviewed & discussed by the above team at several meetings held through zoom and come up with compromised decision to incorporate them. Simultaneously, formats for preparing revised curriculum was given by the CQA of the University. By using the given format by the CQA, curriculum was prepared by the above team by incorporating by stakeholder views, and submitted for consultant's review. Meanwhile, the submitted course specifications were been reviewing by the consultant, a new format was given again by the CQA. Then, as third step, by using new format, the final curriculum was settled by the team again and reviewed at a meeting with all staff members and the consultant. As fourth step, final document of curriculum by aligning programme learning outcomes (PLO's), course objectives, Intending Learning Outcomes (ILO's), teaching strategies, self -learning activities and assessment methods. As final stage, revised curriculum was submitted for final review of the consultant and two evaluators.	
	3.3	**Objectives of the degree program** The objectives of this degree program are to: ● construct and sustain arguments in the discipline of Environmental Management; ● identify, analyze and solve environmental problems using appropriate theories, concepts, methods and techniques in a professional context; ● demonstrate thorough and systematic knowledge, skills and attitudes aiming at a paradigm shift in graduates' mindsets of core aspects of the environmental management; ● communicate information, ideas, issues, problems and solutions to specialist as well as non-specialist audiences; ● exercise initiative, cooperation, collective actions in conducting environmental activities; ● encourage further training and lifelong learning; ● develop ethical conduct, and leadership qualities, and ● enhance accountability and commitment towards the community.	
	3.4	Entry Qualifications	Completion of first academic year including environmental management as a subject of study in a bachelors degree program and being selected for Bachelors Honors program and other criteria as specified in the student prospectus.
	3.5	Volume of learning	Minimum 120 credits after SLQL 2 of which 90 credits after SLQL 3, of which 60 credits after SLQL 4, of which 30 credits after SLQL 5
	3.6	Progression	Completion of BA (Hons) (Env Mgt.) Degree meets the minimum entry requirement for admission to any SLQF level from 7 to 10 directly, or to SLQF level 11 or 12 after successful completion of a qualifying examination, in the same or a related subject. If the qualification holder possesses a minimum GPA of 3.0 in a scale of 0-4, even without a qualifying examination he/she may be admitted to SLQF level 11 or 12. Bachelor's degree of level 5 may be awarded for early exit from Bachelors Honors Degree program provided

			that the candidate has completed minimum of 30 credits in levels 5 and/or 6. A Higher Diploma may be awarded for those completing the requirements equivalent to SLQF Level 4.

Graduate Profile Illustration

Graduate Profile and Program Learning Outcomes

Graduate Profile	PLO	Program Learning Outcomes	Domain	Descriptor
Theoretical Knowledge	PLO1	Apply theoretical knowledge of Environmental Management to identify, analyze and solve the real-world problems	K	Theoretical knowledge rooted in Natural Sciences, Indigenous Knowledge System, Earth Sciences, Spiritual Knowledge Systems and Social Sciences Knowledge and stemmed out as natural environment, technology, management, environmental values and environmental economics
Creativity and Innovation	PLO2	Construct creative and innovative plans to solve environmental problems	S	Skills for engaging creative activities and managing and solving contemporary problems emerged in the working and living environment.
Investigation, Problem Analysis and Development of Solution	PLO3	Conduct scientific and methodical investigations, analyze environmental problems scientifically and produce sustainable solutions	S	Skills of conducting scientific and methodical investigations, applying principles of problem analysis and designing environmental activities, programs and projects from a multidisciplinary perspective.
ICT, Analytical and Numerical Skills	PLO4	Apply Information and Communication Technology, analytic and numerical methods for environmental decision making	S	Skills for analyzing environmental related issues using the ICT, GIS & RS, statistical, cartographic both spatial and aspatial data, techniques and specific environmental analytical tools such as EMS, EIA,MCDA, environmental footprint analysis, acquired through the learning process.
Modern analytical tool usage	PLO5	Apply modern tools for analyzing environmental problems	S	Skills of applying modern tools in analyzing environmental problems arise from human activities, environmental quality and pollution control
Managerial and decision-making skills	PLO6	Make methodical decisions to manage environmental problems	S	Skills for methodically managing and taking appropriate and timely decisions and implementing the same

Sustainability values	PLO7	Appreciate sustainability values in environmental decision making	A,M	Attitudes for dealing with communities in a humanistic manner sticking to environmental values
Professionalism and environmental responsibility	PLO8	Perform environmental activities with professionalism and responsibility	S,M	Skill of behaving to assure quality and efficiency through punctuality, good judgment, politeness, following guidelines and code of conduct
Communication	PLO9	Communicate environmental concepts and solutions to broader audience	S	Skills for efficient and effective dissemination of updated environmental knowledge (scientific publication, seminar presentation, public speaking, use ICT, print and electronic media, community engagement, conduct discussion and effective use of social media)
Team Work and Leadership	PLO10	Take leadership and participate in team work performing environmental activities	S	Participate actively in teams and professional networks, self-motivation, positive outlook, futuristic vision, correct decision making, proposal design, project planning and implementation, persuasion and influence others, achieving goals and targets
Project Management and Finance	PLO11	Manage environmental projects securing finance	S	Plan, secure financial, human and other resources, implement, monitor progress and make corrective actions for environmental projects
Entrepreneurship	PLO12	Perform entrepreneurial skills in conducting environmental activities and projects	S	Design and implement innovative solutions and activities to contemporary environmental issues
Life Long Learning	PLO13	Perform independent learning activities leading to future environmental career	S,M	Acquaint with conducting studies related to environmental management themes using all sources of knowledge, including online sources

Curriculum Mapping-Alignment of Course ILOs with PLOs

S/N	Course Code	Course Name	Type	Program Learning Outcomes (PLOs)												
				1	2	3	4	5	6	7	8	9	10	11	12	13
1	EMGT11012	Fundamentals of Environmental Management	Core	1,2, 3,4, 5												6
2	EMGT11022	Natural Environment	Core	1,2, 3,4, 5,6				2,4, 6								
3	EMGT11032	Environmental Ethics	Optional	1,2						1,2, 3,						
4	EMGT12012	Cartography	Core	1,2, 5		3			4							
5	EMGT12022	Environmental Hazards	Core	1,2, 3,4, 5,6	6	2,3, 4,5, 6,7			7	2,3, 4,5		1	6			7
6	EMGT21012	Geographic Information System	Core	1,2, 3,7			4, 5	6								
7	EMGT21022	Essential Science for Environmental Management	Core	1,2, 3,4, 5,6, 7		6,7 1,5	1, 5, 7	1,5, 7	7				1,2, 3,4, 5,6, 7			1,2, 3,4, 5,6, 7
8	EMGT21032	Environmental Policy and governance	Core	1,2, 3						4,5			6		7	8
9	EMGT21042	Statistics for Environmental Managers	Core	1,2, 3			4, 5, 6					4				6
10	EMGT21052	Economics for Environmental Management	Core	1,2			3				4					5
11	EMGT21062	Principles of Institutional Management	Core	1,2, 3,4, 5,					4, 5							
12	EMGT21071	Academic Writing in English	Core									1, 2, 3,				1

												4, 5				
13	EMGT21081	Personality Management for Environmental Leadership I	Core			1			1				2			1
14	EMGT22012	Environmental Economics	Core	1,2	3		4		5							6
15	EMGT22022	Environmental Management Systems	Core	1,2	3, 5	6			6		4	6	6		6	
16	EMGT22032	Biodiversity Management	Core	1,2, 3,4, 5	6	2,3, 4,5, 6, 7			6	3,4, 6	6		6,7			1,2, 3,4, 5,6, 7
17	EMGT22042	Environmental Impact Assessment	Core	1,2		3,4			5		6,7					
18	EMGT22052	Disaster Management	Core	1,2	3	4	5		6			7	7			8
19	EMGT22062	Waste Management	Core	1,2, 3	4		5			6		4				
20	EMGT31012	Environmental Legislations	Core	1		2,3, 4			5							
21	EMGT31022	Project Management	Core	1	2								3			
22	EMGT31032	Climate Change Science	Core	1,2, 3		3										
23	EMGT31042	Advanced Geographic Information Systems	Core	1,2	5	3,4	3, 4	5,6	5				6			
24	EMGT31052	Eco tourism	Optional	1,2, 3	4	5										
25	EMGT31062	Agroforestry and Sustainable Farming	Optional	1,2, 3,4, 5						1,2, 3,4, 5						
26	EMGT31072	Poverty & Environment	Optional	1,2, 3	2				3							
27	EMGT31081	Personal Management for Environmental Leadership II	Core	1							1		2			1,2
28	EMGT32012	Research Methodology	Core	1	1, 2	1,2	2									
29	EMGT32022	Environmental Sociology	Core	1,2		3	3		4		5			6		
30	EMGT32032	Applied Environmental Project	Core	1,2,		3	4, 3		3			3, 5				5

31	EMGT32042	Watershed Management	Core	1,2			3			1,2						4
32	EMGT32052	Environmental Quality and Standards	Core	1,2, 3,4, 5,6, 7,8		2,5	5	5	6, 8		5,8		8			1,2, 3,4, 5,6, 7,8
33	EMGT32062	Conservation Finance	Optional	1,2	3	4	5									
34	EMGT32072	Environmental Technology	Optional	1,4, 6,7	2, 3	2,3	3		2, 3		6	4, 5, 7	6,7	4		2,3
35	EMGT32082	Remote Sensing	Optional	1,2			3, 4, 5	3,4, 5	6							
36	EMGT32092	Environmental Accounting and Valuation	Optional	1,2	3	4					5		6			
37	EMGT32102	Environment & Health	Optional													
38	EMGT41012	Research Project Proposal Formulation	Core	1,2	3	4,5	7	6				9				8
39	EMGT41022	Data Analysis in Environmental Management	Core	1,2	2		3		4		5			4		
40	EMGT41032	Advanced Solid and Hazardous Waste Management	Optional	1,3	4	2		5				6				
41	EMGT41042	Marine Environment and Aquatic Resources Management	Core	1,2, 3,4		3			5		6				4	
42	EMGT41052	Application of Disaster Management	Optional	1,2			3	4		4	3		5	4		5
43	EMGT41062	Geo-informatics Application for Environmental Analysis	Optional			1,2, 3	4	5,6				5	5			6
44	EMGT41072	Application of Environmental Management Systems	Optional			1,2, 3										
45	EMGT41082	Advance Environmental and Natural Resource Economics	Optional	1,2, 3,4			1, 2		2		3			4		
46	EMGT41092	Climate Change Management	Optional	1,2, 3		1,2, 3,4										
47	EMGT42013	Industrial Training	Core			1	1		1, 2		1,2	1				1,2
48	EMGT42026	Dissertation	Core	1,2	2	3	4, 2	5	6, 4	7	8	9, 8	10	11 ,3		12

SLQF categories of learning and descriptors

Categories of Learning Outcomes (SLQF)	Descriptor
1. Theoretical Knowledge	Demonstrate an advanced knowledge and understanding of the core aspects of Environmental Management. Critically Analyze data, make judgments and propose solutions to environment related problems.
2. Practical Knowledge and Application	Use practical skills and enquiry efficiently and effectively within environmental management subject area.
3. Communication	Communicate/present information, ideas, issues and solutions efficiently and effectively. Demonstrate awareness of the current developments in environmental management.
4. Teamwork and Leadership	Exercise personal/team responsibility, and leadership in the professional environment/work place.
5. Creativity and Problem Solving	Construct and sustain arguments and use these arguments, ideas and techniques in problem solving for a given situation.
6. Managerial and Entrepreneurship	Take initiative, assume personal responsibility and demonstrate accountability and ability to instil entrepreneurship.
7. Information Usage and Management	Thorough in transferable skills related to ICT and information literacy.
8. Networking and Social Skills	Ability to work in teams, give leadership and promote social engagement.
9. Adaptability and Flexibility	Analyze and devise appropriate strategies for adapting to changing environments.
10. Attitudes, Values and Professionalism	Exercise initiative, personal responsibility and accountability in tasks performed. Demonstrate positive attitudes and social responsibility.
11. Vision for Life	Clearly identify where one wants to be and develop long term goals accordingly. Exercise and further develop the new competencies and assume major responsibilities with confidence.
12. Updating Self / Lifelong Learning	Undertake further training and develop additional skills that will enable them to make sound decisions. Engage in independent learning using scholarly reviews and secondary sources of information.

Mapping relationship of SLQF categories of learning to Graduate Attributes

Categories of Learning Outcomes (SLQF)	Graduate Attributes												
	1.Therotical Knowledge	2. Creativity and Innovation	3. Investigation, Problem Analysis and Development of solution	4. ICT, analytical and numerical skills	5. Modern Tool Usage	6. Managerial and decision-making skills	7. Sustainability values	8. Professionalism and environmental responsibility	9. Communication	10. Team Work and Leadership	11.Project Management and Finance	12.Entrepreneurship	13. Life Long Learning
1. Theoretical Knowledge	■												
2. Practical Knowledge and Application	■			■	■								
3. Communication				■					■				
4. Teamwork and Leadership										■			
5. Creativity and Problem Solving		■	■										
6. Managerial and Entrepreneurship						■				■	■	■	
7. Information Usage and Management				■									
8. Networking and Social Skills									■				
9. Adaptability and Flexibility								■					
10. Attitudes, Values and Professionalism							■	■		■			
11. Vision for Life							■						■
12. Updating Self / Lifelong Learning													■

Credit distribution of Bachelors of Arts Honours in Environmental Management

Year	Semester	Subject Discipline	Number of credits	Total credits per Semester
1	1	Environmental Management	4	20
		Other subject disciplines	8	
		Common Subjects	8	
	2	Environmental Management	4	16
		Other subject disciplines	8	
		Common Subjects	4	
2	1	Environmental Management	14	20
		Common Subjects	6	
	2	Environmental Management	12	16
		Common Subjects	4	
3	1	Environmental Management	13	17
		Common Subjects	4	
	2	Environmental Management	14	14
4	1	Environmental Management	12	12
	2	Environmental Management	09	09
Total Credits		**Environmental Management**	82	124
		Other subject discipline	16	
		Common Subjects	26	
			124	

List of common courses offered by the Faculty

Year	Semester	Course Code	Notional Hours	Course Title	Optional/ Compulsory	Respective Department
1	1	GENG11012	100	General English	Compulsory	DELT
		MATH11012	100	Basic Mathematics	Compulsory	Economics
		SING11012	100	General Sinhala	Compulsory	Languages
		COMP11012	100	Introduction to Computer studies	Compulsory	Social Sciences
	2	GENG12012	100	General English	Compulsory	DELT
		COMP12012	100	Basic Computer Applications	Compulsory	Social Sciences
2	1	GENG21012	100	General English	Compulsory	DELT
		GENG21080	00	General English	Compulsory	DELT
		COMP21012	100	DBMS and Web Designing	Compulsory	Social Sciences
		CADE21012	100	Career Development	Compulsory	FSSH
	2	COMS22012	100	Communication Skills	Compulsory	FSSH
		GENG22012	100	General English	Compulsory	DELT
		GENG22130	00	General English	Compulsory	DELT
3	1	CRIT31012	100	Critical Thinking	Compulsory	FSSH
		GENG31012	100	General English	Compulsory	DELT
		GENG31160	00	General English	Compulsory	DELT
Total		26 Credits	1300			

List of course units of Bachelor of Arts Honours in Environmental Management

Year	Semester	Course Code	Course Title	Credits	Notional Hours	Compulsory /Optional	New/Existing
1	1	EMGT 11012	Fundamentals of Environmental Management	2	100	Compulsory	Existing
		EMGT 11022	Natural Environment	2	100	Compulsory	Existing
		EMGT11032	Environmental Ethics	2	100	Optional	New
		EMGT12012	Cartography	2	100	Compulsory	Existing
		EMGT12022	Environmental Hazards	2	100	Compulsory	Existing
2	1	EMGT21012	Geographic Information System	2	100	Compulsory	Existing
		EMGT21022	Essential Science for Environmental Management	2	100	Compulsory	Existing
		EMGT21032	Environmental Policy and governance	2	100	Compulsory	Existing
		EMGT21042	Statistics for Environmental Managers	2	100	Compulsory	Existing
		EMGT21052	Economics for Environmental Management	2	100	Compulsory	Existing
		EMGT21062	Principles of Institutional Management	2	100	Compulsory	New
		EMGT21071	Academic Writing in English	1	50	Compulsory	New
		EMGT21081	Personal Management for Environmental Leadership I	1	50	Compulsory	New
	2	EMGT22012	Environmental Economics	2	100	Compulsory	Existing
		EMGT22022	Environmental Management Systems	2	100	Compulsory	Existing
		EMGT22032	Biodiversity Management	2	100	Compulsory	Existing
		EMGT22042	Environmental Impact Assessment	2	100	Compulsory	Existing

		EMGT22052	Disaster Management	2	100	Compulsory	Existing
		EMGT22062	Waste Management	2	100	Compulsory	Existing
3	1	EMGT31012	Environmental Legislations	2	100	Compulsory	Existing
		EMGT31022	Project Management	2	100	Compulsory	Existing
		EMGT31032	Climate Change Science	2	100	Compulsory	Exiting
		EMGT31042	Advanced Geographic Information Systems	2	100	Compulsory	Existing
		EMGT31052	Eco tourism	2	100	Optional	New
		EMGT31062	Agroforestry and Sustainable Farming	2	100	Optional	Existing
		EMGT31072	Poverty and Environment	2	100	Optional	Existing
		EMGT31081	Personal Management for Environmental Leadership II	1	50	Compulsory	New
	2	EMGT32012	Research Methodology	2	100	Compulsory	Existing
		EMGT32022	Environmental Sociology	2	100	Compulsory	Existing
		EMGT32032	Applied Environmental Project	2	100	Compulsory	Existing
		EMGT32042	Watershed Management	2	100	Compulsory	Existing
		EMGT32052	Environmental Quality and Standards	2	100	Compulsory	Existing
		EMGT32062	Conservation Finance	2	100	Optional	Existing
		EMGT32072	Environmental Technology	2	100	Optional	Existing
		EMGT32082	Remote Sensing	2	100	Optional	New
		EMGT32092	Environmental Accounting and Valuation	2	100	Optional	New
		EMGT32102	Environment and Health	2	100	Optional	Existing
4	1	EMGT41012	Research Project Proposal Formulation	2	100	Compulsory	Existing
		EMGT41022	Data Analysis in Environmental Management	2	100	Compulsory	Existing

		EMGT41032	Advanced Solid and Hazardous Waste Management	2	100	Optional	Existing
		EMGT41042	Marine Environment and Aquatic Resources Management	2	100	Compulsory	New
		EMGT41052	Application of Disaster Management	2	100	Optional	Existing
		EMGT41062	Geo-informatics Application for Environmental Analysis	2	100	Optional	Existing
		EMGT41072	Application of Environmental Management Systems	2	100	Optional	Existing
		EMGT41082	Advance Environmental and Natural Resource Economics	2	100	Optional	Existing
		EMGT41092	Climate Change Management	2	100	Optional	Existing
	2	EMGT42013	Industrial Training	3	300	Compulsory	Existing
		EMGT42026	Dissertation	6	600	Compulsory	Existing
	Environmental Management			82	4550		
	Other subject discipline			16	800		
	Common Subjects			26	1300		
	Total			124	6650		

EMGT11012 Fundamentals of Environmental Management

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Fundamentals of Environmental Management
Course Code: EMGT11012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Environment and global challenges, changing environment: evolution of the natural environment, geological history, evolution of life, evolution of the atmosphere, evolution of the society, approaches to environmental management: conventional approach, optional approaches, environmental management policies of Sri Lanka, Philosophical instance of the concept of environmental management: environmental determinism, environmental possibilism, ecology, sustainable development, contemporary developments in the concept of environmental management: Co-evolutionary view point, postmodernism, Gaia hypothesis, philosophy of the middle-path, applied vision of environmental management.

Course Aim: To provide an opportunity to learners for capturing current and future direction of environmental management discipline so that they can orient themselves for their future studies.

Course ILOs:
Upon successful completion of this course, students will be able to:

1. explain the contemporary challenges to natural environment;
2. describe evolutionary change in the nature and society;
3. examine the approaches to environmental management;
4. examine the theoretical background of environmental management;
5. examine contemporary developments in the philosophy of environmental management, and
6. workout an applied vision for environmental management.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain the integral components, links and interdependencies of environment	1			L	AS1 start Compile diagrams, tables and other material worked out in practical lessons
	1.2	1	Draw a diagram to show links of the components of environment		2		P	
	1.3	1	Learn the Recommended Reading 1 unit 1& 2			4	IL	
2	2.1	1	Examine the contemporary challenges to the natural environment	1		4	L	
	2.2	1	Prepare a table to show characteristics of the challenges to environment		2		P	
	2.3	1	Learn the Recommended Reading 1 unit 5			4	IL	
3	3.1	2	Describe geological history and evolution of life	1			L	
	3.2	2	Draft 20 MCQ to cover geological history and evolution of life		2		P	
	3.3.	2	Learn the Recommended Reading 5 unit 3 & 4			4	IL	
4	4.1	2	Describe evolution of the atmosphere	1			L	
	4.2	2	Analyze time series graph of paleoclimatic air temperature		2		P	
	4.3	2	Read Recommended Reading 2			4	IL	
5	5.1	2	Describe evolution of the society	1			L	
	5.2	2	Draft a table showing characteristics of the stages of social evolution		2		P	
	5.3	2	Read Recommended Reading 5 chapter 3			4	IL	
6	6.1	3	Analyze conventional approach to environmental management	1			L	

	6.2	3	Design 20 MCQs related to conventional approach		2		P	
	6.3	3	Read Recommended Reading 4			4	IL	
7	7.1	3	Analyze optional approaches to environmental management	1			L	AS1 due
	7.2	3	Discuss emergence of optional approaches		2		SGD	
	7.3	3	Read Recommended Reading 5			3	IL	
8	8.1	3	Analyze environmental management policies of Sri Lanka	1			L	AS2 start Compile 50 multiple choice questions on the applied environmental management
	8.2	3	Draw a time line of the development of the environmental policy of Sri Lanka		2		P	
	8.3	3	Read Recommended Reading 5			3	IL	
9	9.1	4	Examine the concepts of environmental determinism and possibilism	1			L	
	9.2	4	Discuss advantages and disadvantages for the environment of determinism and possibilism		2		SGD	
	9.3	4	Read Recommended Reading 5			3	IL	
10	10.1	4	Examine the concepts of ecology and sustainable development	1			L	
	10.2	4	Discuss how the concepts of ecology supports the concept of sustainable development		2		SGD	
	10.3	4	Read Recommended Reading 1			3	IL	
11	11.1	5	Compare co-evolutionary view point and post modernism in relation to environmental management	1			L	
	11.2	5	Read Recommended Reading 5		2		P	
	11.3	5	Draft 20 MCQs on co-evolutionary view point and post modernism			3	IL	
12	12.1	5	Study the Gaia hypothesis	1			L	
	12.2	5	Discuss the usefulness of the Gaia hypothesis		2		SGD	

			for sustainability					
	12.3	5	Read Recommended Reading 5			3	IL	
13	13.1	5	Justify the concept of middle-path for environmental management	1			L	
	13.2	5	Discuss the potential usefulness of the concept of the middle-path for applied environmental management		2		SGD	
	13.3	5	Read Recommended Reading 5			3	IL	
14	14.1	6	Conceptualize an applied vision for environmental management	1			L	AS2 due
	14.2	6	Analyze the conceptual framework of environmental management		2		SGD	
	14.3	6	Read Recommended Reading 3 & 5			3	IL	
15	15.1	6	Workout actions and mechanism for environmental management	1			L	
	15.2	6	Discuss potential actions and relevancy of the mechanism for Sri Lanka		2		SGD	
	15.3	6	Read Recommended Reading 5			3	IL	
		1,2,3,4,5, 6	End Semester examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara, Mr. LMAP Gunawardhana,

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Bharucha, Erach. (2005). Text Book for Environmental Studies for Undergraduate Courses of all Branches of higher Education. Pune, India: UGC, India.
2. March, M William, and M Martin Kaufman. (2012). Physical Geography Great Systems and Global Environments. Cambridge University Press.
3. Jayasundara, J.M.S.B. (2015). A new paradigm for environmental management teaching in universities. Journal of Education and Social Sciences, (JSOS) Vol. 1, (June). 178 – 186. Pp.
4. Theodore, M.K. and Theodor, L. (2010) Introduction to Environmental Management, London: CRP Press, Tailor & Francis Group.
5. Jayasundara. J.M.S.B., (2021) Applied Environmental Management: Sustainability Approach, Colombo: S. Godage & Brothers.

EMGT11022 Natural Environment

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Natural Environment
Course Code: EMGT11022 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Explain the earth's structure and constituents, Geological processes: volcanoes, earthquakes, rock cycle, Plate tectonics theory and geological time scale, Explain the Hypothesis of Continental drift, Geomorphological processes: Denudation cycle, landslides, Soil formation processes, Hydrological processes: water chemistry and physics, River systems, Water cycle, Atmospheric Processes: Atmosphere and its general circulation, Climate and weather, Ecological Processes: Theory of evolution, Ecological succession, Ecological Processes: Flow of energy, Food chains and Food webs, Ecological Processes: Biogeochemical cycles, Biological processes: Photosynthesis, Metabolism, Cellular respiration, Transpiration, Biological processes: Adaptation, Growth and development

Course Aim: To enhance the capacity of knowledge of students about environmental processes of nature, to raise the understanding of the importance of environmental processes for survival, and to introduce theories related to the environment so that learners will be able apply the holistic view of the natural environment in further learning.

Course ILOs:
Upon successful completion of this course, the students will be able to:

1. explain lithospheric processes and their interdependencies;
2. describe morphological and soil formation processes that shape the earth surface;
3. demonstrate knowledge on the hydrological processes, chemical and physical properties process in water;
4. examine the atmospheric processes, climate and weather system components;
5. describe the ecological processes of the biosphere, and
6. analyze the biological process of the earth system.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain the earth's structure and constituents	1			L	AS1 start Compile 50 multiple choice questions and notes on seven practices and discussions
	1.2	1	Prepare a list of rocks types and minerals found in the earth		2		P	
	1.3	1	Read chapter 3 & 5 of Recommended Reading 4			4	IL	
2	2.1	1	Explain geological processes: volcanoes, earthquakes, rock cycle,	1			L	
	2.2	1	Find distribution pattern of volcanoes and earthquakes		2		P	
	2.3	1	Read chapter 6 & 7 of Recommended Reading 4			4	IL	
3	3.1	1	Describe plate tectonics theory and geological time scale	1			L	
	3.2	1	Draft a note on the theory of plate tectonics		2		SGD	
	3.3.	1	Read Recommended Reading 2			4	IL	
4	4.1	1	Explain the Hypothesis of Continental Drift	1			L	
	4.2	1	Draft 10 MCQs on plate tectonics and hypothesis of continental drift		2		P	
	4.3	1	Read Recommended Reading 2			4	IL	
5	5.1	2	Explain geomorphological processes: Denudation cycle, landslides	1			L	

	5.2	2	Prepare a table to show denudation agents and associated landforms		2		SGD	
	5.3	2	Read Chapter 6 & 7 of Recommended Reading 4			4	IL	
6	6.1	2	Describe soil formation processes	1			L	
	6.2	2	Study a soil profile and find relationship of type of soil with the soil formation process		2		SGD	
	6.3	2	Read chapter 5 Recommended Reading 5			4	IL	
7	7.1	3	Analyze hydrological processes: water chemistry and physics, River systems, Water cycle	1			L	AS1 due
	7.2	3	Draft 10 MCQs on the hydrological process		2		SGD	
	7.3	3	Read chapter 13 & 14 of Recommended Reading 4 & Chapter 14 of Recommended Reading 5			4	IL	
8	8.1	4	Analyze atmospheric Processes: Atmosphere and its general circulation	1			L	AS2 start 50 MCQ, notes on discussions and particle lessons
	8.2	4	Draft 10 MCQs on atmosphere		2		SGD	
	8.3	4	Read unit 4 of Recommended Reading 4			4	IL	
9	9.1	4	Clarify climate and weather	1			L	
	9.2	4	Draft 10 MCQs on climate and weather		2		SGD	
	9.3	4	Read unit 4 of Recommended Reading 4			4	IL	
10	10.1	5	Explain ecological Processes: Theory of evolution, Ecological succession	1			SGD	
	10.2	5	Draft 10 MCQ		2		SGD	
	10.3	5	Read Recommended Reading 3			4	IL	
11	11.1	5	Explain ecological Processes: Flow of energy, Food chains and Food webs	1			L	
	11.2	5	Draft 10 MCQ		2		SGD	

	11.3	5	Read Recommended Reading 3			3	IL	
12	12.1	5	Explain ecological Processes: Biogeochemical cycles	1			L	
	12.2	5	Draft 10 MCQ		2		SGD	
	12.3	5	Read Recommended Reading 3			3	IL	
13	13.1	6	Biological processes: Photosynthesis, Metabolism, Cellular respiration, Transpiration	1			L	
	13.2	6	Draft 10 MCQ		2		SGD	
	13.3	6	Read Recommended Reading 6			3	IL	
14	14.1	6	Explain biological processes: Adaptation, Growth and development	1			L	AS2 due
	14.2	6	Draft 10 MCQ		2		P	
	14.3	6	Read Recommended Reading 6			3	IL	
15	15.1	6	Describe concept of Biodiversity and biodiversity degradation	1			SGD	
	15.2	6	Draft 10 MCQ		2		P	
	15.3	6	Read Recommended Reading 6			3	IL	
		1,2,3,4,5, 6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%
AS2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Bharucha, Erach. (2005). Text Book for Environmental Studies for Undergraduate Courses of all Branches of higher Education. Pune, India: UGC, India.
2. March, M William, and M Martin Kaufman. (2012). Physical Geography Great Systems and Global Environments. Cambridge University Press
3. Mossio, M., Montévil, M. and Longo, G., (2016). Theoretical principles for biology: Organization. Progress in Biophysics and Molecular Biology, 122(1), pp.24-35.
4. Fundamentals of Physical Geography (a soft copy text will be provided)
5. Physical Geography, Second edition (a soft copy will be provided
6. Odum, E.P. and Barrett, G.W., (1971). Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders.

EMGT11032 Environmental Ethics

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Ethics
Course Code: EMGT11032 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Challenge of environmental ethics, The early development of environmental ethics, Environmental ethics and politics, Traditional ethical theories and contemporary environmental ethics, biodiversity preservation, Wilderness, the built environment, poverty, and politics, sustainability and climate change, Ethical solutions to environmental issues, The religion and environmental ethics, Judeo Christian tradition, Buddhism and climate change, Ethical dimensions of contemporary environmental issues in Sri Lanka.

Course Aim: To provide opportunity to learners for developing their value judgment on the issues of development so that they can substantiate their world view on sustainability issues.

Course ILOs:
Upon successful completion of this course, the students will be able to:

1. explain the foundation of Western environmental ethics;
2. examine ethical dimensions of environmental issues, and
3. analyze environmental ethical principles of religion.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the challenge of environmental ethics	1			L	AS1 start Compile 50 multiple choice questions along with the notes on seven practices and discussions held up to week 7
	1.2	1	Draft a definition to challenges of environmental ethics		2		P	
	1.3	1	Read chapter 1 of Recommended Reading 3			4	IL	
2	2.1	1	Explore the early development of environmental ethics	1			L	
	2.2	1	Prepare list of milestones of the development of environmental ethics		2		P	
	2.3	1	Read chapter 2 of Recommended Reading 3			4	IL	
3	3.1	1	Recognize relationship of environmental ethics with politics	1			L	
	3.2	1	Discuss on the topic of environment and ethics		2		SGD	
	3.3.	1	Read chapter 3 of Recommended Reading 3			4	IL	
4	4.1	1	Examine traditional ethical theories and contemporary environmental ethics	1			L	
	4.2	1	Compare and contrast traditional and contemporary environmental ethics		2		P	
	4.3	1	Read chapter 4 of Recommended Reading 3			4	IL	
5	5.1	2	Clarify ethical dimension of biodiversity preservation	1			L	
	5.2	2	Discuss ethical issues of biodiversity conservation		2		SGD	
	5.3	2	Read supplementary to chapter 4 of			4	IL	

			Recommended Reading 3					
6	6.1	2	Clarify ethical dimension of Wilderness preservation	1			L	
	6.2	2	Discuss ethical issues in wilderness conservation in Sri Lanka		2		SGD	
	6.3	2	Read the first section in chapter 5 of Recommended Reading 3			4	IL	
7	7.1	2	Clarify ethical dimension of built environment	1			L	AS1 due
	7.2	2	Discuss ethical issues in built environment in Sri Lanka		2		SGD	
	7.3	2	Read the second section in chapter 5 of Recommended Reading 3			4	IL	
8	8.1	2	Clarify ethical dimension of poverty and politics	1			L	AS2 start Compile 50 multiple choice questions and notes on discussions and particle lessons held from 8th to 14th week
	8.2	2	Discuss ethical issues of poverty and politics in Sri Lanka		2		SGD	
	8.3	2	Read the third section in chapter 5 of Recommended Reading 3			4	IL	
9	9.1	2	Analyze ethics of sustainability and climate change	1			L	
	9.2	2	Discuss ethical issues of sustainability and climate change		2		SGD	
	9.3	2	Read the 6th chapter of Recommended Reading 3			4	IL	
10	10.1	2	Study ethical solutions to environmental issues	1			SGD	
	10.2	2	Discuss ethical solutions to environmental issues in Sri Lanka		2		SGD	
	10.3	2	Read the first Recommended Reading			4	IL	
11	11.1	3	Analyze relationship between the religion and environmental ethics	1			L	

	11.2	3	Discuss the role of religion in environmental ethics		2		SGD	
	11.3	3	Read the second Recommended Reading			3	IL	
12	12.1	3	Analyze the Judeo-Christian tradition	1			L	
	12.2	3	Discuss anthropocentrism in environmental ethics, critically		2		SGD	
	12.3	3	Read Recommended Reading 1			3	IL	
13	13.1	3	Evaluate connections of Buddhism with climate change	1			L	
	13.2	3	Discuss Buddhist discourses related to end of the world		2		SGD	
	13.3	3	Find content of Aggannasutta in the sources of internet and read			3	IL	
14	14.1	3	Discuss Ethical dimensions of contemporary environmental issues in Sri Lanka – loss of forests	1			L	AS2 due
	14.2	3	Make presentation		2		P	
	14.3	3	Find appropriate news articles and read			3	IL	
15	15.1	3	Discuss ethical dimensions of contemporary environmental issues in Sri Lanka – human wildlife conflict	1			SGD	
	15.2	3	Make presentation		2		P	
	15.3	3	Find appropriate news articles and read			3	IL	
		1,2,3	End semester examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Matlievska, Margarita, Suzana Dzamatoska-Zdravkovska, and Jadranka Denkova. (2014)"Managing Sustainability: Poetry of Motion." *International Journal of Development and Sustainability* 2162 - 2174.
2. Novacek, Pavel. (2013). "Human Values Compatible with Sustainable Development." *Journal of Human Values 19 (I)* 5 -13.
3. Brennan, Andrew and Yeuk-Sze Lo,(2020) "Environmental Ethics", *The Stanford Encyclopedia of Philosophy* (Winter 2020 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2020/entries/ethics-environmental/>. (2015 Reviewed) Stanford Encyclopedia of Philosophy: Environmental Ethics.
4. Rawls, J.(2021)The Stanford Encyclopedia of Philosophy, https://plato.stanford.edu/cgi-bin/encyclopedia/archinfo.cgi?entry=rawls

EMGT12012 Cartography

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Cartography
Course Code: EMGT12012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concepts, History and the main task of cartography, Basic maps elements, Types of maps, Physical features of maps, Cultural features of maps, Map reading and interpretation, Map projections in cartography, Enlargement, and reduction of the maps, Map construction, Importance of the use of maps in decision making, Visual presentation of statistical data. Recent trends in cartography.

Course Aim: To provide essential principles and concepts to develop a basic understanding of cartography's theory and practical so that students will be able to apply the learnt principles and theories to use maps for environmental-related activities at the local, regional and global levels.

Course ILOs:
Upon successful completion of this course, students will be able to:

1. identify the concepts of the cartography as a spatial data presentation method;
2. describe the essential and features of the maps;
3. apply cartographic techniques to utilize maps for environmental activities;
4. describe the importance of use of maps for the decision-making process, and
5. analyze recent developments of the cartography.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concepts of cartography: Definitions	1			L, D	
	1.2	1	Collect and read definitions and overview of cartography using available web sources			3	SR	
2	2.1	1	Describe history of the cartography: Explain the development of the cartography	1			L, D	AS1 start (Take home assignments about the history of the maps)
	2.2	1	Read Recommended Reading 1: Chapter 1			3	SR	
3	3.1	1	Describe the main task of cartography: Definitions, explain the main task of cartography to map the real-world features using stranded methods	1			L, D	
	3.2.	1	Collect and read the main task of cartography using available web sources			4	SR	
4	4.1	2	Discuss basic maps elements: Definition,	1			L, D	
	4.2	2	Explain basic maps elements by using several printed maps		2		P	
	4.3	2	Read Recommended Reading 3, Chapter 04			4	SR	
5	5.1	3	Discuss the types of maps: Classification of the maps based on the available method.	1			L	AS1 due
	5.2	3	Explain types of maps based on the represented information of the maps		2		P	
	5.3	3	Read Recommended Reading 1: Chapter 1			5	SR	
6	6.1	3	Discuss physical features of maps: Define the standard method to represent the physical features	2			L	AS2 start (Take home assignments about the information on the maps)

	6.2	3	Analysis of physical features based on the mapped data in the topographic maps		2		SGD, P	
	6.3	3	Identify main physical features in selected 1:50000 maps			5	IL	
7	7.1	3	Discuss cultural features of maps: Define the standard method to represent the cultural features	1			L	
	7.2	3	Analysis of cultural features based on the mapped data in the topographic maps		4		SGD, P	
	7.3	3	Identify main cultural features in selected 1:50000 maps			5	IL	
8	8.1	3	Explain the cultural and physical features based on the several topographical regions such as mountain, coastal, lowland, etc.		4		P	
	8.2	3	Capture cultural activities and physical features of the 1:50000 maps related to students home town			5	IL	
9	9.1	3	Discuss map reading and interpretation: Provide usefulness and essential facts related to map reading and interpretation	1			L, D	
	9.2	3	Explain the method of map reading and interpretation based on the available information on the maps		2		SGD, P	
	9.3	3	Read Recommended Reading 2. Chapter 4			4	SR	
10	10.1	3	Discuss map projections in cartography: Definition, types and importance	1			L	
	10.2	3	Explain maps projection systems in available maps		2		SGD, P	
	10.3	3	Read Recommended Reading 2. Chapter 8			3	SR	
11	11.1	3	Discuss methods in enlargement and reduction of the maps: types, and calculation based on	1			L	AS2 due

			the several scales					
	11.2	3	Enlarge and reduce maps using available methods		2		P	
	11.3	3	Read Recommended Reading 2. Chapter 2			3	SR	
12	12.1	3	Discuss map construction: provide knowledge about the construction of maps with available data	1			L	
	12.2	3	Describe the method of map construction based on the available data		2		P	
	12.3	3	Read Recommended Reading 2. Chapter 5			3	SR	
13	13.1	4	Discuss the importance of the use of maps in decision making	1			L	
	13.2	4	Divide students into small groups and discuss “how maps can be used in the decision making process.”		2		GA	
	13.3	4	Collect more information related to maps and decision making using the internet			2	SR	
14	13.1	4	Discuss the visual presentation of statistical data: Define, types, and usefulness	1			L	
	13.2	4	Describe the use of statistical data presentation methods based on graphs, charts, etc.		4		P	
	13.3	4	Read Recommended Reading 2. Chapter 7			4	SR	
15	14.1	5	Discuss recent trends in cartography	1			L	
	14.2	5	Divide students into small groups and discuss the “recent trends in cartography.”		2		GA	
	14.3	5	Collect more information related to the recent development of cartography using the internet			2	IL	
		1,2,3,4,5	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE= End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 20%

AS2 = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1 රණගලගේ මංජුල, දිසානායක ඩී. එම්. එස්. එල්. බී. (2019) ***භූගෝලීය තොරතුරු පද්ධති ප්‍රවේශය***, සන්දේශා ප්‍රකාශන, 2019.

2 Vitarana, K.M. (2007), Cartography, Sarasavi Publishers, Nugegoda.

3 Peterson, G. N. (2020). GIS cartography: a guide to effective map design. CRC Press.

4 උපාලි වීරක්කොඩි (2011), ප්‍රායෝගික භූගෝල විද්‍යාව, මෙට්‍රික් සිතියම සංඛ්‍යානය සහ ප්‍රස්තාර

5 Peterson, G. N. (2020). *GIS cartography: a guide to effective map design*. CRC Press.

6 Cartwright, W., Gartner, G., & Lehn, A. (Eds.). (2009). *Cartography and art*. Springer Science & Business Media.

EMGT12022 Environmental Hazards

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Hazards
Course Code: EMGT12022 (T15hrs: P30hrs: IL55hrs)

Course Capsule: The concept of environmental hazards and related terminology, The evolution of environmental hazard paradigms, Classification of environmental hazards, Natural and Man-made hazards, Causes, Impacts, Spatial temporal distribution, Mitigation strategies particularly related to Sri Lanka, Atmospheric: Cyclones, Lightning, Geological: Landslides, Earthquake, Tsunami, Hydrological : Floods, Droughts, Biological: Dengue Fever, Covid 19, HIV, Man-made**:** Human and animal conflict, Road Accidents, Ocean related hazards, Oil spills Hazard Management Cycle.

Course Aim: To provide essential knowledge, skills and attitudes on various natural and man-made environmental hazards which are particularly relevant to Sri Lanka so that students will be able to apply this knowledge and skills in their day today life to live with environmental hazards while managing impacts at various local, regional and global levels.

Course ILOs:
Upon successful completion of this course, students will be able to:

1. describe the different hazardous situations more accurately using the standard terminology;
2. explain the causes, impacts and mitigation strategies of atmospheric hazards at local, regional and global levels;
3. discuss the causes, impacts and mitigation strategies of geological hazards at local, regional and global levels;
4. analyze the causes, impacts and mitigation strategies of hydrological hazards at local, regional and global levels;
5. describe the causes, impacts and mitigation strategies of biological hazards at local, regional and global levels;
6. examine major man-made hazards in Sri Lanka and its mitigation strategies, and
7. apply knowledge on various hazards, hazard management concepts and principles for minimizing impacts of different hazards and learn to live with different environmental hazards of the real world.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concept of environmental hazards and related terminology, identify the evolution of environmental hazard paradigms and classify environmental hazards	2			L	
	1.2	1	List various natural and man-made hazards in Sri Lanka		1		SGD	
	1.3	1	Read chapter 1 of Recommended Reading 1. Read Recommended Reading 2 Pages No 1-10			3	SR	
2	2.1	2	Analyze atmospheric hazards: Definition, causes and impacts and mitigation strategies of cyclones	1			L, VP, D	AS1 start Multiple Choice Questions covering lessons 2-7
	2.2	2	Explain impacts of cyclones to Sri Lanka and its spatial and temporal distribution referring to secondary sources of information (Research articles, websites etc.)		1		GA, P	
	2.3	2	Read Recommended Reading 2: chapter 9 Pages: 175-192			5	SR	
3	3.1	2	Discuss atmospheric hazards: Definition, causes and impacts and strategies to avoid the impacts of lightning	1			L, VP	
	3.2	2	Analyze causes, impacts of lightning in Sri Lanka and determine spatial distribution variation of vulnerability using given materials as a group activity within the class		2		SGD, P	
	3.3.	2	Read Recommended Reading 2 chapter 6 Pages no 105-121			5	SR	

4	4.1	3	Analyze geological hazards: Definition, types, causes and impacts, signs of occurrence mitigation strategies of landslides	1			L, VP	
	4.2	3	Explain causes and impacts of landslides in Sri Lanka and its spatial temporal distribution		2		SGD, P	
	4.3	3	Read Recommended Reading 2, Chapter 05 Pages 91-103			5	SR	
5	5.1	3	Discuss geological hazards: Definition, causes, impacts and mitigation methods of earthquake	1			L, VP	
	5.2	3	Analyze earthquake risk in Sri Lanka		2		SGD, P	
	5.3	3	Read Recommended Reading 4, chapter 02			5	SR	
6	6.1	3	Discuss geological hazards: Definition, causes and impacts, impact reducing methods of Tsunami	1			L, VP	
	6.2	3	Explain Tsunami Risk to Sri Lanka and its spatial vulnerability		2		SGD, P	
	6.3	3	Read Recommended Reading 2, chapter 10, Pages 199- 226			5	SR	
7	7.1	4	Discuss hydrological hazards: Definition, types, causes and impacts, mitigation measures of floods	1			L, VP	AS1 due
	7.2	4	Examine flood causes and impacts in Sri Lanka and its spatial temporal distribution		2		SGD, P	
	7.3	4	Read Recommended Reading 2, chapter 4 Pages 68-88			5	SR	
8	8.1	4	Discuss hydrological hazards: Definition, types, causes, impacts, mitigation measures of droughts	1			L, VP	AS2 start Submit an individual report
	8.2	4	Analyze causes, impacts of drought and adaptation strategies in Sri Lanka: A case study		6		FV	

			in the Dry zone of Sri Lanka					
	8.3	4	Read Recommended Reading 2 chapter 03, Pages 47-62			5	SR	
9	9.1	5	Discuss biological hazards: Definition, causes, impacts, mitigation methods of dengue fever.	1			L	
	9.2	5	Analyze causes and impacts of dengue fever in Sri Lanka and its spatial, temporal distribution.		2		SGD, P	
	9.3	5	Read Recommended Reading 5.			5	SR	
10	10.1	5	Discuss biological hazards: Definition, causes, impacts, and mitigation methods of Covid 19.	1			L	AS2 due
	10.2	5	Criticize Covid 19 management process in Sri Lanka considering its success and failures		1		SGD, P	
	10.3	5	Read Recommended Reading 5			3	SR	
11	11.1	5	Discuss biological hazards: Definition, causes and impacts, vulnerable groups, control measures of HIV.	1			L	
	11.2	5	Assess HIV impacts of Sri Lanka		2		SGD, P	
	11.3	5	Read Recommended Reading 5			3	SR	
12	12.1	6	Discuss man-made hazards: Explain human animal conflict, causes and impacts, mitigation methods.	1			L	
	12.2	6	Prioritize best solution for human and animal conflict in Sri Lanka		2		SGD, P	
	12.3	6	Read Recommended Reading 06			2	SR	
13	13.1	6	Discuss man-made hazards: Definition, causes and impacts, mitigation methods of road accident.	1			L	AS3 start Group Presentation
	13.2	6	Divide students into small groups and collect data on road accidents in selected districts of Sri Lanka during the last 12 months.		2		GA	

14	13.3	6	Develop PowerPoint presentation analyzing and using collected data on road accidents in selected districts of Sri Lanka		1		GA	
	13.4	6	Interpret results by presenting group presentation using a multimedia projector		1		GA, SGD	AS3 due
	13.5	6	Read Recommended Reading 7			2	SR	
15	14.1	6	Describe ocean related hazards: Oil spills	1			L	
	14.2	7	Explain hazard Management: Build Back Better Principle, create most suitable hazard management cycle using various hazard management cycles		1		SGD,P	
	14.3	7	Read Recommended Reading 3			2	SR	
		1,2,3,4,5, 6,7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field Visit, SGD=Small Group Discussion, VP=Video Presentation, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Mr. LMAP Gunawardhana, Mr. WMSB Wanninayake

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 20%

AS2 =10%

AS3 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field visits															
Continuous Assessments															
End Semester Examination	**After two week study leave**														

Transport Requirement: Transport is needed for field visits

Recommended Readings:

1. Smith, K. David, N.P (2009), Environmental Hazards-Assessing Risk and Reducing Disaster, Rutledge, New York.
2. Disaster Management Center (2012) Hazard Profile of Sri Lanka, Ministry of Disaster Management, Vidya Mawatha, Colombo 07, Sri Lanka.
3. Wisner, B at all (2012), The Routledge Handbook of Hazards and Disaster Risk Reduction, Rutledge, New York.
4. University of Wisconsin (1986), Natural Hazards: Causes and Effects, Study Guide for Disaster Management: https://www.yumpu.com/en/document/read/7239863/natural-hazards-causes-and-effects-disaster-management-center.

5. Epidemiology unit. (2019). Epidemiology unit, Ministry of Health. Accessed January 13/01/2021. https://www.epid.gov.lk/web.
6. Gunawardhana, L.M.A.P. (2018) An analysis of Human-Elephant Conflict as a Disaster: A case study in Anuradhapura District of Sri Lanka: Journal of Tropical Environment Volume 01 pages 40-55 : https://www.researchgate.net/publication/327155123_An_analysis_of_Human-Elephant_conflict_as_a_disaster_A_case_study_in_Anuradhapura_district_of_Sri_Lanka.
7. Sri Lanka Police, Information Technology Division. (1993). Sri Lanka Police. Accessed 01 09, 2021. https://www.police.lk/index.php/item/68-traffic-police-road-traffic-accidents.

EMGT21012 Geographic Information Systems

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Geographic Information Systems
Course Code: EMGT21012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concepts of GIS, History of the GIS, Components of GIS, Data types in GIS, Data formats in GIS, Data input methods in GIS, GIS vs. traditional maps, Functions of ArcGIS software, Geo- referencing, Digitizing Functions, Reprocessing Analysis, Buffer Analysis, and Symbology in GIS, Creating useful maps, The recent trend in GIS.

Course Aim: To provide fundamental aspects of the principles of Geographic Information Systems, provide a basic knowledge of theory about GIS, spatial data types, and hands-on training of GIS software so that the students will be able to apply principles and theories accurately to incorporate spatial data types using computer-based software.

Course ILOs:
Upon successful completion of this course, students will be able to:

1. explain the fundamentals of GIS;
2. describe the essential components and features of the GIS;
3. explain the concepts of the GIS;
4. explain tools of the ArcGIS software to produce meaningful full maps;
5. apply the fundamental analysis method available in GIS for the environmental variable;
6. create basic maps using GIS techniques, and
7. describe the recent development of the GIS.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concepts of GIS: Definitions, importance of GIS, and multidisciplinary approach of GIS	1			L, D	
	1.2	1	Collect and read definitions and overview of GIS using available web sources			2	SR	
2	2.1	1	Describe the history of the GIS: Explain the development stage of GIS	1			L, D	AS1 start Take home assignments about the history of the maps
	2.2	1	Read Recommended Reading 1: Chapter 1			2	SR	
3	3.1	2	Describe main components of GIS: Provide more details about the components and their tasks	1			L, D	
	3.2.	2	Read Recommended Reading 2: Chapter 1			2	SR	
4	4.1	3	Discuss data types in GIS: Definitions, spatial and non-spatial data	1			L, D	
	4.2	3	Explain types of data using suitable examples		2		P	
	4.3	3	Read Recommended Reading 2: Chapter 1			4	SR	
5	5.1	3	Discuss data formats in GIS: Definitions, raster, vector, comparisons, advantages, and disadvantages.	1			L	AS1 due
	5.2	3	Explain data formats by using available GIS data and Maps		2		P	
	5.3	3	Read Recommended Reading 2: Chapter 1			4	SR	
6	6.1	3	Discuss data inputs methods in GIS: Define main data input methods and their advantages	1			L	AS2 start Take home assignments about

								data types in GIS
	6.2	3	Discuss the main data input method in GIS and its advantages		2		SGD, P	
	6.3	3	Collect and read more information related to data input methods in GIS using available web sources			6	IL	
7	7.1	3	Discuss comparison between GIS and traditional maps: explain similarities and dissimilarities between GIS vs. traditional maps	1			L	
	7.2	3	Compare both data types and encourage students to identify the similarities and dissimilarities		2		SGD, P	
	7.3	3	Discuss the similarities and dissimilarities of GIS and paper maps			2	IL	
8	8.1	4	Discuss the functions of ArcGIS software: (It provides more information and hands-on training about ArcGIS software)	1			L	
	8.2	4	Explain main tools and functions available in ArcGIS and provide hands-on training		8		P	
	8.3	4	Study more using ArcGIS software			10	IL	
9	9.1	4	Discuss geo-referencing: Provide usefulness and essential facts related to geo-referencing functions of GIS	1			L, D	
	9.2	4	Identify the geo-referencing functions to assign real-world coordinates to the maps.		2		SGD, P	
	9.3	4	Read Recommended Reading 3. Chapter 6			4	SR	
10	10.1	4	Discuss digitizing functions: Definition, types, usefulness	1			L	
	10.2	4	Provide hands-on training regarding the digitizing		2		SGD, P	

	10.3	4	Read Recommended Reading 4. Chapter 4			3	SR	
11	11.1	5	Discuss Geoprocessing Analysis: Definitions, types, and usefulness	1			L, R	AS2 due
	11.2	5	Provide hands-on training on Geoprocessing		2		P	
	11.3	5	Read Recommended Reading 3. Chapter 18			3	SR	
12	12.1	5	Define buffer analysis: Definitions, types, and usefulness	1			L	
	12.2	5	Provide hands-on training on buffer analysis		2		P	
	12.3	5	Read Recommended Reading 3. Chapter 19			3	SR	
13	13.1	6	Define symbology in GIS: Explain features, categories, quantities, chars, and multiple attributes	1			L	
	13.2	6	Provide hands-on training on symbology in GIS		2		GA	
	13.3	6	Read Recommended Reading 3. Chapter 7			4	SR	
14	14.1	6	Discuss steps of creating useful maps: Adding main components of the maps, exporting maps	1			L	AS3 start and due Classroom practical test
	14.2	6	Provide hands-on training on preparing quality maps		2		P	
	14.3	6	Read Recommended Reading 3. Chapter 8,9,10			3	SR	
15	15.1	7	Discuss recent trends in GIS	1			L	
	15.2	7	Divide students into small groups and discuss the “recent trends in GIS.”		2		GA	
	15.3	7	Collect more information related to the recent trend in GIS using the internet			3	IL	
		1,2,3,4,5, 6,7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 20%

AS3 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Ranagalage, M. (2019), Geographical Information Systems. Sandesha Publishers.
2. Chang, K., (2007) *An Introduction to Geographic Information Systems*, Tata McGraw hill publication
3. Law, M., Collins, A. (2018), Getting to Know ArcGIS Desktop, fifth edition, ESRI, USA
4. රණගලගේ මංජුල, දිසානායක ඩී. එම්. එස්. එල්. බී. (2019) ***භූගෝලීය තොරතුරු පද්ධති ප්‍රවේශය***, සන්දේශා ප්‍රකාශන
5. Fotheringham, A. S., &Rogerson, P. A. (Eds.). (2008). *The SAGE handbook of spatial analysis*. Sage.
6. Kresse, W., Danko, D. M. (Eds.). (2012). *Springer handbook of geographic information*. Springer Science & Business Media.
7. Longley, P. A., Goodchild, M. F., Maguire, D. J., &Rhind, D. W. (2005). *Geographic information systems and science*. John Wiley & Sons.
8. Fazal, S. (2008), *GIS Basics*, New Age International Publishers Limited, New Delhi
9. Wilson, J. P., &Fotheringham, A. S. (Eds.). (2008). *The handbook of geographic information science*. John Wiley & Sons.

EMGT21022 Essential Science for Environmental Management

Department of Environmental Management
Faculty of Social science and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Essential Science for Environmental Management
Course Code: EMGT21022 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Environmental biology: Introduction to cell biology, Energy Enters Ecosystems Through Photosynthesis, Energy Flow through Ecosystems**,** Biogeochemical Cycles**,** Biomes**,** Wilderness**;** Environmental Physics**:** Atmosphere and radiation**,** Physics of water, soil and air**,** Thermodynamics and energy transfer**,** Energy for living; Environmental Chemistry : Chemistry of the natural processes in the biosphere**,** Chemistry associated with pollution processes**,** Chemistry applied to the analysis of pollutants and natural compounds**,** Chemistry applied to the treatment and remediation of pollution**,** Green Chemistry**,** Importance of Environmental Chemistry.

Course Aim: To provide theoretical and practical knowledge on essentials of environmental biology, physics and chemistry, so that students will be able to apply knowledge related to environmental pollution issues and overcome environmental issues.

Course ILOs:
Upon successful completion of this course, the students will be able to:

1. describe the roles of cells in organisms;
2. describe the ways of energy entering to the environment and transfer through the environment;
3. discuss the biogeochemical cycles of water, carbon, nitrogen, phosphorus, and sulfur;
4. identify terrestrial and aquatic biomes and Wilderness in the world;
5. explain specific environmental related issues such as global warming, ozone depletion etc. and environmental processes using environment physics;
6. describe the chemistry related natural processes and environmental issues, and
7. elaborate the importance of environmental chemistry to overcome the environmental issues.

Lesson sequence

Week	Lesson No.	Related ILO/s	Lesson Title	Time (Hours)			Teaching/ Learning Method	Assessment Methods
				T	P	IL		
1	1.1	1	Describe Environmental Biology: Introduction to cell biology	1			L	
	1.2	1	Divide students into groups and guide to use a light microscope		2		L, P	PR1 start Preparation of practical report covering Environmental Biology: practical class 1-3
	1.3	1	Compare the difference between light and electron microscope			10	LS	
2	1.4	1	Describe Environmental Biology: Introduction to cell biology	1			L	
	1.5	1	Investigate cells with light microscope		2		L, P	
3	2.1	2	Discuss Environmental Biology: Energy Enters Ecosystems Through Photosynthesis	1			L	
	2.2	2	Discuss Environmental Biology: practical class 3- Investigation the process of photosynthesis		2		L, P	
4	3.1	2	Explain Environmental Biology: Energy Flow through Ecosystems	1			L, GD	PR1 due
	3.2	2	Draw food chains and food webs		2		L, GD	
5	4.1	3	Describe biogeochemical cycles	1			L	
	4.2	3	Draw diagrams of biogeochemical cycles		2		L, GD	PR2 start Drawing diagrams of biogeochemical cycles
6	5.1	4	Discuss Biomes and Wilderness	1			L	
	5.2	4	Evaluate the role of forest vegetation in the biogeochemical cycle of heavy metals (Recommended			15		

			Reading no 2)					
7	6.1	5	Identify atmosphere and radiation, physics of water, soil and air	1			L	AS1 start Construct 30 multiple choice answer questions under Environmental Physics
8	6.2	5	Describe thermodynamics and energy transfer	1			L	
	6.3	5	Determine of the dimensions of solids, liquids and air		2			PR3 start Preparation of practical report covering Environmental Physics: practical class 1 & 2
9	6.4	5	Analyze energy for living	1			L	
	6.5	5	Investigate of heat transfer by conduction ,radiation and convection		3		P	
10	7.1	6	Explain natural processes in the biosphere	1			L	PR3 due
	7.2	6	Discuss the chemistry associated with pollution processes and importance of Environmental Chemistry	1			L	
	7.3	6	Survey on the current status of chemical associated pollution in Sri Lanka			15	LS	
11	7.4	6	Group presentations on a chemical related pollution issue in Sri Lanka		3		GP	AS2 start & due Group presentations on a chemical related pollution issue in Sri Lanka
12		6,7	Environmental Chemistry: Chemistry applied to the analysis of pollutants and natural compounds	1			L	
		6,7	Environmental Chemistry: Practical class 1- Introduction of water ,soil and air quality analyzing equipment and instruments		3		L, P	PR4 start Preparation of practical report covering Environmental Chemistry: practical class 1-3

13		6,7	Analyze of pollutants and natural compounds	1			L	AS1 due
		6,7	Apply of analytical equipment and instruments to analyze pollutant in the environment		3		L, P	
14		6,7	Discuss the treatment and remediation of pollution	1			L	AS2 due
		6,7	Apply of various adsorbents to remove contaminants in the environment		3		L, P	
		6,7	Apply of Green Chemistry in Sri Lanka			15	LS	
15		6,7	Discuss Green Chemistry	1			L	PR4 due
			Group presentations on the topic of "Green Chemistry and Industries in Sri Lanka"		3		GP	AS3 start Group presentations on the topic of "Green Chemistry and Industries in Sri Lanka"
		1-7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, GP=Group Presentations, GD=Group Discussion, LS=Literature Survey, PR1=Practical Recordings 1, PR2= Practical Recordings 2, PR3=Practical Recordings 3, PR4=Practical Recordings 4, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: JMSB Jayasundara

Assessment Strategy:
In Course (Continuous) Assessment - 50%

Assignments - 30%

AS1 = 5%

AS2 = 10%

AS3 = 15%

Practical Records - 20%

PR1 = 5%

PR2 = 5%

PR3 = 5%

PR4 = 5%

End Semester Examination - 50%

Organization of the Course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings:

1. Boeker, E. and Van Grondelle, R., (2011). *Environmental physics: sustainable energy and climate change*. John Wiley & Sons.
2. Heinrichs, H. and Mayer, R., (1980). The role of forest vegetation in the biogeochemical cycle of heavy metals (Vol. 9, No. 1, pp. 111-118). American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.
3. Manahan, S.E., (2017). *Environmental chemistry*. CRC press.
4. Manahan, S.E., (2011). *Fundamentals of environmental chemistry*. CRC press.

5. Monteith, J. and Unsworth, M., 2013. Principles of environmental physics: plants, animals, and the atmosphere. Academic Press.
6. Nobel, P.S. and Bobich, E.G., (2002). Environmental biology. *Cacti: biology and uses*, pp.57-74.
7. Smith, C., (2004). *Environmental physics*. Routledge.
8. Odum, E.P. and Barrett, G.W., (1971). *Fundamentals of ecology* (Vol. 3, p. 5). Philadelphia: Saunders.

EMGT 21032 Environmental Policy and Governance

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Policy and Governance
Course Code: EMGT21032 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Definitions, and Concepts used in policy development and analysis; Classification of environmental policies (Land, Water, Atmosphere/ Biota/Human Settlements); Global and Sri Lankan contexts of Environmental Policy Analysis; International conventions and protocols related to environmental protection; Legal, institutional analysis; Existing Institutions and their performance at national and provincial levels; Constitutional provisions for environmental protection and management; National legal frameworks and processes; Policy formulation and its legal process in Sri Lanka; Human rights and environmental protection; Green Governance and ecological survival.

Course Aim: To provide essential knowledge on important principles and key policies related to environmental management at global and local levels including legal and institutional settings so that students will be able to apply the principles and theories accurately for policy implementation in order to secure good governance.

Course ILOs:
Upon completion of this course unit, students will be able to:

1. describe the concept of environmental policy and governance using the standard terminology;
2. evaluate the National environmental policy, and strategies on environmental governance perspective;
3. explain the existing environmental policies related to land, air, water, biota, and human settlements;
4. explain the international conventions and protocols related to the environmental management and green governance;
5. discuss the design and implementation of environmental governance in Sri Lanka;
6. demonstrate the capacity to analyze and communicate different methods of environmental management across different social and cultural contexts;
7. explain different concepts of green technologies and their applications, and
8. describe and understand concepts and theories that are central to the study of environmental governance, including sustainable development, multi-level governance, and the importance of institutions.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concept of environmental policy and governance	1			L	
	1.2	1	List the key concepts of environmental policy and governance in Sri Lanka		2		SGD	
	1.3	1	Read chapter 1 of Recommended Reading 1, Pages No 1-7			5	SR	
2	2.1	2	Describe the constitutional provisions of environmental protection and management in Sri Lanka	1			L	
	2.2	2	Read chapter 2 of Recommended Reading 1			5	SR	
3	3.1	2	Explain the process of environmental policy development and implementation in Sri Lanka	1			L	
	3.2	2	Prepare a road map of policy development process in Sri Lanka		3		P	
4	4.1	3	Discuss the classification of environmental policies on Physical resources (land, water, and atmosphere) and biological diversity in Sri Lanka	1			L	AS1 start Submit an individual report

	4.2	3	Discuss the importance of environmental policies for protecting physical resources in Sri Lanka		3		SGD	
	4.3	3	Read chapter 1 of Recommended Reading 1, Pages No 8-12			5	SR	
5	5.4	3	Discuss the environmental policies on biological diversity in Sri Lanka	1			L	
	5.5	3	List the key points of the environmental policies on both physical and biological resources		3		P	
	5.6	3	Read Recommended Reading 2			5	SR	
6	6.1	4	Discuss the international conventions and protocols related to environmental policy and governance	2			L	AS1 due
	6.2	4	Read Recommended Reading 3			5	SR	
7	6.3	4	Prepare a summary of international conventions and protocols after the independence of Sri Lanka and their influence on environmental protection in Sri Lanka	1	2		L, P	AS2 start Multiple choice questions covering lessons 5 and 6
8	7.1	5	Discuss the legal, and institutional analysis; existing institutions and their performance at national and provincial levels in Sri Lanka	1			L	

	7.2	5	Prepare a resource profile on local government institutions in your area, which are contributing on environmental protection and environmental governance		3	5	P, IL	
9	8.1	5	Discuss the policy formulation process and its legal background in Sri Lanka	1			L	AS2 due
	8.2	5	Explore the newly enacted environmental policy in Sri Lanka using online or printed sources			5	IL	
10	9.1	6	Explain the human rights and environmental protection	1			L	
	9.2		Examine how the exercise of human rights can help promote environmental protection		2		P	
11	10.1	7	Discuss the green technology theory and concepts	1			L	
	10.2	7	Explore the newly introduce green theories and concepts in the world		2		P	
	10.3	7	Read Recommended Reading 6			5	SR	
12	11.1	7	Explain the applications of green technologies and clean production	1			L	
	11.2	7	Prepare a summary of green technology applications by using past research papers, especially focus into Sri Lanka		5		P	
	11.3	7	Read Recommended Reading 7			5	SR	
13	12.1	7	Explain the green governance and ecological survival in Sri Lanka	1			L	
	12.2	7	Read Recommended Reading 8			5	SR	

14	12.3	7	Prepare an green technology application by selecting a private or government institution in your home town area (A basic structure including required information will be provided)		5		P, IL	AS3 start Submit an individual report
15	11.2	8	Current Issues related to environmental policies and policy implementation in Sri Lanka. (A case will be selected and discuss in details)	1		5	L, IL	AS3 due
		1-8	End-semester examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, SR=Self Reading, AS1=Assignment 1, AS2=Assignment 2 AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. DMSLB Dissanayake

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

AS3 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings

1. National Environmental Policy and Strategies, (2003), Ministry of Environment and Natural Resources, Sri Lanka.
2. Wijayadasa K. H. J., Ailapperuma W. D (2003), Survey of Environmental Legislation and Institutions in Sri Lanka, South Asia Co-operative Environmental Programme, Central Environmental Authority of Sri Lanka, Colombo.
3. Mitchell, Ronald B. (2003) International Environmental Agreements: A Survey of Their Features, Formation, and Effects. Annual Rev. Environ. Resource 28, 429–61.
4. Thirumurthy A.M, Fanthome F. (1996), Sustainable Development and Environment, Frank Bros & Co (Publishers) Ltd, New Delhi.
5. Thangavel, P. & Sridevi, G. (2015). Environmental Sustainability: Role of Green Technologies. Springer Publications.
6. Woolley, T. & Kimmins, S. (1999) Green Building Handbook (Volume 1 and 2). Spon Press
7. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
8. United Nations Environment Programme (UNEP). (2009) Judges & Environmental Law - Handbook for the Sri Lankan Judiciary, Environmental Foundation Limited, Colombo 5, Sri Lanka.

EMGT21042 Statistics for Environmental Managers

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Statistics for Environmental Managers
Course Code: EMGT21042 (T15hrs: P30hrs: IL 55hrs)

Course Capsule: Introduction to data and statistics in the field of environmental management, Data and variables, Introduction to descriptive statistics, Measures central tendency (mean, median and mode), Measures of variation (standard deviation, variance, kurtosis and skewness), Empirical rule and normal distribution, Data representation using charts and graphs, Charts and graphs drawing using Excel and SPSS software, Introduction to inferential statistics, Sampling techniques, Estimation of confidence intervals, Hypothesis testing, Analysis of Variance, Linear and non-linear regression, Correlation coefficient, Regression analysis, Time series analysis.

Course Aim: To improve the statistical knowledge and skills of students with scientific methods of collecting and organizing environmental related data, so that students will be able to employ the correct analyses, interpret and draw conclusion and finally present the results effectively, in order to enhance the ability to analyze environmental problems for supporting evidence based decision making.

Course ILOs:
Upon the successful completion of this course, the students will be able to:

1. define and explain basic terminologies in statistics;
2. organize and display data by means of various tables, charts, and graphs;
3. calculate and interpret descriptive, inferential and other statistical measures;
4. demonstrate the skills of computing statistical analysis using statistical software such as SPSS, Stata, etc;
5. perform time series analysis, and
6. apply statistical inferences to analyze real world environmental issues.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss data and statistics in the field of environmental management , data and variables	2			L	
	1.2	1,3	Explain descriptive statistics: Measures central tendency	1			L	
	1.3	3,6	Explore the area where statistics can be applied for decision making in general and particularly in the field of environmental management			3	SR, WS	
2	2.1	1,3	Discuss descriptive statistics: Measures of variation	1			L	
	2.2	4	Perform descriptive statistical analysis using SPSS and excel software		2		P, GD	
	2.3	3,4,6	Find data set by own and perform descriptive analysis using SPSS and excel			7	SR, WS, DC, P	
3	3.1	1,3	Explain empirical rule and normal distribution	1			L	
	3.2	3	Find the probabilities under the normal distribution curve using standard normal distribution table-classroom activity	1	1		P, GD	
	3.3	3	Compute probabilities of given set of data		1		P	Q1 start & due
4	4.1	2,3	Demonstrate data representation using charts and graphs	1			L	
	4.2	2	Draw charts and graphs drawing using excel and SPSS software		2		P, GD	

	4.3	2,4,6	Assignment 1 - Plot bar charts, pie charts, scatter plots and histograms for given set of data and perform descriptive analysis of given data		1			AS1 start
5	5.1	1,3	Explain sampling techniques	2			L	
	5.2	1,3	Investigate of sampling techniques applications in environment related researches			3	SR, WS, GD	
	6.1	1,3	Discuss inferential statistics	1			L	
6	6.2	1,3	Compare and contrast the descriptive vs. inferential statistical applications			4	SR, WS, GD	AS1 due
	7.1	3	Perform hypothesis testing for qualitative and quantitative data, analysis of variance	2			L	
7	7.2	3	Perform hypothesis testing for qualitative data using equations		2		P, GD	
	7.3	3,4,6	Execute hypothesis testing for qualitative data using software		2		P, GD	
8	7.4	3,4,6	Perform hypothesis testing for qualitative data using software		2		P, GD	
	7.5	3,4,6	Perform further hypothesis testing for given empirical data sets			8	SR, WS, DC, P	
9	7.6	3	Perform hypothesis testing for quantitative data using equations		2		P, GD	
	7.7	3,4,6	Execute hypothesis testing for quantitative data using software		1		P, GD	
10	7.8	3, 4,6	Perform hypothesis testing for quantitative data using software		2		P,GD	
	7.9	3,4,6	Perform hypothesis testing for quantitative data using both equations and software for empirical data sets			8	SR, WS, DC, P	
11	7.10	3,4	Analyze of variance using software		2		P, GD	
	7.11	3,4,6	Assignment 2 - Hypothesis testing using		1		P	AS2 start & due

			SPSS software					
12	8.1	1,3	Explain linear and nonlinear regression, correlation coefficient, regression analysis	2			L	
	8.2	3	Compute correlation coefficient and regression analysis using equations		1		P, GD	
	8.3	1,3	Perform correlation and regression analysis using equations for secondary data set			8	SR	
13	8.4	3	Compute correlation coefficient and regression analysis using equations		2		P, GD	
	8.5	4	Compute correlation coefficient and regression analysis using software		1		P, GD	
	8.6	4	Perform linear and non-linear regression analysis using software			7	SR	
14	8.7	4	Compute correlation coefficient and regression analysis using software		2		P, GD	
	8.8	3,6	Assignment 3 - Perform regression and correlation analysis for given data set using SPSS software		1		P	AS3 start & due
15	9.1	1,5	Discuss time series analysis	1			L	
	9.2	5,6	Explain time series analysis - application		2		P, GD	
	9.3	5,6	Practice time series analysis for secondary data			7	SR, WS, DC	
		1,2,3,4,5,6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, SR=Self Reading, WS=Web Searching, DC=Data Collection, GD=Group Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, Q1=Quiz 1, ESE=End Semester Examination

Practical will be conducted mainly using statistical software such as SPSS, STATA, etc. and real world environmental data.

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 50%

Q1 = 10%

AS1 = 10%,

AS2 = 20%

AS3 = 10%

End Semester Examination - 50%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continues Assessment															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings

1. R. Lyman Ott, Michael Longnecker, (2010).An Introduction to Statistical Methods and Data Analysis, *6th Edition*
2. David S. Moore, George P. Mccabe, Bruce A. Craig (2005*).*Introduction to the Practice of Statistics, *6th Edition*,
3. Urdan, Timothy C. (2010).Statistics in plain English, *3rd Edition.*
4. Freeman. Marascuilo, L. A., &Serlin, R. C. (1988), Statistical Methods for the Social and Behavioral Sciences. New York
5. Boca Raton, FL. Cothern C.R. and Ross N.P. (1994), Environmental Statistics, Assessment and Forecasting, Lewis Publishers.

EMGT21052 Economics for Environmental Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Economics for Environmental Management
Course Code: EMGT21052 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Understanding Economics, Importance of Studying economics, Scarcity, Economic goods and free goods, Fundamental questions in economics, Factors of production, Opportunity cost, Production possibility frontier, Demand, supply, Market equilibrium, Elasticity of demand, Elasticity of supply, Market structures, Market failures, Fundamentals in welfare economics.

Course Aim: To provide essential theoretical knowledge on economic concepts especially in micro economics and fundamentals in welfare economic, so that student will be able to enhance the knowledge to understand the real world economic phenomena.

Course ILOs:
Upon the successful completion of this course, the students will be able to:

1. define and explain the basic concepts in economics, particularly in micro economics;
2. discuss and compute the demand, supply and equilibrium situations under different economic conditions;
3. explain the concept of elasticity and different types of elasticity;
4. compare the different types of market structures, and
5. discuss fundamentals in welfare economics and its relation to the environment.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain what is economics and why study economics	1			L, D	
	1.2		Read the given Recommended Readings, identify the branches of economics and their role citing real world examples			5	SR	
2	2.1	1	Discuss basic concepts in economics	2			L, D	AS1 start
	2.2	1	Discuss basic concepts in micro economics providing real world examples		2		P	
	2.3	1	Read Recommended Readings given and make a collection of basic concepts in economics and their applications			5	SR	
3	3.1	1	Discuss scarcity as a foundation of economics	1			L, D	
	3.2	1	Discuss scare resources in local and global context how economics distributes economic resource among competing demand		2		P	
	3.3	1	Read given Recommended Readings and further study on limited resources and unlimited human needs and wants			5	SR	
4	4.1	1	Discuss fundamental questions in economics	1			L, D	AS1 due
	4.2	1	Give an account on how the countries with different economic systems taking measures to solve those fundamental questions		2		P	
	4.3	1	Read Recommended Readings given and find other sources and examine how			5	SR	
5	5.1	1	Explain Economic resources and factors of	1			L, D	Q1 start & due

			production					
	5.2	1	Discuss the pricing of factors of production		2		P	
	5.3	1	Read the Recommended Readings			5	SR	
6	6.1	1,2	Discuss opportunity cost and production possibility frontier	1			L, D	
	6.2	2	Calculate on opportunity cost with given data sets		2		P	
7	7.1	2	Distinguish demand and supply	2			L, D	
	7.2	2	Discuss the determinants of demand and supply , demand and supply equations, tables and demand and supply curves		2		P	
	7.3	2	Read Recommended Readings on demand and supply for a good and services			5	SR	
8	8.1	2	Prepare 30 structured question bank from the previous lessons in week 1-7		5		L, D	AS2 start
9	9.1	2	Explain market equilibrium	1			L, D	
	9.2	2	Calculations on Demand, supply and market equilibrium under different conditions		2		P	
	9.3	2	Calculations on demand, supply and market equilibrium finding questions by own reading Recommended Readings and from other sources			5	SA	
10	10.1	3	Discuss Elasticity of demand and Supply	1			L, D	
	10.2	3	Read Recommended Readings on elasticity of demand and Supply			5	SR	
11	11.1		price, income and cross price elasticity of demand	1			L, D	AS2 due
	11.2	3	Calculations of price, income and cross price elasticity for a given data set		2		P	
	11.3	3	Calculations finding questions by own reading Recommended Readings and from			5	SR	

			other sources such as extensive web searching, etc.					
12	12.1	4	Explain Market Structures, characteristics and price determination	2			L, D	AS3 start
	12.2	4	Discuss the different market strictures available in Sri Lanka providing examples		2		P	
	12.3	4	Read Recommended Readings and figure out how different market structures impact upon market efficiency			5	SR	
13	13.1	4	Explain Market Structures, characteristics and price determination				L, D	
	13.2	4	Prepare 30 questions from the lessons learned in week 8-12		5		P	
14	14.1	4,5	Fundamentals of welfare economics	1			L, D	AS3 due
	14.2	4,5	Read Recommended Readings on fundamentals of welfare economics			5	SR	
15	15.1	5	Discuss Fundamentals of welfare economics- Parato optimality		2		P	
		1,2,3 4,5	End Semester Examination (Theory)	15	30	55		ESE

L=Lectures, P=Practical, D=Discussion, SA=Self Activity, SR=Self Reading, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, Q1= Quiz 1, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 10%

AS3 = 10%

Q1 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessment															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings

1. Mas-Colell, A., M.D. Whinston and J.R. Green (1995): Microeconomic Theory, Oxford University Press.
2. N. Gregory Mankiw (2011), Principles of Economics,Cengage Learning
3. Hal R Varian, (1995). Microeconomic analysis.
4. Nick Hanley, Jason Shogren, Ben White, (2019) Introduction to Environmental Economics, Oxford.
5. Scott J. Callan, Janet M. Thomas, (2013) Environmental Economics and Management: Theory, Policy and Applications.

EMGT21062 Principles of Institutional Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities,
Rajarata University of Sri Lanka
Course Plan

Course Title: Principles of Institutional Management
Course Code: EMGT21062 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Introduce the subject of Management: Definition; a science and art; Management and administration and Functions of Management. Explain the Steps in Planning: Purpose; Stapes; Objectives; Types of plans, Managing by Objectives; Strategies; Policies; forecasting and Decision Making, Analyze Organizing function and Human Resource Management: Purpose; Departmentalization of Strategies; Authority; Benefits and Limitations; Decentralization and Delegation of Authority and Human Resource Management, Review Directing Function: Human Factors; Creativity; Innovation; Harmonizing Objectives; Leadership; Motivation; hierarchy of Needs; Studying Controlling function and International Management: Controlling System and Process; Requirements; Budgeting, techniques; Information Technology; Productivity; Performance Control; Reporting; the Global Business Environment and Management Theories.

Course Aim: To introduce basic principles of general management applicable to institutional environmental management so that the learners will be able to perform as environmental management and apply the principles in managing environmental issues relating to institutions.

Course ILOs:

Upon successful completion of this course, the students will be able to:

1. explain the major components of management that are relevant to environmental management;
2. describe major concepts related to institutional planning;
3. examine the organizing function and Human Resource Management;
4. evaluate directing function in institutional management, and
5. analyze controlling function in a global context.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduce the main components of management	1			L	AS1 start Multiple Choice Questions covering lessons 1-7
	1.2	1	Discuss the importance of management for sustainable development		2		SGD	
	1.3	1	Read Chapter 1 of Recommended Reading 2 and Chapter 1 of Recommended Reading 2			4	IL	
2	2.1	1	Describe the approaches to management with emphasis on environment	1			L	
	2.2	1	Compare behavior of managers in terms of their job		2		GA	
	2.3	1	Read Chapter 2 of Recommended Reading 1			4	IL	
3	3.1	1	Explain Functions of management	1			L	
	3.2	1	Discuss appropriate strategic plans for selected institutions		2		SGD	
	3.3.	1	Read chapter 3 of Recommended Reading 1 and Chapter 3 of Recommended Reading 2			4	IL	
4	4.1	2	Describe stages of Planning	1			L	
	4.2	2	Compare vision of several institutions		2		SGD, P	
	4.3	2	Read Chapter 4 of both Recommended Readings 1 & 2			4	IL	
5	5.1	2	Set objectives and policies for environmental management	1			L	
	5.2	2	Discuss importance of entrepreneurship for environmental management		2		SGD	
	5.3	2	Read chapter 5 of both 1& 2 Recommended			4	IL	

			Readings					
6	6.1	2	Discuss environmental forecasting and decision making	1			L	
	6.2	2	Compare organizational structure of a state sector organization with same of a company		2		SGD	
	6.3	2	Read chapter 6 in both Recommended Readings			4	IL	
7	7.1	3	Familiarize organization of environmental activities as a function	1			L	AS1 due
	7.2	3	Discuss importance of innovation in changing society		2		SGD, P	
	7.3	3	Read chapter seven of both Recommended Readings			4	IL	
8	8.1	3	Explicate the division of authority	1			L	AS2 start Individual presentation
	8.2	3	Contrast requirements of human resource management with the same for environmental management		2		GD	
	8.3	3	Read chapter eight of both Recommended Reading's			4	IL	
9	9.1	3	Developing human resource planning for environmental management	1			L	
	9.2	3	Discuss the importance of social networks in environmental management		2		SGD, P	
	9.3	3	Read chapter nine of both Recommended Readings			4	IL	
10	10.1	4	Demonstrate the concepts of creativity and innovation for green world	1			L	
	10.2	4	Define leadership styles of self		6		FC	
	10.3	4	Read chapter 11 of Recommended Reading 1 and 10 of Recommended Reading 2			4	IL	

11	11.1	4	Demonstrate the role of environmental leadership	1			L	
	11.2	4	Evaluate biographies of great world leaders		2			
	11.3	4	Read chapter 11 of Recommended Reading 1 and chapter 10 of Recommended Reading 2			3	IL	
12	12.1	4	Motivating for green thinking	1			L	
	12.2	4	Prepare list of activities to improve motivation for environmental management		1		SGD, P	
	12.3	4	Read chapter 10 of Recommended Reading 1 and chapter 14 of Recommended Reading 2			3	IL	
13	13.1	5	Familiarize with the controlling process	1			L	
	13.2	5	Discuss about types of controls		1		GA	
	13.3	5	Read chapter 14 of the Recommended Reading 1 and chapter 15 of Recommended Reading 2			3	IL	
14	14.3	5	Establish productivity and techniques for controlling	1			GA	AS2 due
	14.4	5	Discuss the types of control		1		SGD	
	14.5	5	Read chapter and 14 & 15 of the Recommended Reading 1 and chapter 15 of Recommended Reading 2			3	IL	
15	15.1	5	Discuss global theories of management in relation to needs of the nature	1			L	
	15.2.	5	Discuss sustainability as a competitive challenge		1		SGD, P	
	15.3	5	Read chapter 16 of Recommended Reading			3	IL	
		1,2,3,4,5		15	30	55		ESE

L=Lectures, P=Practical, FC=Field Class, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, GD=Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

End Semester Examination – 60%

Organization of the course:

Activity	**Week of the Semester**														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Theory															
Practical															
Independent Learning															
Continuous Assessment															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Reading:

1. Griffin, Ricky W. (2016). *Fundamentals of Management.* Boston: Cengage Learning,
2. *Principles of Management.* http://www.saylor.org/books.

EMGT21071 Academic Writing in English

Department of Environmental Management,
Faculty of Social Sciences and Humanities,
Rajarata University of Sri Lanka
Course Plan

Course Title : Academic Writing in English
Course Code: EMGT21071 (L6hrs: P24hrs: IL20hrs)

Course Capsule: Using dictionaries and environmental management vocabulary, comprehension of environmental management texts, creative writing of environmental text, writing answers to environmental management questions, understanding environment related audio-visual material, academic writing styles.

Course Aim: The aim of this course unit is to enhance the particular English language skills of learners whose native language is other than English and is essential for effective learning environmental management in English medium so that learners will be able to successfully learn environmental management related material available in English medium and perform well in further studies.

Course ILOs:
Upon successful completion of this course, the learners will be able to:

1. keep records of vocabulary accurately and successfully using standard higher learning monolingual dictionaries and published vocabularies;
2. comprehend environmental management related texts fluently;
3. construct creative error free subject matter paragraphs;
4. analyze various environmental management audiovisual products, and
5. draft abstracts of environmental literature using appropriate terminology.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Practice tactics of using monolingual dictionaries		2		P	PR
	1.2	1				2	IL	
2	2.1	1	Practice using published vocabulary in environmental management		2		P	PR
	2.2	1				2	IL	
3	3.1	2	Study sentence structures and usage of the parts of speech in environmental management texts in English	2			L	
	3.2	2				2	IL	
4	4.1	3	Creative writing: constructing error free sentences	2			L	
	4.2	3				2	IL	
5	5.1	3	Creative writing: systematic paragraphs		2		P	PR
	5.2	3				2	IL	
6	6.1	3	Creative writing: newspaper article		2		P	PR
	6.2	3				1	IL	
7	7.1	3	Writing answers to essay type questions		2		P	PR
	7.2					1	IL	
8	8.1	4	Analyzing audio material related to environmental management		2		P	PR
	8.2	4				1	IL	
9	9.1	4	Analyze audio visual material related to environmental management		2		P	PR
	9.2	4				1	IL	

10	10.1	4	Develop audiovisual material on environmental management		2		P	PR
	10.2	4				1	IL	
11	11.1	5	Structurize academic writing	2			L	
	11.3	5				1	IL	
12	12.1	5	Practice writing in academic language		2		P	PR
	12.2	5				1	IL	
13	13.1	5	Design quality presentations		2		P	PR
	13.2	5				1	IL	
14, 15	14.2	5	Demonstrate presentation in English		4		SP	SP
	14.3	5				2	IL	
		1-5	End semester examination	6	24	20		ESE

L=Lectures, P=Practical, IL=Independent Learning, PR=Practical Lesson Record, SP=Student Presentation, ESE= End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara, Dr. PSK Rajapakshe, Dr. DMSLB Dissanayake, Mr. LMAP Gunawardhana

Assessment Strategy

In Course (Continuous) Assessment - 100 %

PR = 50% (10 PR & 5% for each)

SP = 50%

End Semester Examination - No

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: No

Recommended Readings:

1. Hornby, AS, (2015). Oxford Advanced Learner's Dictionary, Oxford: Oxford University Press.
2. Raymond Murphy (1990) Essential English Grammar: A Self-Study Recommended Reading and Practice Book for Elementary Students of English with Answers delineates elementary principles of grammar for beginners, Cambridge University Press.

EMGT21081 Personality Management for Environmental Leadership I

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Personality Management for Environmental Leadership 1
Course Code: EMGT21081 (T6hrs: P24hrs: IL20hrs)

Course Capsule: Aspects of mental strength: Attention, Concentration, Endurance, Memory, Mental Flexibility, Problem Solving, Decision Making and Creative act and Creating General Knowledge on the Environment.

Course Aim: To enhance mental strength by way of exercising and improve general knowledge on environment and its management among learners so that learners will be able to perform as successful environmental leaders**.**

Course ILOs:

Upon successful completion of this course, the learners will be able to:

1. design and perform exercises for improving various aspects of mental strength and
2. design tests to address general knowledge pertaining to environmental management.

Lesson sequence

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Improving mental strength	2			L	PR
	1.2	1	Read preface to page 22 of the Recommended Reading 1			2	IL	
2	2.1	1	Learn attention improving exercises		2		P	PR
	2.2	1	Practicing attention improving exercises (chapter 1 of Recommended Reading 1)			1	IL	
3	3.1	1	Learn concentration improving exercises		2		P	PR
	3.2	1	Practicing concentration improving exercises (chapter 2 of Recommended Reading 1)			1	IL	
4	4.1	1	Learn endurance and imagination improving exercises		2		P	PR
	4.2	1	Practicing endurance and imagination improving exercises (chapter 3, 4 & 5 of Recommended Reading 1)			1	IL	
5	5.1	1	Learn memory improving exercises		2		P	PR
	5.2	1	Practicing memory improving exercises (chapter 8 of Recommended Reading 1)			2	IL	
6	6.1	1	Learn flexibility improving exercises		2		P	PR

	6.2	1	Practicing flexibility improving exercises (chapter 9)			1	IL	
7	7.1	1	Discuss problem solving and decision-making strategies	2			L	PR
	7.2	1	Read chapter 6 & 7 of Recommended Reading 1			1	IL	
8	8.1	1	Learn problem solving		2		P	PR
	8.2	1	Practice problem solving (chapter 6 & 7 of Recommended Reading 1)			1	IL	
9	9.1	1	Learn decision-making		2		P	PR
	9.2	1	Practice decision-making (chapter 10 of Recommended Reading 1)			1	IL	
10	10.1	2	Learn creative process	2			L	PR
	10.2	4	Practice creative act (Chapter 11 & 12)			1	IL	
11	11.1	5	Exercise improving general knowledge in natural environment and its disasters		2		P	PR
	11.2	5	Design MCQ using prescribed books for the relevant courses			2	IL	
12	12.1	5	Exercise improving general knowledge in waste management and economics		2		P	PR
	12.2	5	Design MCQ using prescribed books for the relevant courses			2	IL	
13	13.1	5	Exercise improving general knowledge in EIA & GIS		2		P	PR
	13.2	5	Design MCQ using prescribed books for the relevant courses			2	IL	

14	14.1	5	Evaluating general knowledge in environmental management		4		GA	AS1 start & due
	14.2	5				2	IL	
				6	24	20		

L=Lectures, P=Practical, IL=Independent Learning, GA=Group Activity, P=Practical Lesson Record, GA=Group Activity, AS1=Assignment 1

Course Coordinator/ Teaching Panel:

Teaching Panel: Dr. JMSB Jayasundara, Dr. PSK Rajapakshe, Dr. MM Ranagala, Dr. DMSLB Dissanayake, LMAP Gunawardhana.

Assessment Strategy:
Continuous Assessment - 100%

PR = 60% (13 practical exercises, 6% for each highest 10 will be counted)

AS1 = 40%

Course Organizer:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings:

1. Wujec, T., 1992. *The Complete Mental Fitness Book: Exercise to Improve Your Brain Power*. 2nd printing ed. New Delhi: ORIENT PAPERBACKS Division of Vision Books Pvt. Ltd.
2. Materials from all text books in environmental management.

EMGT22012 Environmental Economics

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Economics
Course Code: EMGT22012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Economy and environment, Externalities, Modelling externalities, Market failures, Marginal private cost and benefit, Marginal external cost and benefit, Marginal social cost and benefit, Internalizing externalities, Command and control policies, Market based instruments, Property rights, Property rights regimes, Attributes of efficient property rights, Property rights and natural resource management, Tragedy of the commons, Coase theorem, Economic policies and environment, Overview of economics of renewable and nonrenewable resource management, Sustainable development from economic perspective.

Course: To provide essential theoretical knowledge, skills and attitudes to identify and analyze interrelationships and interdependences between natural environment and economic system, to enhance the ability to internalize the externalities using different approaches particularly market based/economic instruments and analyze impact of different economic policies on natural environment and vice versa.

Course ILOs:

After the successful completion of this course, the students will be able to:

1. define and explain the basic concepts in the field of environmental economics;
2. discuss the externalities as a source of market failure and modeling externalities;
3. identify and compare the appropriate tools for internalizing externalities;
4. design appropriate market based instruments for internalizing externalities in Sri Lanka;
5. discuss the concept of property rights, property rights regimes and their impacts on natural resources management, and
6. analyze the impacts of different economic policies on the environment and vice versa.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss Environment and economy relationship and basic concepts in environmental economics	1			L, D	
	1.2	1	Discuss the relationship between economy and environment in Sri Lanka and develop your own model to show the relationship		1		P	
2	2.1	2	Explain Externalities	1			L, D	AS1 start & due
	2.2	2	Discuss the different types of externalities created by the individuals/firms in the NCP		2		P	
	2.3	2	Read Recommended Readings given on externalities and find out the impact of externalities on environment and on economic system			5	SR	
3	3.1	2	Modelling externalities	2			L, D	
	3.2	2	Discuss the positive and negative externalities using economic models		2		P	
	3.3	2	Read Recommended Readings and case studies on externalities			5	SR	
4	4.1	3	Find Solutions for environmental issues/internalizing externalities	1			L, D	Q1 start & due
	4.2	3	Discuss the different policy instruments available for environmental protection in Sri Lanka		2		P	
	4.3	3	Study on legal and institutional framework for environmental management in Sri Lanka			5	SS	

5	5.1	3	Explain Command and control policies	2			L,D	
	5.2	3	Make a list of command and control policies practicing in Sri Lanka		2			
6	6.1	3	Examine the effectiveness of command and control policies in Sri Lanka		2		P	
	6.2	3	Read case studies on application of command and control polices			5	SR	
7	7.1	3,4	Explain Market based/economic instruments	1			L, D	
	7.2	3,4	Identify the different market based instruments for internalizing externalities		2		P	
	7.3	3,4	Read Recommended Readings and case studies on MBIs			5	SR	
8	8.1	3,4	Discuss the potentials for applying market based instruments for environmental protection in Sri Lanka		2		L, D	
	8.2	3,4	Read Recommended Readings and identify the merits and demerits of each market based instruments			5	SR	
9	9.1	1,2,3,4	Design a market based instrument to internalizing the externalities of selected case study from Sri Lanka		5		L, SGD, FV	AS2 start & due
	9.2	1,2,3,4	Read case studies on application of MBIs			5	SR	
10	10.1	5	Discuss Property rights and environment, different property rights regimes	2			L, D	
	10.2	5	Read case studies on community based resource managements around the world			5	SR	
11	11.1	5	Examine the different property rights regimes in Sri Lanka and their implications on natural resources management		5		P	
12	12.1	2,5	Discuss the concept of Tragedy of commons	2			L, D	

	12.2	2,5	Read case studies on tragedy of commons			5	SR	
13	13.1	3,5	Explain Coase theorem	1			L, D	
	13.2	3,5	Read case studies on application of coase theorem			5	SR	
14	14.1	6	Examine the Impact of economic policies on environmental sector in Sri Lanka		5		P	P1 start and due
	14.2	6	Read case studies on impact of economic policies on environment and vise versa			5	SR	
15	15.1	5,6	Overview economics of renewable and non-renewable resource management	2			L, D	
		1,2,3,4,5, 6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, SGD=Small Group Discussion, SR=Self Reading, SS= Self Study, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, P1=Practical 1, Q1= Quiz 1, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 10%

P1 = 10%

Q1 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport needed for field visit in 9th Week

Recommended Readings:

1. Tom Tietenberg (2019), Environmental and Natural Resource Economics, 8thed, Pearson Edu.
2. Roger Perman, (1996), Natural Resource and Environmental Economics, Pearson Edu.
3. Scott J. Callan, Janet M. Thomas,(2013) Environmental Economics and Management: Theory, Policy and Applications, 5th ed, Cengage Learning Publishers.
4. Thomas Sterner and Jessica Coria, (2012) Policy Instruments for Environmental and Natural Resource Management 2nd Ed, Routledge.
5. Nick Hanley**,** Jason Shogren**,** and Ben White, (2019) Introduction to Environmental Economics, 3rd ed, Oxford University Press. Use standard method.

EMGT 22022 Environmental Management Systems

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Environmental Management Systems
Course Code: EMGT 22022 (T15hrs: P30hrs: L55hrs)

Course Capsule: The concept of Environmental Management Systems, Terminology related EMS, Context of the organization, Leadership, Planning, Support, Operation, Performance evaluation, Improvement, and Obtaining ISO 14001:2015 certificate in Sri Lanka.

Course Aim: To develop knowledge, skills and attitudes on ISO 14001:2015 standard and its requirements so that students will be able to establish an Environmental Management System (EMS) for an organization successfully where necessary.

Course ILOs:

Upon the successful completion of this course, students will be able to:

1. explain ISO 14001 Environmental Management System(EMS) concept and related terminology;
2. describe ISO14001: 2015 requirements;
3. develop an Environmental Policy for any organization according to ISO14001:2015 Standard;
4. perform EMS Audit to verify EMS Requirements;
5. design Emergency preparedness plan for an organization, and
6. review and establish EMS for an institution.

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching /Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Identify the concept of Environmental Management System (EMS): Definition, history, benefits	2			L	
	1.2	1	Summarize the evolution of EMS into one A4 pag		1		SGD, P	
	1.3		Read chapter 01 of Recommended Reading 03			3	SR	
2	2.1	1	Describe terminology related EMS	1			L	AS1 start Multiple choice questions covering 1-10
	2.2		Read Recommended Reading 2 terms and definitions 1-5 pages			4	SR	
3	3.1	2	Discuss the context of the organization: organization context, needs and expectations of the interested parties, the scope of the EMS	1			L	
	3.2	2	Describe requirements of the context of the organization as a small group		2		SGD, P	
	3.3		Read Recommended Reading 2			4	SR	
4	4.1	2,3	Explain the requirements of leadership: Commitment, Policy, Organizational roles, responsibilities and authorities	1			L	
	4.2	2,3	Develop an environmental policy for the university as a small group		2		SGD, P	AS2 start Develop an environmental policy as a small group
	4.3		Read Recommended Reading 1			4	SR	
5	5.1	2	Analyze requirements of planning : Risk	1			L	

			and Opportunities, aspects, impacts					
	5.2	2	Identify environmental aspects and impacts list selecting an organization and prioritize according to the significance using numerical methods		5		SGD, P	
	5.3		Read Recommended Reading 1, 2, 3 related to EMS aspects, impacts and programs			4	SR	
6	6.1	2	Analyze requirements of planning: compliance obligations, objectives, planning schedule	1			L	AS2 due
	6.2	2	Prepare an environmental management program		2		SGD	
	6.3		Read Recommended Reading 1, 2			4	SR	
7	7.1	2	Discuss the requirements of support: Resources, competence, awareness	1			L	
	7.2	2	Identify resources for EMS		2		SGD, P	
	7.3		Read Recommended Reading 1			4		
8	8.1	2	Discuss the requirements of support: communication, documented information	1			L	
	8.2	2	Explain importance of communication for EMS		2		SGD	
	8.3		Read Recommended Reading 1, 2			4	SR	
9	9.1	2	Discuss the ISO requirements of operation: Operational planning and control	1			L	
	9.2		Read Recommended Reading 2			4	SR	
10	10.1	2,5	Discuss the ISO requirements of operation: Emergency preparedness and response	1			L	
	10.2	2,5	Design an emergency preparedness plan for the university		2		SGD, P	AS1 due
	10.3		Read Recommended Reading 1, 2, 3			4	SR	

11	11	2	Analyze an organization to review the ISO 14001:2015 Requirements		6		FV, P	AS3 start Submit a group report
12	12.1	2	Discuss the performance evaluation :monitoring, measurement, analysis, and evaluation: evaluation of compliance	1			L	
	12.2		Read Recommended Reading 2			4	SR	
13	13.1	2,4	Examine the performance evaluation: Internal Audit, internal audit programme, Management review	1			L	AS3 due
	13.2	2,4	Divide in to small groups and develop an EMS audit format to verify EMS		2		SGD,P	
	13.3		Read Recommended Reading 1, 2			4	SR	
14	14.1	2	Review the improvement : non conformity and corrective action, , continual improvement	1			L	
	14.2	2	Divide in to small groups and discuss importance of identifying non conformity		2		SGD,P	
	14.3		Read Recommended Reading 3			4	SR	
15	15.1	6	Explain obtaining ISO 14001:2015 certificate in Sri Lanka	1			L	
	15.2	6	Divide small groups and discuss in the class why most institution in Sri Lanka are not certified with ISO 14001		2		SGD,P	
	15.3		Refer the website of Sri Lanka Standards Institution			4	SR	
		1,2,3,4, 5,6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, SGD=Small Group Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Mr. LMAP Gunawardhana, Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 10%

AS3 = 10%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Transport is needed for field visits for around 150 learners for one day.

Recommended Readings:

1. DNV, G. (2015). *ISO14001:2015 Environmental Management Requirements: Guidance Document.* Hovik : Norway.
2. Hoehne, J. (2015). *Environmental Management Systems-Requirements with guidance for use.* Verneier, Geneva, Switzerland: ISO.
3. Jayasundara, J.M.S.B., Gunawardhana, L.M.A.P. (2015). *An approach to institutional Environmental Management -Sinhala* . Mihintale: Author (ISBN-978-955-42791-0-0

EMGT22032 Biodiversity Management

Department of Environmental Management,
Faculty of Social science and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Biodiversity Management
Course Code: EMGT22032 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Biodiversity: Introduction, Dimensions and levels of biodiversity; Values of biodiversity; Threats to biodiversity, Biodiversity conservation strategies: In situ & Ex situ conservation; Role of traditional knowledge in biodiversity conservation; Protected Area Classification & Legislations; Biodiversity management : What is biodiversity management, planning to manage biodiversity issues, Assessing Biodiversity Impacts, managing biodiversity issues through the mitigation hierarchy, monitoring and reporting performance; Biodiversity of Sri Lanka and challenges for conservation and management**.**

Course Aim: To enhance the capacity of knowledge of students in biodiversity, present situation of global and national biodiversity, strategies in biodiversity conservation, and protected areas and legislations, so that students will be able to apply the developed skills and attitudes in the management of biodiversity.

Course ILOs:

Upon successful completion of this course, the students will be able to:

1. describe the importance of biodiversity;
2. describe the different types of threats to biodiversity;
3. discuss the biodiversity conservation strategies;
4. explain the role of traditional knowledge in biodiversity conservation and management;
5. describe national and international policy and legislations for biodiversity conservation;
6. address biodiversity issues through biodiversity management, and
7. illustrate the current situation of biodiversity of Sri Lanka.

Lesson sequence

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching/ Learning Methods Used	Assessments
				T	P	IL		
1	1.1	1	Explain Biodiversity: Introduction	1			L	
	1.2	1	Field visit around Rajarata university (Day 1-evening)		3		FV	
2	1.3	1	Field visit around Rajarata university (Day 2- morning)		3		FV	AS1start Preparation of diagram of observed biodiversity within university premises
	1.4	1	Reading Recommended Reading No 6			8	SR	
3	2.1	1	Discuss the dimensions and levels of biodiversity	2			L	AS1 due
	2.2	1	Discuss the values of biodiversity	1			L	
4	2.3		Reading Recommended Reading No 7			8	SR	
	2.4	1	Value biodiversity and ecosystem services: Why put economic values on Nature?- Group discussion		4		GD	AS2 start Preparation of an individual reports based on this discussion
5	3.1	2	Discuss Threats to biodiversity	2			L	
	3.2	2	Conduct Comprehensive survey on different types of threats on biodiversity			10	LS	
6	3.3	2	Discuss Natural threats to biodiversity Vs Anthropogenic threats to biodiversity threats		3		GD	AS2 due
7	3.4	2	Discuss threats to Marine biodiversity Vs threats to Terrestrial Biodiversity threats		3		GD	
8	4	3	Explain Biodiversity conservation strategies	2			L	

	5.1	4	Explain Role of traditional knowledge in biodiversity conservation	1			L	
9	5.2	4	Examine about traditional knowledge of biodiversity conservation all over the world			10	LS	
	5.3	4	Compare of traditional knowledge in biodiversity conservation between Sri Lanka and another country -Group (power point) presentation		3		GP	AS3 start & due Group presentation
10	6.1	5	Discuss Protected Area Classification & Legislations	2			L	
	6.2	5	List down all Protected areas in the world		2		GA	
11	6.3	5	Mapping Protected areas in the world		3		GA	
12	7	6	Discuss biodiversity management; planning to manage biodiversity; managing biodiversity issues through the mitigation hierarchy; monitoring and reporting performance	4			L	AS4 start Prepare a biodiversity management plan for addressing a biodiversity issue in Sri Lanka
13	8.1	7	Explain Current threats to biodiversity of Sri Lanka		3		GD	
14	8.2	6,7	Investigate about currently available biodiversity management plans for addressing biodiversity issues			11	LS	
15	9.1	6,7	Study about biodiversity of Sri Lanka and challenges for conservation and management			8	LS	
	9.2	6	Analyze Current challenges for biodiversity conservation and management- Group discussion		3		L,GD	AS4 due
		1-7	End-semester Examination	15	30	55		ESE

L=Lectures, FV=Field Visit, P=Practical, GD=Group Discussion, GP=Group Presentation, SR=Self Reading, LS=Literature Survey, GA=Group Activity, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy:
In Course (Continuous) Assessment - 40%

AS1 = 5%
AS2 = 5%
AS3 = 10%
AS4 = 20%

End Semester Examination - 60%

Course Organizer:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings:

1. Chapin Iii, F.S., Zavaleta, E.S., Eviner, V.T., Naylor, R.L., Vitousek, P.M., Reynolds, H.L., Hooper, D.U., Lavorel, S., Sala, O.E., Hobbie, S.E. and Mack, M.C., (2000). Consequences of changing biodiversity. *Nature*, *405*(6783), pp.234-242.
2. Grafton, R.Q., (2012). *Biodiversity*. Edward Elgar Publishing Limited.
3. Mittermeier, R.A., Mittermeier, C.G., Brooks, T.M., Pilgrim, J.D., Konstant, W.R., da Fonseca, G.A. and Kormos, C., (2003). Wilderness and biodiversity conservation. *Proceedings of the National Academy of Sciences*, *100*(18), pp.10309-10313.
4. Noss, R.F., (1990). Indicators for monitoring biodiversity: a hierarchical approach. *Conservation biology*, *4*(4), pp.355-364.
5. Pearce, D.W., (2003). The value of biodiversity. *Microbial Diversity and Bioprospecting*, pp.469-475.
6. Pimm, S.L., Russell, G.J., Gittleman, J.L. and Brooks, T.M., (1995). The future of biodiversity. Science, 269(5222), pp.347-350.

7. Salles, J.M., (2011). Valuing biodiversity and ecosystem services: economic values on Nature. *Comptes rendus biologies*is.334 (5-6), pp.469-482.
8. Sandlund, O.T., Schei, P.J. and Viken, Å. eds., (2001). *Invasive species and biodiversity management* (Vol. 24). Springer Science & Business Media.

EMGT22042 Environmental Impact Assessment

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Impact Assessment
Course Code: EMGT22042 (T15hrs: P30hrs: IL55hrs)

Course Capsule: What is EIA, Legal and institutional background, Basic concepts of EIA in local and foreign countries, Prediction of environmental impacts, Evaluation of environmental impacts, Social and ecological impact assessment, Public participation, Environment monitoring and auditing, EIA systems and cases in Sri Lanka - I, EIA systems and cases in Sri Lanka - II, Market and non-market techniques for impact identification, Cost-benefit analysis (CBA) and extended cost-benefit analysis, The role of CBA in public projects, Multi-criteria analysis and importance of MCDA as a decision support tool. Practical application of MCDA-I, Practical application of MCDA-II.

Course Aim: To deliver essential principles and key approaches to develop a comprehensive and critical understanding of the theory and practice of EIA so that students will be able to apply the principles and theories accurately for any EIA activity in the global and local context.

Course ILOs:

Upon the completion of this course, students will be able to:

1. explain the history of environmental impact assessment (EIA) and its evolution with key points;
2. discuss EIA process in Sri Lanka;
3. explain the EIA process and its methods in local and foreign countries;
4. describe the basic environmental assessment policies and requirements;
5. analyze proposed development project plans for possible environmental effects and prepare appropriate initial studies;
6. utilize EIA documents for policy development, project planning, or legal or political action planning;
7. demonstrate understanding of the main steps of conducting ECBA and MCD, and
8. apply computer-based practical skills for conducting ECBA and MCDA.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Identify the evolution of EIA and discuss its key points	1			L	
	1.2	1	Make two lists: I. Definitions of EIA, and II. Key points of EIA evolution process		2		SDG	
	1.3	1	Find EIA definition and evolution key points by exploring internet			5	IL, SR	
2	2.1	2	Discuss legal background of EIA process in Sri Lanka	1			L	
	2.3	2	Read Recommended Reading 1			5	IL, SR	
3	3.1	2	Explain institutional background of EIA process in Sri Lanka	1			L	
	3.2	2	Read Recommended Reading 1			3	IL, SR	
4	4.1	3	Discuss the EIA process in Sri Lanka and foreign countries	1			L	
	4.2	3	Explain the necessary steps of EIA process in Sri Lanka		2		GA	AS1 start Submit an individual report
	4.3	3	Read Recommended Reading 2			5	SR	
5	5.1	4	Explain the environmental impacts prediction methods	1			L	
	5.2	4	Discuss the impacts prediction methods by selecting a EIA case in Sri Lanka		2		GA	
	5.3	4	Apply the above discussion (4.1) environmental impacts prediction methods in the local government area/s			4	IL	
6	6.1	4	Explain the of environmental	1			L	

			impacts evaluation methods and tools					
	6.2	4	Prioritize best evaluation method for socioeconomic and environmental impacts		2		GA	
	6.3	4	Read Recommended Reading 3 and 4			6	SR	
7	7.1	5	Elaborate social and ecological impact assessment on EIA process	1			L	
	7.2	5	Make a list of social and ecological impact of selected EIA report		2		GA	
	7.3	5	Identify social and ecological impact of past EIA activity in local government area			6	IL	
8	8.1	5	Explain public participation, environment monitoring, and auditing	1			L	AS1 due
	8.2	5	Discuss the key information and necessary steps of environment monitoring, and auditing		2		P	
	8.3	5	Explore the new methods and innovation by using online sources for environment monitoring, and auditing			4	IL	
9	9.1	6	Discuss the necessary steps for reviewing of EIA report	1			L	
	9.2	**6**	Review a past EIA report in Sri Lanka related to the development project		2		GA	
	9.3	6	Review a past EIA report in Sri Lanka related to the service project			6	IL	
10	9.4	6	Discuss the key points of above two cases (8.2, and 8.3) and prepare a	1			L	AS2 start Submit an individual report

			synopsis for each one					
11	10.1	4	Explain market and non-market based techniques for impact identification	1			L	
	10.2	4	Apply market and non-market based technique for the real world case		2		GA, IL	
	10.3	4	Explore the past research which used market and non-market based techniques			3	IL	
12	11.1	7	Discuss cost-benefit analysis (CBA) and extended cost-benefit analysis	1			L	
	11.2	7	Calculate CBA of selected project (service or development)		2		GA	
	11.3	7	Explore the advantages of CBA using secondary sources			2	IL	
13	12.1	8	Explain the multi-criteria analysis and importance of MCDA as a decision support tool	1			L	AS2 due
	12.2	8	Identify the MCDA applications and methods using past research		2		GA, IL	
	12.3	8	Read Recommended Reading 5			3	SR	
14	13.1	8	Explain criterion hierarchy and parameters on MCDM as GIS practical application	1				
	13.2	8	Prepare criteria and methods on selected case in provincial administrative area		8		P	AS3 start Submit an individual report
	13.3	8	Read Recommended Reading 5			3	SR	
15	14.1	8	Explain the practical steps and key points related to the 14.2	1			L	AS3 due
	14.2	8	Create a suitability of a location for		2		IL, P	

			any project using GIS techniques and write a small report of the analysis					
		1-8	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. DMSLB Dissanayake, Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 10%

AS3 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

List of Recommended Readings

1. Central Environmental Authority (2005), Simple Questions and Answer on EIA, Central Environmental Authority "Parisara Piyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka.
2. Central Environmental Authority (2006), Guidance for Implementing the EIA process – No1, Central Environmental Authority "ParisaraPiyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka.
3. Central Environmental Authority (2006), Guidance for Implementing the EIA process – No2, Central Environmental Authority "ParisaraPiyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka.
4. Central Environmental Authority (2006), Review of Environmental Legislation in Sri Lanka, Central Environmental Authority "ParisaraPiyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka.
5. Vicky Mabin and Michael Beattie (2006), A practical guide to MCDA (2006), Victoria University of Wellington

EMGT22052 Disaster Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Disaster Management
Course Code: EMGT22052 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concept, definitions and terminology of disaster management; Increasing trend of disasters and their impacts in local and global contexts; Disaster management cycle, its phases and activities, their applications and consequences; Disaster management policies in local and global contexts; Stakeholders and their roles and responsibilities in disaster management; Disaster risk, vulnerability and capacity; Disaster impacts on development; Holistic and community based approach in disaster management.

Course Aim: To provide the theoretical understanding and managerial skills of disaster management so that the students would be able to apply the knowledge and skills to reduce disaster risk and to effectively manage disaster situations.

Course ILOs:

Upon successful completion of this course unit, students will be able to:

1. define and explain the concept and key terms of disaster management;
2. explain the increasing trend and impacts of disasters;
3. identify and explain the activities in phases of disaster management cycle;
4. evaluate the disaster management policies and mechanism in Sri Lanka and analyze the global efforts in disaster risk reduction;
5. identify the stakeholders and explain their roles and responsibilities in disaster management;
6. explain the Risk, vulnerability and capacity concepts in disaster management;
7. analyze the impact of disasters on development, and
8. describe the community-based approach in disaster management and apply the knowledge in disaster management activities in society.

Lesson Sequence:

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain concept of Disaster Management, definitions, terminology and the development of the discipline	2			L, D	
	1.2	1	Ref.18, 20- Read UNISDR Terminology on Disaster Risk Reduction.			3		
2	2.1	2	Discuss disaster trend and impacts to the society of Sri Lanka	1			L,D	
	2.1.1	2	Identify disasters and vulnerable areas in Sri Lanka		2		GA, D, P	
	2.1.2	2	Ref.3- Read chapter 01 and 02 of 'Impacts of disasters in Sri Lanka 2016'			4		
3	2.2	2	Discuss disaster trend and impacts in global context	1			L, D	AS1 start Individual report
	2.2.1	2	Examine existing world disaster risk indices and ranking of the countries		2		GA, D, P	
	2.2.2	2	Ref.4- Read CRED report 2020			4		
4	3.1	1, 3, 8	Identify Disaster Management Cycle – Activities in prevention and mitigation phases, their applications and consequences	1			L,D	
	3.1.1	1, 3, 8	Identify prevention and mitigation measures in Sri Lanka		2		GA, D, P	
	3.1.2	1, 3, 8	Ref.2- Read Chap.5,14,15 (Catrte,2008,Disaster Managers handbook)			4		
5	3.2	1, 3, 8	Perform activities in preparedness phase, their applications and consequences	1			L, D	AS1due

	3.2.1	1, 3, 8	Identify preparedness measures in Sri Lanka		2		GA, D, P	
	3.2.2	1, 3, 8	Ref.2- Read Chap.16 (Catrte,2008,Disaster Managers handbook)			4		
6	3.3	1, 3, 8	Perform activities in response phase, their applications and consequences	1			L, D	AS2 start Individual report
	3.3.1	1, 3, 8	Identify measures and issues of response phase in Sri Lanka		2		GA, D, P	
	3.3.2	1, 3, 8	Ref.2- Read Chap.17 (Catrte,2008,Disaster Managers handbook)			4		
7	3.4	1, 3, 8	Perform activates in rehabilitation and reconstruction phases, their applications and consequences	1			L, D	
	3.4.1	1, 3, 8	Identify measures of rehabilitation and reconstruction phases in Sri Lankan context		2		GA, D, P	
	3.4.2	1, 3, 8	Ref.2- Read Chap.19 (Catrte,2008,Disaster Managers handbook)			4		
8	4.1	4	Analyze disaster management policies and mechanism in Sri Lanka	1			L, D	AS2 due
	4.2	4	Identify the gaps in disaster management policies and mechanism in Sri Lanka		2		GA, D, P	
	4.3	4	Ref.6- National Policy on Disaster Management. Ref.13-Sri Lanka disaster Management Act. Read chapters of 2 and 3.5 of Data Collection Survey on Disaster Risk Reduction Sector in Sri Lanka.			4		
9	5.1	4	Discuss global efforts in disaster risk reduction	1			L, D	
	5.2	4	Examine the existing international disaster management policies and programs		2		GA, D, P	
	5.3	4	Ref.19- Sendai Framework for Disaster Risk			4		

			Reduction: 2015 - 20130.					
10	6.1	5	Explain stakeholders and their roles and responsibilities in disaster management	1			L,D	
	6.1.1	5	Identify relevant stakeholders in disaster management in Sri Lanka		2		GA, D, P	
	6.1.2	5	Ref.5- Read District Disaster Management Plan for Anuradhapura district			4		
11	6.2	2, 3, , 5, 6, 7,8	Conduct field study on disaster management in a selected vulnerable community in Sri Lanka		6		FV	
12	7.1	6	Recognize Disaster 'Risk' concept	1			L,D	AS3 start Group report & presentation
	7.1.1	6	Identify the hazards and elements at risk in Sri Lankan context		2		GA, D, P	
	7.1.2	6	Ref.1- chap. 2.1 – 2.2 Determinants of risk (Cardona et al)			4		
13	7.2	6	Explain Disaster 'Vulnerability' and 'Capacity' concepts	1			L, D	
	7.2.1	6	Identify the vulnerabilities and capacities in communities in Sri Lanka		2		GA, D, P	
	7.2.2	6	Ref.1- chap. 2.3 – 2.4 Determinants of risk (Cardona et al)			4		
14	8.1	7	Explain Disaster impacts on Development	1			L, D	AS3 due
	8.2	7	Ref.2- Read Chap.6 (Catrte,2008,Disaster Managers handbook)			4		
15	9.1	8	Discuss Community based disaster management as a holistic approach	1			L, D	
	9.2	8	Make proposals to develop the involvement of communities in disaster management in Sri		2		GA, D, P	

			Lanka					
	9.3	8	Ref.8- Read Community Resilience Framework of Sri Lanka			4		
		1-9	End Semester Examination	15	30	55		ESE

L=Lectures, D=Discussion, GA=Group Activity, P=Practical, FV=Field Visit, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Teaching Panel: Mr. WMSB Wanninayake, Mr. LMAP Gunawardhana

Assessment Strategy:

In course (continuous) assessment - 40%

AS1 = 12% (Individual)

AS2 = 12% (Individual)

AS3 = 16% (Group; 12 for report and 04 for presentation)

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport requirement: Transport facilities for field class

Recommended Readings:

1. Cardona, etal (2012). Determinants of risk, A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA.
2. Carter, N. W., (2008). Disaster Management: A Disaster Manager's Handbook. 2 ed. Manila, Philippines: Asian Development Bank.
3. CHA, (2016). Impacts of disasters in Sri Lanka 2016, Colombo, Consortium of Humanitarian Agencies.
4. CRED and UNDDR, (2020). Human Cost of Disasters 2000 - 2019, Belgium: Center for Research on the Epidemiology of Disasters - CRED.
5. Disaster Management Center (DMC), (2017). District Disaster Management Plan; at www.dmc.gov.lk
6. Disaster Management Center (DMC), (2010). National Policy on Disaster Management, Colombo: National Council for Disaster Management.
7. DMC, (2015). Community Resilience Framework Sri Lanka. Colombo: Disaster Management Centre.

8. GWU, I. f. C. D. a. R. M., (2010). Emergency Management Glossary of Terms. [Online]
Available at: https://www.calhospitalprepare.org/sites/main/files/file-attachments/glossary_-_emergency_management_icdrm_30_june_10.pdf

9. UNISDR, (2015). *Sendai Framework for Disaster Risk Reduction: 2015 - 20130.* [Online]
Available at:
https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

10. UNISDR, (2016). *Terminology related to Disaster Risk Reduction-Updated technical non-paper.*[Online]

EMGT22062 Waste Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Waste Management
Course Code: EMGT22062 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concepts of waste and waste management, Current situation of the waste generation and issues in the world, Type of waste from a different place; industry, agriculture, municipality, E-waste, Hazardous waste, Waste classification; Waste disposal and problems in Sri Lanka, Waste management hierarchy; 3R concept (reduce, reuse, recycle), The need for integrated solid waste management, Sanitary landfilling, Waste treatment plant, Hazardous waste management, E-waste management, National and international waste management legislations.

Course Aim: To enhance the knowledge of students of waste generation, type of waste, waste minimization methods with modern technology, waste management strategies, integrated waste management concepts and legislative frameworks to promote accurate waste management activities so that students will be able to understand and manage the waste as a resource.

Course ILOs:

Upon successful completion of this course unit, students will be able to;

1. explain waste and waste management, type of waste, composition, and properties of waste;
2. identify waste disposal or transformation techniques (landfills and incinerators);
3. perform skills to manage the trash with the waste management strategies;
4. recognize the relevant regulations that apply for integrated waste management;
5. analyze recycling and reuse options (composting, source separation, and reuse of shredded tires, recycled glass, and
6. explain the legislative framework at the national and international levels.

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching /Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss and explain definitions of waste management,	1		10	D, L	
	1.2	1,2	Discuss the current situation of waste generation and issues at global and Sri Lankan levels	1	4	4	D, P, L	AS1 Should submit individually
2	2.1	1,2	Explain the type of waste from a different locations, industry, agriculture, municipality	1	2	5	L, GD	
3	3.1	1,2,3	Discuss the type of e-waste and issues of the world	1			D, L	
4	4.1	1,2,3	Describe the waste classification	1	2	5	D, L	SGD (6 group)
5	5.1	2,3	Explain waste disposal method and problem	1	4	4	D, P, L	
6	6.1	3,4	Explain the waste management concept	1	2	5	L, P	
7	7.1	4	Discuss reduction, source reduction or waste generation	1	2	4	D, L, P	

8		1,2,3,4	Mid Semester Examination Marking and discussion of answers		2	4	MSE	MSE
9	9.1	4	Introduce 3 R concept and other waste management methods	1		3	D, L	
10	10.1	4,5	Explain the recycling process for plastics, glass, paper etc.	1			D, L	
11	11.1	4,5	Evaluate the techniques of waste management: Sanitary Landfilling, composting	1	4	4	D, P, L	Q1
12	12.1	4,5	Discuss techniques of waste management: Waste treatment plant	1	4	4	FV, GD, P	
13	13.1	4,5	Explain the hazardous waste	1	4		L, P, D	AS2 Hazardous waste and issues
14	14.1	6	Find literature on waste management rules and regulation in Sri Lanka	1		3	D	GD find information in the library
15	15.1	6,4-5	Evaluate the waste management legislation in the world	1			L, D	
		1,2,3,4,5,6	End-semester Examination	15	30	55		ESE

L=Lectures, P=Practical, GD=Group discussion, SGD=Small group discussion, FV=Field Visit, D=Discussion, Q1=Quiz 1, AS1=Assignment 1, AS2=Assignment 2, MSE=Mid Semester Examination, ESE=End semester examination

Course Coordinator/Teaching Panel:

Teaching panel: Mrs. MMSA Marasinghe

Assessment Strategy

In Course (Continuous) Assessment = 40 %

AS1 = 5%

AS2 = 5%

Q1 = 10 %

Mid Semester Examination = 15%

Small Group Presentation = 5%

End Semester Examination = 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport is needed for field visits for 5 hrs

Recommended Readings:

1. J. W. Serene, (1989) *Waste management.* vol. 18, no. 8. 1989.

2. S. Kumar, *Municipal Solid Waste Management in Developing Countries*. 2016.

3. F. Status and Q. (2004) report, “Integrated Solid Waste Management Plan Final Status Quo Report,” no. 6, pp. 98–103.

4. N. Renewable, (1995). “Municipal Solid Waste Management : A Bibliography of U. S.

Department of Energy Contractor Reports through 1995 Municipal Solid Waste Management, 1997.

5. J. Pichtel, (2010). *Waste Management Practices: Municipal, Hazardous, and Industrial (Google eBook)*. 2010.

EMGT31012 Environmental Legislations

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Legislations
Course Code: EMGT31012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Background of environmental legislation, Principles and concepts of international environmental law, Hierarchy and process of legislation in Sri Lanka, Constitutional provisions and national commitment for environmental management in Sri Lanka, National environmental act and other sectorial legislation in Sri Lanka, Environmental legislations in Sri Lanka related to: land and natural resources, Water and aquatic resources, Air and atmospheric resources, Biodiversity and living organisms avoid repetitions, Judiciary and environment, Sectoral issues on environmental legislation in Sri Lanka, Environmental influence and level of discharge on: Land, Water, Air, New trends of legislation in Sri Lanka.

Course Aim: To provide key constitutional principles, statutes, regulations, rules, acts, and protocols on environmental legislation so that students will be able to apply those for the environmental protection and formulation of new legislations.

Course ILOs:

Upon the completion of this course, students will be able to:

1. examine the sources of environmental legislation at the local and international levels;
2. explain key principles and fundamental concepts in environmental law and policy;
3. describe the significance of environmental legislations of various levels;
4. analyze the effectiveness of existing legislations for environmental management;
5. explain the process of environmental policy formulation in Sri Lanka;
6. explain the legal provision for discharging of waste to the environment and their current drawbacks, and
7. apply knowledge on various environmental law and legislations for formulation of new laws; and identification of new tends in environmental law.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concept of the environmental legislation (EL) and related terminology, Identify the evolution of environmental legislation in Sri Lanka and other countries.	1			L	
	1.2	1	Prepare a list of EL in Sri Lanka before and after independence		3		SGD	
	1.3	1	Read Recommended Reading 01			8	SR	
2	2.1	1	Discuss the principles and concepts of international environmental laws	1			L	
	2.2	1	Prepare a timeline to show the evolution of international environmental laws		3		L, GA	
	2.3	2	Read Recommended Reading 02			8	SR	
3	3.1	2	Explain the process of legislation in Sri Lanka and preparation of environmental laws	1			L	
	3.2	2	Read Recommended Reading 03			7	SR	
4	4.1	3	Discuss the constitutional provisions and national commitment for environmental management in Sri Lanka	1			L	AS1 start Submit an individual report
	4.2	3	Examine the role of individuals for environmental protection on legal perspective.		4		IL	
	4.3	3	Read Recommended Reading 04			7	SR	
5	5.1	2, 3	Discuss the role of National Environmental Act and other sectorial legislation in Sri Lanka	1			L	

	5.2	3	Prepare a timeline to show the evolution of the National Environmental Act		2		IL	
	5.3	3	Read the National Environmental Act with recent amendments			8	SR, IL	
6	6.1	4	Examine the pieces of environmental legislations related to physical resources especially, land and natural resources, water and aquatic resources, air and atmospheric resources in Sri Lanka	1			L	AS1 due
7	6.2	4	Prepare a detailed document to show the list of environmental legislations with respective administrative bodies and institutions in Sri Lanka.		2		P	AS2 start Submit an individual report
	6.3	4	Read Recommended Reading 04, and 05			8	IL	
8	7.1	4	Examine the pieces of environmental legislations related to biological resources especially, biodiversity and living organisms	1			L	
	7.2	4	Discuss the legal provision for protecting living organisms in the world		2		P	
	7.3	4	Read Recommended Reading 04, and 05			4	IL	
9	8.1	5	Explain the judiciary and environment	1			L	
	8.2	5	Read Recommended Reading 06, and 07			5	IL	
10	9.1	5	Discuss sectoral issues on environmental legislation in Sri	1			L	AS2 due

			Lanka					
	9.2	6	Identify legal and institutional conflict on environmental legislation in Sri Lanka		3		L, GA	
11	10.1	6	Explain legal provisions of environmental influence and level of discharge on: Land, water, air	2			L	
12	10.2	6	Discuss environmental legislation framework and provisions for discharging of waste by selecting a production or service sector in Sri Lanka.	2			L	
13	10.3	6	Identify level of discharge of waste by selecting a production or service sector in local government area (Field activity)		7		P, IL, FA	
14	10.4	6	Discuss collected information (10.3) and prepare a field report	1	2		L, GA	AS3 start Submit an individual report
15	11.1	7	Discuss new trends of legislation in Sri Lanka	1			P, L	AS3 due
	11.2	7	Explore trends of legislation in the word using secondary sources.		2		P	
		1- 7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FA=Field Activity, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. DMSLB Dissanayake

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS01 = 10%

AS02 =10%

AS03 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visits															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings

1. Environmental legislation and institutions in Sri Lanka (2002), South Asia cooperation for environment program (SACEP) Colombo, Sri Lanka (Online) Available from: (http://www.sacep.org/pdf/Reports-Technical/2002-UNEP-SACEP-Law-Handbook-Sri-Lanka.pdf) (Accessed on …..mention date)
2. Bodansky, D. (2017), International Environmental Law, Codification Division of the United Nations Office of Legal Affairs, Santiago, Chile. (https:// legal.un.org/ avl/ study materials/ rcil-laac/2017/book3_1.pdf)
3. Dabare Ravindranath (2009), Environmental Law, Centre for Environmental Justice, Colombo, Sri Lanka.
4. Ministry of Environment and Natural Resources (2003), National Environmental Policy and Strategies. Sri Lanka
5. National Watershed Management Policy (2004), Ministry of Environment and Natural Resources, Sri Lanka.

6. Sri Lanka country paper land watch Asia (2010), Land Ownership and the Journey to Self-Determination-, Sarvodaya Shramadana- Movement through the support of the International Land Coalition (ILC).
7. United Nations Environmental Programme (2009), Judges and Environmental Law (A handbook for the Sri Lanka judiciary), Environmental Foundation Limited, Colombo, Sri Lanka. (https://www.ajne.org/sites/default/files/document/laws/5352/judges-environmental-law-a-handbook-for-the-sri-lankan-judiciary.pdf)

EMGT31022 Project Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Project Management
Course Code: EMGT31022 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Introduction to project management, Need of a project for any purposes, Identification of Project types, Project concept: project cycle, aspects of project preparation and analysis, System analysis and design: analysis of client objectives and formulation of strategic plans, Organization management and project processes : organizational structures project team, contractor selection, procurement process, Quality management: risk management, quality control management, contracts, Project review, project evaluation and monitoring, Social safeguard, safeguard policies in projects, compliances, Information management: techniques, communication and feedback, Management Information Systems (MIS), Project finance: cost, planning and execution, cost and benefits, Discounted and undiscounted measures of project worth, Project integration: project plan, execution and control, Project time management: activity definition sequencing, duration estimating, schedule development and control, Project human resource management: organizational planning, team development, behavioral science, health and safety in project management, leadership.

Course Aim: To provide essential knowledge for managing environmental projects; enhance managerial skills of students so that students will be able to apply knowledge and skills for implementing environmental projects and promote application of project management skills in environmental management.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify and describe on essential components and processes of environmental project management;
2. analyze contemporary environmental project performances in Sri Lanka and other countries, and
3. design environmental projects for local and national applications.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain the project management	1			L, D	
	1.2	1	Prepare a detail note on project management		2		P	
	1.3	1	Explain project management referring secondary source of information			5	SS	
2	2.1	2	Discuss the need of a project for any purposes	1			L, D	
	2.2	2	Find the need of a project for any purposes		2		P	
	2.3	2	Read Recommended Reading 1			4	SR	
3	3.1	2	Explain the project types	1			L,D	Q1 start & due
	3.2	2	List the different project types		2		SGD	
	3.3.	2	Explain different project types referring secondary source of information			5	SS	
4	4.1	2,3	Explain the Project concept: project cycle, aspects of project preparation and analysis	1			L,D	AS1 start
	4.2	2,3	Analyze importance of project concept: project cycle, aspects of project preparation and analysis		2		SGD	
	4.3	2,3	Draft a small report on project concept: project cycle, aspects of project preparation and analysis			4	SA	
5	5.1	2,3	Explain the system analysis and design: analysis of client objectives and formulation of strategic plans	1			L, D	
	5.2	2,3	Prepare a document on system analysis and design: analysis of client objectives and		2		SGD	AS 1 due

			formulation of strategic plans					
	5.3	2,3	Conduct a detail study on system analysis and design: analysis of client objectives and formulation of strategic plans			4	SS	
6	6.1	2,3	Discuss the organization management and project processes : organizational structures	1			L,D	AS2 start
	6.2	2,3	Study an organization management and project processes : and find relationship organizational structures		3		SGD	
	6.3	2,3	Read Recommended Readings given on organization management and project processes : and find relationship organizational structures			4	SS	
7	7.1	2,3	Explain the project team, contractor selection, procurement process	1			L, D	
	7.2	2,3	Discuss the project team, contractor selection, procurement process		3		SGD	
	7.3	2,3	Read Recommended Readings and case studies on project team, contractor selection, procurement process			7	SR	
8	8.1	2,3	Explain the quality management: risk management, quality control management, contracts	1			L,D	Q2 start & due
	8.2	2,3	Examine the effectiveness of quality management: risk management, quality control management, contracts		4		SGD	
	8.3	2,3	Study on quality management: risk management, quality control management, contracts			6	SS	
9	9.1	2,3	Discuss the project review, project evaluation	1			L,D	AS2 due

			and monitoring					
10	10.1	3	Explain the social safeguard, safeguard policies in projects, compliances	1			SGD	
	10.2	3	Analyze social safeguard, safeguard policies in projects, compliances		3		SGD	
	10.3	3	Study the case studies given on social safeguard, safeguard policies in projects, compliances			8	SS	PE start & due
11	11.1	2,3	Discuss the information management: techniques, communication and feedback, Management Information Systems (MIS)	1			L, D	
12	12.1	2,3	Discuss project finance: cost, planning and execution, difference between financial and economic analysis, cost and benefits, measuring of project worth: Discounted (NPV,CBR,IRR) and undiscounted criteria of project selection	1			L	
	12.2	2,3	Identify the different types of project finance: cost, planning and execution and cost and benefits, perform cost benefit analysis, calculate discounted criteria of project evaluation (NPV,CBR,IRR) and undiscounted measures		4		SGD	
	12.3	2,3	Read Recommended Readings and case studies on project finance: cost, planning and execution, cost benefit analysis			8	SS	
13	13.1	2,3	Discuss the project integration: project plan, execution and control	1			L, D	
14	14.1	3	Discuss project time management: activity definition sequencing, duration estimating, schedule development and control	1			L	

15	15.1	1,3	Discuss project human resource management: organizational planning, team development, behavioral science, health and safety in project management, leadership	1			L, SGD	
	15.2	1,3	Design the report on Project human resource management: organizational planning, team development, behavioral science, health and safety in project management, leadership		3		P	
		1,2,3	End semester Examination	15	30	55		ESE

L=Lectures, Discussion P=Practical, SA=Self Activity, SR=Self Reading, SS= Self Study, SGD=Small Group Discussion, Q1=Quiz 1, Q2=Quiz 2, AS1=Assignment 1, AS2=Assignment 2, PE=Practical Exam, *ESE=End Semester Examination*

Course Coordinator/Teaching Panel:

Teaching panel: Mr. NSK Herath, Dr. PSK Rajapakshe, Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 10%

Q1 = 5%

Q2 = 05%

PE = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Ebenezer A.Sholarin, J. L. (2015). Environmental Project Management, Principles, methodology and process. Switzerland: Springer International publishing.
2. Cosma C & Hopcroft F (2018). Environmental Project Management. Momentum Press Publisher.
3. Munier, N (2012). Project Management for Environmental, Construction and Manufacturirng Engineers: A manual for Putting Theory into Practice. Springer Dordrecht.
4. Project Management Institute, (2013). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition, Pennsylvania , USA.
5. වික්‍රමසිංහ Y.M (2009). සංවර්ධන ව්‍යාපෘති හඳුනාගැනීම හා සැලසුම් කිරීම -කෝට්ටේ, සිරිපුර ප්‍රින්ටර්ස්.

EMGT31032 Climate Change Science

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Climate Change Science
Course Code: EMGT31032 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Describe factors governing the climate, Global, regional and local atmospheric circulation systems, Oceanic streams and deep ocean circulation, Climates of the world, Historical and present causes of climate change, Observed effects and impacts of contemporary climate change, Climate change projection methodology, Climate change projection for near future of the world, Projected climate for Sri Lanka, Climate change risks, Climate change risks in Sri Lanka, Climate change mitigation measures, Climate change adaptation measures (including indigenous adaptations).

Course Aim: To provide fundamental knowledge on the processes of the ocean - atmosphere system which composes the climates of the world; introduce causes, effects and impacts of contemporary climate change with a perspective on paleo-climatological view on climate change; make familiar with climate projection methodology and projected changes in future and introduce climate change adaptation and mitigation measures in various sectors so that students will be able to appropriately consider issues related to climate and its change in environmental management decision making.

Course ILOs:

Upon successful completion of this course, students will be able to:

1. explain climatic factors, processes of the ocean – atmosphere system composing the climates of the world;
2. explicate the causes, observed effects and impacts of historical and contemporary global climate change;
3. describe climate change projection methodology and future global climate change projections, and
4. propose climate change mitigation and adaptation measures to various sectors of the economy and society.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain the causes for spatiotemporal variation of solar radiation in the earth surface	1			L	AS1 start Compile 50 multiple choice questions on climate, observed climate change and its impact
	1.2	1	Conduct qualitative assessment of diurnal and seasonal variation of solar radiation in given locations		1		P	
	1.3	1	Learn observed changes and their causes (Recommended Reading 1 pages 39 – 42)			3	IL	
2	2.1	1	Explain the global atmospheric circulation pattern	1		3	L, IL	
	2.2	1	Workout prevailing wind pattern in a given location		1		P	
	2.3	1	Learn observed changes and their causes (Recommended Reading 1 pages 42– 44)			3	IL	
3	3.1	1	Describe the global oceanic circulation pattern	1			L	
	3.2	1	Design 10 multiple choice questions on observed changes and their causes		2		P	
	3.3	1	Learn observed changes and their causes (Recommended Reading 1 pages 42– 44)			3	IL	
4	4.1	1	Explain regional and local circulation patterns	1			L	
	4.2	1	Design 10 multiple choice questions on observed changes and their causes		2		P	
	4.3	1	Learn observed changes and their causes (Recommended Reading 1 pages 42– 44)			3	IL	
5	5.1	1	Analyze world climates	1			L	
	5.2	1	Design 10 multiple choice questions on observed changes and their causes		2		P	

	5.3	1	Learn observed changes and their causes (Recommended Reading 1 pages 44– 48)			3	IL	
6	6.1	2	Study historical and present causes of climate change	1			L	
	6.2	2	Design 10 multiple choice questions on causes of climate change		2		P	
	6.3	2	Learn observed changes and their causes (Recommended Reading 1 pages 48– 55)			3	IL	
7	7.1	2	Clarify Observed effects and impacts of contemporary climate change	1			L	AS1 due
	7.2	2	Investigate observed effects and impacts of contemporary climate change		4		FC	
	7.3	2	Learn future climate, risk and impact (Recommended Reading 1 pages 56– 62)			3	IL	
8	8.1	3	Study Climate change projection methodology	1			L	AS2 start Compile 50 multiple choice questions on climate change effects, risk, mitigation and adaptation
	8.2	3	Design 10 multiple choice questions on Climate change projection methodology		2		P	
	8.3	3	Learn future climate, risk and impact (Recommended Reading 1 pages 62 - 74)			3	IL	
9	9.1	3	Examine Climate change projection for near future of the world	1			L	
	9.2	3	Design 10 multiple choice questions on climate change projection		2		P	
	9.3	3	Learn future pathways (Recommended Reading 1 pages 75– 80)			4	IL	
10	10.1	3	Investigate Projected climate for Sri Lanka	1			SGD	
	10.2	3	Design 10 multiple choice questions on projected climate of Sri Lanka		2		P	
	10.3	3	Learn future climate, risk and impact (Recommended Reading 1 pages 81 - 91)			4	IL	

11	11.1	4	Estimate Climate change risks	1			L	
	11.2	4	Design 10 multiple choice questions on Climate change risks		2		P	
	11.3	4	Learn adaptation and mitigation (Recommended Reading 1 pages 93 - 101)			4	IL	
12	12.1	4	Estimate Climate change risks in Sri Lanka	1			L	
	12.2	4	Design 10 multiple choice questions on Climate change risks in Sri Lanka		2		P	
	12.3	4	Learn adaptation and mitigation (Recommended Reading 1 pages 93 - 101)			4	IL	
13	13.1	4	Propose Climate change mitigation measures	1			L	
	13.2	4	Design 10 multiple choice questions on Climate change mitigation measures		2		P	
	13.3	4	Learn adaptation and mitigation (Recommended Reading 1 pages 102 - 108)			4	IL	
14	14.1	4	Recommend Climate change adaptation measures	1			L	AS2 due
	14.2	4	Design 10 multiple choice questions on Climate change adaptation measures		2		P	
	14.3	4	Learn adaptation and mitigation (Recommended Reading 1 pages 108 - 112)			4	IL	
15	15.1	4	Evaluate Climate change management of Sri Lanka	1			SGD	
	15.2	4	Design 10 multiple choice questions on Climate change management of Sri Lanka		2		P	
	15.3	4	Read Recommended Reading 2			4	IL	
		1,2,3,4	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, FC=Field Class, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination.

Course Coordinator/Teaching Panel:

Teaching panel: Dr.JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 20%

AS2 = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. IPCC, 2014. Climate Change (2014): Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland: IPCC.
2. National Research Council, (2012). Climate Change: Evidence, Impact and Choices: PDF Booklet. Washington DC: National Academies Press.
3. Shafer, M. D., (2017). Climate change Primer. First ed. A. PhraoChing Mai, Thailand: Author.

EMGT31042 Advanced Geographic Information systems

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Advanced Geographic Information systems
Course Code: EMGT31042 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Advanced GIS techniques, Building and working Geo-data bases, Spatial data projection and transformation, Data quarry in GIS, Spatial Analysis, Advanced Spatial Analysis, 3D Analysis, Zonal and focal statistics, Spatial trend analysis, Spatial Statistics, Hydrology tool, Hotspots analysis, Spatial multi-criteria analysis, GPS application for spatial data capturing method, GPS data collection techniques

Course Aim: To provide advanced knowledge of theory and practice in GIS, GPS techniques, and its applications in Environmental Management activities so that the students will be able to analyze and use advanced GIS functions for any environmental variables at local, regional, and global levels.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify advanced knowledge of the GIS techniques;
2. explain functions of the Geo-data bases;
3. describe the theory of the leading advanced GIS functions;
4. analyze the theory and application of spatial statistics in GIS;
5. apply skills and knowledge on the selection, integration, analysis, visualization/communication of spatial information using GIS-related spatial analytical methods, and
6. evaluate the value of the GPS data collection method to capture spatial data.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the advanced GIS techniques: Definitions, list the functions	1			L, D	AS1 start Take home assignments about the advanced GIS functions
	1.2	1	Collect and read advanced GIS techniques using available web sources			2	SR	
2	2.1	2	Describe, building and working Geo-data bases	1			L, D	
	2.2	2	Provide hands-on training on creating and working with Geo-data bases		2		SGD, P	
	2.3	2	Read Recommended Reading 1: Chapter 3			2	SR	
3	3.1	3,4,5	Describe the spatial data projection and transformation	1			L, D	
		3,4,5	Provide hands-on training on maps projection and transformation		2		SGD, P	
	3.2.	3,4,5	Read Recommended Reading 2: Chapter 2			2	SR	
4	4.1	3,4,5	Describe data quarry in GIS: Definition, Types of quarries	1			L, D	
	4.2	3,4,5	Provide hands-on training on data quarries in GIS		2		P	
	4.3	3,4,5	Collect and read data quarries in GIS using available web sources			4	SR	
5	5.1	3,4,5	Discuss Spatial Analysis: Definitions, types, and usage	1			L	AS1 due
	5.2	3,4,5	Provide hands-on training on fundamental spatial analysis available in GIS		2		SGD, P	
	5.3	3,4,5	Read Recommended Reading 3: Chapter 25			4	SR	

			and 26 Read Recommended Reading 4: Chapter 1					
6	6.1	3,4,5	Discuss advanced Spatial Analysis: Definitions, types, and usage	1			L	AS2 start Take home assignments about spatial analysis in GIS
	6.2	3,4,5	Provide hands-on training on advanced spatial analysis available in GIS		2		SGD, P	
	6.3	3,4,5	Read Recommended Reading 3: Chapter 25 and 26 Read Recommended Reading 4: Chapter 1			6	IL	
7	7.1	3,4,5	Describe 3D Analysis: Definitions, types, and usage	1			L	
	7.2	3,4,5	Provide hands-on training on 3D analysis available in GIS		2		SGD, P	
	7.3	3,4,5	Read Recommended Reading 5: Chapter 1 Read Recommended Reading 5: Chapter 2, 3, 4			2	SR	
8	8.1	3,4,5	Discuss Zonal and focal statistics: Definitions, types, and usage	1		L		
	8.2	3,4,5	Provide hands-on training on zonal and focal statistics available in GIS		2		SGD, P	
	8.3	3,4,5	Collect and read Zonal and focal statistics in GIS using available web sources			10	IL	
9	9.1	3,4,5	Define Spatial trend analysis: Definitions, types, and usage	1			L, D	
	9.2	3,4,5	Provide hands-on training on Spatial trend analysis available in GIS		2		SGD, P	
	9.3	3,4,5	Collect and read Spatial trend analysis in GIS using available web sources			4	SR	
10	10.1	3,4,5	Discuss Spatial Statistics: Definition, Types, usefulness	1			L	

	10.2	3,4,5	Provide hands-on training on Spatial Statistics available in GIS		2		SGD, P	
	10.3	3,4,5	Read Recommended Reading 7. Chapter 1 to 5			3	SR	
11	11.1	3,4,5	Discuss Hydrology tool: Definitions, and usefulness	1			L, R	AS2 due
	11.2	3,4,5	Provide hands-on training on Hydrology tool available in GIS		2		SGD, P	
	11.3	3,4,5	Collect and read hydrology tools in GIS using available web sources			3	SR	
12	12.1	3,4,5	Discuss hotspots analysis: Definition, Types, usefulness	1			L	
	12.2	3,4,5	Provide hands-on training on hotspots analysis available in GIS		2		SGD, P	
	12.3	3,4,5	Read Recommended Reading 8			2	SR	
13	13.1	3,4,5	Define Spatial multi-criteria analysis: Definition, advantage, usefulness	1			L	
	13.2	3,4,5	Provide hands-on training on Spatial multi-criteria analysis available in GIS		2		SGD, P	
	13.3	3,4,5	Read Recommended Reading 9,10,11			4	SR	
14	14.1	6	Discuss GPS application for spatial data capturing method: Definitions, types, and usage	1			L	
	14.2	6	Provide hands-on training on working with GPS		2		SGD, P	
	14.3	6	Collect and read GPS data capturing method using available web sources			4	SR	
15	15.1	6	Discuss GPS data collection techniques	1			L	
	15.2	6	Divide students into small groups and conduct GPS data collection exercises to provide hands-on training		4		GA	

	15.3	6	Conduct mini project			3	IL	AS3 start Mini-projects
		1,2,3,4,5, 6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1= Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

AS3 (Mini projects) = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Kresse, W., Danko, D. M. (Eds.). (2012). Springer handbook of geographic information. Springer Science & Business Media.
2. Chakraborty, D., Sahoo, R.N.(2007), Fundamentals of Geographic Information System, Viva book private limited, New Delhi, India
3. Fotheringham, A. S., & Rogerson, P. A. (Eds.). (2008). The SAGE handbook of spatial analysis. Sage.
4. Murayama, Y., & Thapa, R. B. (Eds.). (2011). spatial analysis and modeling in geographical transformation process: GIS-based applications (Vol. 100). Springer Science & Business Media.
5. Zlatanova, S., Rahman, A., & Pilouk, M. (2002). 3D GIS: current status and perspectives. International Archives of Photogrammetry Remote Sensing and Spatial Information Sciences, 34(4), 66-71.
6. Abdul-Rahman, A., & Pilouk, M. (2007). Spatial data modelling for 3D GIS. Springer Science & Business Media.
7. De Silva, R.P. & Gunasena, C.P (2006). Spatial Statistics Theory and Application, Geo-informatics Society of Sri Lanka.

8. Ranagalage, M.; Estoque, R.C.; Zhang, X.; Murayama, Y. (2018). Spatial changes of urban heat island formation in the Colombo District, Sri Lanka: Implications for sustainability planning. Sustainability 10, doi: 10.3390/su10051367.
9. Saaty TL, Vargas LG, (2012) Concepts & applications of the analytic hierarchy process (2nd edn). Kluwer Academic Publishers, Netherlands.
10. Estoque, R. C. (2012). Analytic hierarchy process in geospatial analysis. In Progress in geospatial analysis (pp. 157-181). Springer, Tokyo.
11. Dissanayake, D.; Morimoto, T.; Murayama, Y.; Ranagalage, M.; Perera, E. (2020). Analysis of Life Quality in a Tropical Mountain City Using a Multi-Criteria Geospatial Technique : A Case Study of Kandy City, Sri Lanka. Sustainability 12, 1–22.

EMGT31052 Ecotourism

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Ecotourism
Course Code: EMGT31052 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Definitions of ecotourism, Ecology and ecotourism, Differences among mass tourism and ecotourism, Concepts of ecotourism, Evolution and modern trends of ecotourism, Ecotourism resources: natural, built, and events, Ecological footprint, Ecotourism activities, Ecotourism market: cultural tourism, Rural tourism, Nature tourism: sun and beach tourism, etc., Economic aspects of ecotourism: resources, carrying capacity, social, economic and ecological impacts of tourism, Need for sustainable ecotourism, Ecotourism opportunities, Ecotourism in the national/global context, Convention on biological diversity, Sustainable development goals, this will cover from economic aspects, production and development.

Course Aim: To provide knowledge, skills and attitudes on ecotourism, trends, and opportunities for development and sustainability in Sri Lanka. This knowledge and understanding will help a student in their decision-making process and environmental protection in their day to day life.

Course ILOs:

After the successful completion of this course unit, students will be able to:

1. identify and explain the fundamental component of the ecosystems, the concept of ecotourism, and resources of ecotourism;
2. explain the ecotourism market and compounds of its emergence, growth and continued development;
3. recognize and critically discuss the issues associated with the use of the natural environment for tourism;
4. analyze the environmental, socio-cultural and economic impacts of ecotourism and its management, and
5. explain how ecotourism can contribute to the local socio-economic development and environmental conservation and protection.

Lesson Sequence:

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching /Learning Methods	Assessment methods
				T	P	IL		
1	1.1	1	Discuss the concept of ecotourism and its definition	1		1	D, L	
2	2.1	1,2	Discuss and explain differences of ecology and ecotourism	1		2	D	
3	3.1	1,2	Explain the differences between mass tourism and ecotourism	1	4		D, L	
4	4.1	1,2	Explain to make a flow chart for evolution of ecotourism and modern trends an essential element in the ecotourism	1	2	2	D, L , GD	AS1 start Make a flow chart for explaining the evolution of ecotourism by a small group
5	5.1	2,3	Discuss ecotourism resources: natural, built, and events	1	8	4	D, FV, P	
6	6.1	2,3	Explain the ecological footprint	1	2		D, P, L	
7	7.1	1,2,3	Make arrangements for midterm examination and discussion	1	2	6	MCQ	MSE (one to 6 weeks)
8	8.1	1,42,5	Discuss ecotourism activities	1	2		D, L, P	
9	9.1	1,2,4	Explain the ecotourism market: cultural tourism, rural tourism, nature tourism: sun, sand and beach tourism, etc.	1			L	
10	10.1	4,5	Analyze the economic aspects of ecotourism: resources, carrying capacity in ecotourism, economic benefits to the local community ecotourism job	1		8	D, L	

			opportunities in Sri Lanka,					
11	11.1	4,5	Discuss social and ecological impacts of ecotourism	1	2	10	D, P, L,	Q1start and due Related to the today lesson
12	12.1	4,5	Explain the need for sustainable ecotourism	1	2	10	P, L	
13	13.1	3,4,5	Discuss the need of sustainable ecotourism and	1	4	6	D, P	AS2 start Find the information from the library and internet by dividing students into small groups and collecting information etc.
14	14.1	4,5	Explain ecotourism in the national/global context (Sustainable development)	1	2		P, L	
15	15.1	4,5	Review the report related to the ecotourism and development	1		6	D	
		1,2,3,4, 5	End-semester examination	15	30	55	ESE	

L=Lectures, P=Practical, FV=Field Visit, D=Discussion, GD=Group Discussion, Q1=Quiz 1, MSE=Mid Semester Examination, ESE=End Semester Examination, AS1=Assignment 1, AS2=Assignment 2, MCQ= Multiple Choice Question

Course Coordinator/Teaching Panel:

Teaching panel: Mrs. MMSA Marasinghe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

MSE = 15%

Q1 = 10%

AS2 = 5%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport is needed for 12 hrs.

Recommended Readings:

1. Honey, Martha. (2008). Eco-tourism and Sustainable Development: Who Owns Paradise? (2nd edition) Washington, DC: Island Press.

2. McLaughlin J. M. (2011) "Ecotourism Assessment: Applying the Principles of Ecotourism to Paddle-Based Recreation in St. Lawrence Islands National Park and Environs," *ProQuest Diss. Theses*, p. 153,.

3. Fennell, D. (2002) *Ecotourism: an introduction*, ISBN 0-415-20168-3

4. Fennell D. A. (2014) *Ecotourism 4th Edition*.

5. Learning M, Cookbook R. (2006) *Ecotourism Impacts, Potentials, and Possibilitie*

EMGT31062 Applied Agroforestry Systems and Diversification

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Applied Agroforestry Systems and Diversification
Course Code: EMGT31062 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Introduction to Agroforestry, Practical Applications of Agroforestry, Soil Conservation and Agroforestry, Agroforestry services, Successful Agroforestry Approaches in Sri Lanka, Multipurpose Tree Species in Agroforestry, Land diversification and its importance.

Course Aim: To provide theoretical knowledge on the concepts, issues and practical approach of agroforestry systems, into plantation industry of Sri Lanka an environmentally responsible agricultural and forestry practices and systems with an ideal context for the plantation industry, to extent the knowledge of the scientific concepts of agroforestry and implementing the practical so that student will be able to protect the environment and promote sustainability in both agricultural and forestry sectors.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify the need of Agroforestry and the involved biophysical processes;
2. explain the role of agroforestry systems in plantation soil fertility, nutrient cycling and other environmental services;
3. apply the practical approach of Agroforestry towards plantation agro ecosystem;
4. assess of benefits of traditional knowledge and income through agroforestry systems and
5. analyse the importance of diversification of ecosystem.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduction to Agroforestry	1			L	
	1.2	1	Study about application of Agroforestry in other countries			8	LS	
2	1.3	1	Discuss importance of Agroforestry in plantation industry of Sri Lanka	1			L, VP	
	1.4	1	Compare of the current status of Agroforestry in Sri Lanka with other countries		4		GD	AS1 start Preparation of a report under this discussion
3	2.1	1,3	Practical applications of Agroforestry	1			L	
	2.2	1,3	Examine of applying the Agroforestry to different climatic regions in Sri Lanka			7	LS, IL	
4	2.3	1,3	Group presentations on “Agroforestry in different climatic regions of Sri Lanka”		4		GP, D	AS2 start & due Group presentations
	3.1	2	Soil Conservation and Agroforestry	1			L	
	3.3	2	Explore of role of Agroforestry in soil conservation			10	LS	AS1 due
5	3.4	2	Other Environmental restoration of Agroforestry	1			L, VP	
6	4.1	2,3	Agroforestry services	1			L	
	4.2		Group discussion on Agroforestry for ecosystems services		4		GD	
7	5.1	4	Explain Successful Agroforestry Approaches in Sri Lanka	1			L	
	5.2	4	Extensive study on global successful			5	LS, IL	

			Agroforestry Approaches					
8	5.2	4	Group discussion about successful Agroforestry Approaches in other countries		4		GD	AS3 start Preparation of a report under this discussion
	5.3	4	High intensity cropping models	1			L, VP	
9	5.3	4	Mixed cropping systems	1			L	
			Investigate of the advantages of mixed cropping system			5	IL	
10	6.1	4	Multipurpose Tree Species in Agroforestry	1			L	AS3 due
			Group discussion on "Mixed-cropping systems of different rice cultivars"		4		GD	
11	6.2	4	Study on current researches related to Agroforestry			5	LS	
		4	Tropical and Temperate Tree Species and Current Research	1			D	
12	6.3	4	Social, economic benefits of Agroforestry systems	1			D	
	6.4	4	Compare of economic benefits of Agroforestry in Sri Lanka with other countries			10	LS	
13	7.1	5	Explain Land diversification and its importance	1			L	
	7.1	5	Group presentation of economic and social benefits of Agroforestry in Sri Lanka and other Asian country		4		GP	AS4 starts Group presentation
14	7.2	5	Group presentation of economic and social benefits of Agroforestry in Sri Lanka and other Asian country		4		GP	AS4 due
	7.3	5	Need of diversification	1			L, D	
	7.4	5	Thorough study on the diversification			5	LS	

15	7.5	5	Discuss Importance of diversification and its benefits in Sri Lankan plantation industry	1			D	
	7.6	5	Group discussion on “Benefits and risks of diversification”		2		GD	
		1,2,3 4,5	End Semester Examination	15	30	55		ESE

L=Lectures, IL=Independent Learning, VP=Video Presentation, GD=Group Discussion, LS=Literature Survey, D=Discussion, GP=Group Presentation, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Visiting Lecturer, Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

Assignment-01 = 10%

Assignment-02 =10%

Assignment-03= 10%

Assignment-04= 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Dwivedi AP, Agroforestry: Principles and Practices, (1994: 2012) 81-204-0703-2.
2. Raj, AJ, Agroforestry: Theory and Practice, (2014) 9788172338664.
3. Lawrence R. Kellimore, Handbook of Agroforestry, (2010) 9781608763597.
4. P. K. Ramachandran Nair, Agroforestry for sustainable agriculture (2019) 13-9781786762207.
5. An Introduction to Agroforestry (1993) P.K. Nair, Kluwer Academic Publishers Boston and in cooperation with International Center for Agroforestry.
6. Planning for Agroforestry Projects, (1990) Budd, W.W., Duchhart, I. Hardesty, L.H. and Steiner, Elsevier New York, 1990.
7. North American Agroforestry: An Integrated Science and Practice, (2000) Garrett, H.E, Rietveld, W.J. and Fisher, R.F. American Society of Agronomy, Inc. Madison, Wisconsin, USA.

8. Guidelines on Agroforestry Extension Planning in Kenya, (1993) Tengnas, Bo, SIDA' Regional Soil Conservation Unit
9. An Introduction to Agroforestry Diagnosis and Design, D & D User's Manual, (1987) Raintree J.B. ICRAF, Nairobi, Kenya.

EMGT31072 Poverty and Environment

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Poverty and Environment
Course Code: EMGT31072 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Concept of poverty, Dimensions of poverty, Approaches to poverty, Poverty environment nexus, Poverty and Sustainable Development Goals, Poverty management Strategies, Participatory tools in managing poverty, planning for no poverty.

Course Aim: To provide learners exposure to broad understanding of the issue of poverty within the sustainable development concept and to learn the national practice of poverty management in Sri Lanka so that the learners will be able to make decisions balancing societal and environmental needs in the sustainable development activities.

Course ILOs:
Upon successful completion of this course, the learners will be able to:

1. define justifiable approach and strategies for poverty management within the sustainable development concept;
2. analyze present poverty management approaches and strategies applied in Sri Lanka, and
3. demonstrate skills of planning and implementation of 'no poverty' actions.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain the concepts and dimensions of poverty	1			L	AS1 start Multiple Choice Questions covering lessons 1-7
	1.2	1	Learn various concepts and dimensions of poverty		2		SGD	
	1.3	1	Read Recommended Reading 4, 8 & 11			4	IL	
2	2.1	1	Discuss the Measures of poverty	1			L	
	2.2	1	Learn various measures of poverty		2		GA	
	2.3	1	Read Recommended Reading 4, 8& 11			4	IL	
3	3.1	1	Approaches to poverty	1			L	
	3.2	1	Learn various approaches to poverty		2		SGD	
	3.3.	1	Read Recommended Reading 5			4	IL	
4	4.1	1	Discuss Capability approach	1			L	
	4.2	1	Learn the capability approach		2		SGD, P	
	4.3	1	Read Recommended Reading 5			4	IL	
5	5.1	1	Establish poverty environment nexus	1			L	
	5.2	1	Discuss poverty environment linkage at the household level		2		SGD	
	5.3	1	Read Recommended Reading 12			4	IL	
6	6.1	1	Outline key factors of poverty environment nexus	1			L	
	6.2	1	Discuss the factors of poverty environment nexus		2		SGD	
	6.3	1	Read Recommended Reading 10			4	IL	

7	7.1	1	Analyze policies addressing poverty and environment objectives	1			L, VP	AS1 due
	7.2	1	Discuss policies addressing objectives of environment and poverty		2		SGD,P	
	7.3	1	Read Recommended Reading 10			4	IL	
8	8.1	2	Place of poverty issue in sustainable development	1			L	AS2 start & due Individual presentation
	8.2	2	Deliberate the importance of balancing planet – people – and profit		2		GD	
	8.3	2	Conduct web search on importance of poverty in the Sustainable Development Goals			4	IL	
9	9.1	2	Analyze strategies: putting the last first	1			L	
	9.2	2	Discuss issues and remedies in putting the last first in the Sri Lankan context		2		SGD, P	
	9.3	2	Read chapter 6 & 8 in Recommended Reading 2			4	IL	
10	10.1	2	Justifying empowerment as the perspective	1			L	
	10.2	2	Find the potential of the capability approach for empowerment		6		FC	
	10.3	2	Read Recommended Reading 5			4	IL	
11	11.1	2	Evaluate co-creation paradigm	1			L	
	11.2	2	Learn stages of participatory process		2			
	11.3	2	Read Recommended Reading 6			5	IL	
12	12.1	2	Familiarize with participatory techniques	1			L	
	12.2	2	Discuss potential use of European Union experience for Sri Lanka		2		SGD, P	
	12.3	2	Read Recommended Reading 6			4	IL	
13, 14 & 15	13.1	3	Planning for ‘No Poverty’	3			L	End of Individual Presentations
	13.2	3	Draft a plan to achieve SDG 1 in Sri Lanka		2		GA	

	13.3	3	Read Recommended Reading 9 and relevant material from websites			6	IL	
		1,2,3,4,5		15	30	55		ESE

L=Lectures, P=Practical, FC=Field Class, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, VP=Video Presentation, GD=Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

ASG1 = 20%

ASG2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: A bus for 35 persons for one day

Recommended Readings

1. Chambers, R. (1980). *Rural Poverty Un perceived: Problems and Remedies.* Brighton: Institute of Development Studies, University of Sussex.
2. Chambers, R. (1983). *Rural Development: putting the last first.* Prentice Hall.
3. Duraiappah, A. K. (1996). Poverty and Environmental Degradation: A Literature Review and Analysis.
4. Ehrenpreis, D. (2006). *What is poverty? Concepts and measures.* Bracilla DF, Brazil: International Poverty Centre, UNDP.
5. Knecht, A. (2012). Understanding and Fighting Poverty – Amartya Sen's Capability Approach and Related Theories. *Social Change Review*, 153 - 176.
6. Korosak, T. S., Zavratnik, V., Kos, A., & Duh, E. S. (2018). *REPORT OF PARTICIPATORY TOOLS, METHODS AND TECHNIQUES.* University of Ljubljana.
7. Lipton, M. (1977). *Why Poor People Stay Poor: Urban bias in World Development.* Harvard University Press: Harvard.
8. Lok-Dessallien, R. (n.d.). *Review of Poverty Concepts and Indicators.*

9. *National Policy Framework: Vistas of Prosperity.* (2019). Colombo: Government Press.
10. Scherr, S. J. (2000). A downward spiral? Research evidence on the relationship between poverty and natural resource degradation. *Food Policy*, 479-498.
11. Sen, A. (2006). Conceptualizing and Measuring Poverty. In D. B. Grusky, & R. Kanbur, *poverty and inequality* (pp. 1- 40). Stanford : Stanford university press.
12. The World Bank. (2008). *Poverty and the Environment - Understanding Linkages at the Household Level.* Washington: IBRD, the World Bank.

EMGT 31081 Personality Management for Environmental Leadership II

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Personality Management for Environmental Leadership II
Course Code: EMGT31081 (T6hrs: P15hrs: IL29hrs)

Course Capsule: Aspects of environmental intelligence: Aptitude, logical reasoning, creativity, emotional intelligence and general knowledge on the environment.

Course Aim: To enhance environmental intelligence by practicing tests and improving general knowledge on the environment among learners which is essential for performing as successful environmental leaders.

Course ILOs:

Upon successful completion of this course, the learners will be able to:

1. demonstrate high standard in performing aptitude and intelligence tests and
2. design competitions to test aptitude, intelligence and general knowledge pertaining to environmental management.

Lesson sequence

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduce aptitude	1			L	
	1.2	1	Learn IQ tests		1		P	PR
	1.3	1	Read introduction in Recommended Reading 1			2	IL	
2	2.1	1	Learn verbal aptitude exercises		1		P	PR
	2.2	1	Practice verbal aptitude exercises (section 1 of chapter 2 in Recommended Reading 1)			2	IL	
3	3.1	1	Learn numerical aptitude exercises		1		P	PR
	3.2	1	Practie numerical aptitude exercises (section II of chapter 2 in Recommended Reading 1)			2	IL	
4	4.1	1	Practice Learning technical aptitude exercises		1		P	PR
	4.2	1	Practice technical aptitude exercises (Section III of chapter 2 in Recommended Reading 1)			2	IL	
5	5.1	1	Learn logical reasoning	1			L	
	5.2	1	Practice logical reasoning exercises		1		P	PR
	5.3	1	Practice logical reasoning exercises (chapter 3 of Recommended Reading 1)			2	IL	
6	6.1	1	Learn creativity	1			L	
	6.2	1	Practice creativity exercises		1		P	PR
	6.3	1	Practice creativity exercises (chapter 4 test 4 of Recommended Reading 1)			2	IL	
	7.1	1	Learn imagination exercises		1		P	PR
	7.2	1	Practice imagination exercises (Section 1 of chapter 4 in Recommended Reading 1			2	IL	
8	8.1	1	Learn lateral thinking exercises		1		P	PR
	8.2	1	Practice lateral thinking exercises (section II of			2	IL	

			chapter 4 in Recommended Reading 1)					
9	9.1	1	Learn problem solving exercises		1		P	PR
	9.2	1	Practice problem solving exercises (section III of chapter 4 in Recommended Reading 1)			2	IL	
10	10.1	2	Study emotional intelligence	1			L	
	10.2	4	Practice emotional intelligence exercises		1		P	PR
	10.3	4	Practice emotional intelligence exercises (chapter 5 in Recommended Reading 1)			2	IL	
11	11.1	5	Study memory	1			L	
	11.2	5	Practice memory exercises		1		P	PR
	11.3	5	Practice memory exercises (chapter 6 in Recommended Reading 1)			2	IL	
12, 13, 14, 15	12.1	5	Learn designing IQ competitions	1			L	
	12.2	5	Practice designing IQ competition		4		P	AS1 Group assessment
	12.3	5	Practice designing IQ competition			7	IL	
				6	15	29		

Abbreviations

L=Lectures, P=Practical, IL=Independent Learning, PR=Practical Records

Course Coordinator/Teaching Panel:

Teaching Panel: Dr. JMSB Jayasundara

Assessment Strategy:
Continuous assessment -100%
Group assignment – 50%

Practical records -50% (Total 11 PR, 10 highest counted each 5%)

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: None

Recommended Readings:

1. Carter, P., 2005. *The complete book of intelligence test.* First Edition ed. West Sussex: John Wiley & Sons Ltd.

2. Gallagher, DR. (2012). Environmental Leadership: A Recommended Reading Handbook. SAGE Publications, India.

EMGT32012 Research Methodology

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Research Methodology
Course Code: EMGT32012 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Critically Reviving Literature, Approaches to Theory Development, Formulating the Research Design, Selecting Samples, Using secondary Data, Data collection through Observation, Collecting data through Interview, Collecting Data through questionnaire, Analyzing Quantitative Data and Analyzing Qualitative Data

Course Aim: To expose learners to proven methodology of scientific inquiry in order to inculcate scientific research discipline which molds their future independent academic work so that students will be able to conduct independent research related to both natural societal phenomena supporting environmental management decision making.

Course ILOs:
Upon successful completion of this course, the learners will be able to:

1. expound fundamental principles of methodical, management-oriented investigation of natural and societal phenomena;
2. demonstrate skill in application of quantitative methodologies of scientific investigations, and
3. demonstrate skill in application of qualitative methodologies of scientific investigations.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Grasping Critical Review	1			L	AS1 start Literature review
	1.2	1	Exercise critical review		2		P	
	1.3	1	Google Scholar search for Literature sources			3	IL	
2	2.1	1	Planning Literature Search	1			L	
	2.2	1	Exercise planning literature search		2		P	
	2.3	1	Other web search for literature search			3	IL	
3	3.1	1	Approaches to Theory Development	1			L	AS1 due
	3.2	1	Analyze research philosophies		2		SGD	AS2 start Research strategy
	3.3.	1	Select a research philosophy			3	IL	
4	4.1	2	Formulating the Research Design	1			L	
	4.2	2	Discuss choice and coherence in research design		2		SGD	
	4.3	2	Select a research strategy			3	IL	
5	5.1	2	Selecting Samples	1			L	AS2 due
	5.2	2	Compare and contrast sampling techniques		2		SGD	AS3 start Sampling technique
	5.3	2	Select appropriate sampling technique			3	IL	
6	6.1	2	Using Secondary Data	1			L	AS3 due
	6.2	2	Evaluate sources of secondary data		2		SGD	
	6.3	2	Search for secondary data for the selected theme			4	IL	

7	7.1	2	Data Collection through Observation	1			L	AS4 start Research methodology
	7.2	2	Discuss observation data collection methods		2		SGD	
	7.3	2	Define your observation data			4	IL	
8	8.1	3	Collecting Data through Interview	1			L	
	8.2	3	Discuss types of interviews		2		GD	
	8.3	3	Select and justify a preferred type of interview			4	IL	
9	9.1	3	Collecting Data Through Questionnaire	1			L	
	9.2	3	Discuss types of questionnaires		2		SGD	
	9.3	3	Select and justify a type of questionnaire			4	IL	
10	10.1	3	Preparing, Entering and Checking Quantitative data	1			L	
	10.2	3	Discuss procedure of preparing, entering and checking data		2		GD	
	10.3	3	Decide what data to be collected			4	IL	
11	11.1	3	Exploring and Presenting Quantitative Data	1			L	
	11.2	3	Discuss data presentation techniques		2		SGD	
	11.3	3	Prepare formats for data entry			4	IL	
12	12.1	4	Describing quantitative Data Using Statistics	1			L	
	12.2	4	Examine how relationships, differences and trends are established using statistics		2		SGD	
	12.3	4	Select appropriate statistical techniques			4	IL	
13	13.1	4	Nature of Qualitative Data and Analysis	1			L	
	13.2	4	Discuss how data are prepared for analysis		2		GA	
	13.3	4	Read about qualitative data analysis			4	IL	
14	14.1	5	Qualitative Data Analysis	1			L	
	14.2	5	Compare types of qualitative data analysis methods		2		GD	

	14.3	5	Read about qualitative data analysis			4	IL	
15	15.1	5	Content Analysis and Quantitative and Qualitative data	1			L	AS4 due
	15.2.	5	Discuss the procedure of content analysis		2		SGD	
	15.3	5	Evaluate content analysis			4	IL	
		1,2,3,4,5	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GD=Group Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara, Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS2 & AS3 = 5% each

AS1 & AS4 = 15% each

End Semester Examination – 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: No

Recommended Readings:

Pandey, Prabhat, and Meenu Mishra Pandey. (2015). *Research Methodology: Tools and techniques.* Marghiloman, Romania, EU: Bridge Center.

Saunders, M, Lewis, P and Thornhill, A,. (2016). *Research methods for business students 7th edition.* Essex: Pearson Education Limited

EMGT32022 Environmental Sociology

Department of environmental management,
Faculty of social sciences & humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Sociology
Course Code: EMGT32022 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Definition for Environmental sociology, social, natural, cultural, human Manufacture, thoughts, social evolution, science, technology, industrialization Post-industrialization, urbanization, development and globalization, pollution **i**ndigenous knowledge social change, environment change.

Course Aim: To enhance the students' knowledge on basic concept an theories of sociology, conceptualization of the relation between society and environment and its historical and crosss cultural differences. Also examine the ways, how sociologists have attempted to theorize and empirically investigate environment society relations. So that students will be able to understand the relationship between society and environment and analyze environmental problems in view point of sociology.

Couse ILOs:

Upon successful completion of this course, the learners will be able to:

1. identify the relationship between nature and society;
2. analyze impacts created by human groups on planet;
3. examine environmental limits, human behavior ,cultural practices, and social institution;
4. explain development in science and technology, economic practices change the nature and society relations;
5. examine the way how, sociologists have attempted to theorize and to empirically investigate environment society relation, and
6. conceptualize the relationship between human societies and nature.

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching /Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss environmental sociology, by means of basic concepts of sociology. What is the relationship between nature and society	1			L, D	
	1.2	1	Recommended Reading Erika cud worth Chapters 1 & 2			4	SR	
2	2.1	1,2	Draw a firm distinction between the social world and natural world.	1			L, VP	
	2,2	1,2	Make summary of above reading		2		GA	
	2.3	1,2	Recommended Reading Box 1&2 above			3	IL	
3	3.1	1,2,3	Outline the historical contribution which sociology as a discipline has made to our understanding of the environment	1			L	
	3.2	1,2,3	Discussion, relationship of Environment and society		2		SGD	
	3.3	1,2,3	Library Reading			4	SR	
4	4.1	4	Explore sociological understanding of environment-society relation in the context of particular environmental issue and problems	1			L, VP	SAQ Short answers
	4.2	4	Discussion of current social environmental issues		2		GD	
	4.3	4	Reading above chaps; 2&3			4	SR	

5	5.1	1, 5	Critical discussion of different approaches in environmental sociology, including ethno-centric, eco-centric and social constructionism	1			L, GD	
	5.2		Making questionaries' in particular social issue		2		GA	
	5.3		Recommended Reading chaps; 3 &5			4	SR	
6	6.1	5	Discuss How environmental sociology has attempted to combine and analysis of intra-human oppression with the idea of environmental exploitation	1			L	
	6.2		Questionnaires ' discussion		2		L, GD	
	6.3		Reading internet related to the above what?			4	SA	
7	7.1	1,2,5	Explain how eco-socialist analysis of the role of capitalism in degrading the environment	1	1	4	L, P, IL	AS1 start Individual report writing
	7.2		Essay writing		2		SA	
	7.3		Summarizing 3,5 chaps			4	GA	
8	8.1	3,4,5,6	Evaluate the notion that urbanism has become a way of life particularly in the rich countries in the globe, have made all environmental crisis in the world today	1			L	
	8.2		Discussion of two thoughts		2		D	
	8.3		Recommended Reading above 6 & 7 chaps			4	SR	
9	9.1	2,3	Explore the way in which the sociology is important to our understanding of the environment	1			GD	AS1 due
	9.2		Criticisms & suggestions 6 & 7 chaps		2		SGD	
	9.3		Structuring questionaries'			4	GA	

10	10.1	5,6	Outline some general characteristics of eco-centric thought	1			L, VP	
	10.2		Presentations with multi- media		2		P	
	10.3		Preparing frame-work urban pollution			4	GA	
11	11.1	4.5	Discuss Ecologists argue that our current social and economic practices need to change in important ways in order to avert an environmental crisis.	1			L	AS2 start Group presentation
	11.2		Discussion of globalization		2		L, GD	
	11.3		Recommended Reading chaps; 6,7,& 8			2	SR	
12	12 .1	6	Differences between built environment and natural environment	1	1	2	L, P, IL	
	12.2		Structuring the built environment of Mihintale		2		GA	
	12.3		Library Recommended Readings			2	SR	
13	13.1	5,6	Explain Environment modernity and society; industrialism and urbanization	1			L, GA	AS2 due
	13.2		SAQ		2		P	
	13.3		Creating plan for a environmental problem			2	GA	
14	14.1	6	Analyze Globalization, development and environmental change	1			L	AS3 start
	14.2		Discussion & writing essay		2		GA	
	14.3		Web-search & prepare a document for a given topic			2	SA	
15	15.1	1,2,3	Society, culture and nature	1			L	AS3 due
	15.2		Discussion		2		GA	
	15.3		Recommended Reading chaps 2 to 3			2	SR	

		1,2,3,4,5, 6,7,8	End Semester Examination	15	30	55		ESE

L=Lecture, D=Discussion, SR= Self Reading, SGD= Small Group Discussion, GA= Group Activity, GD=Group Discussion, SA= Self-activity, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Mr. LMAP Gunawardhana

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS-01 = 20%

AS-02 =10%

AS-03 = 10%

End Semester Examination – 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: No

Recommended Readings:

1. Alan Irwin. (2001) Sociology and Environment. Cambridge: Polity.

2. Bell, M.M. (1998) an Invitation to Environmental Sociology. Incomplete

3. Cud worth, E. (2003) Environment and society. Routledge.

4. Dicken, P. (1992). Society and Nature: Toward a Green Social Theory. London: Harvester.

5. Yearly, S (1992). The Green Case: A Sociology of Environmental Issues. London: Routledge.

EMGT32032 Applied Environmental Project

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Applied Environmental Project
Course Code: EMGT32032 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Identify a burning environmental issue ,Explain the concept of Literature review, Identify the gap, Develop research objectives, Collect data, Conduct the field survey and fill the questionnaires, Data analyzing, Write research reports through Justify the results making presentation.

Course Aim: To provide an opportunity to develop several skills such as team work, literature review, developing questionnaire for survey, data collecting and analyzing, generating new knowledge, and dissemination of knowledge through various media such as reports writing, presentations so that students will be able to identify projects and conduct successful research independently or as a team where necessary in their real life situations in the future.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify environmental projects based on burning environmental issues in the living environment successfully;
2. conduct a scientific literature review, make objectives and develop questionnaire for the surveys independently or as a team following scientific methods;
3. analyze and interpret data using SPSS and Arc map GIS software very accurate manner.
4. write reports, research papers based on findings of a research, and
5. justify research finding through making an effective power point presentation.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Identify a burning environmental issue	2			L, VP	AS1 start
	1.2	1	Collect more information related to introduced environmental issues			4	IL	
2	2.1	2	Explain the concept of Literature review	2			L	
	2.2	2	Read Recommended Reading 1			5	IL	
3	3.1	2	Divide all students of the class into small groups and conduct a literature review related to selected issue and identify the gap.		3		P, SGD	
	3.2	2	Read Recommended Reading 1			5		
4	4.1	2	Develop research objectives	2			L	
	4.2	2	Develop research objectives related to identify issue.		1		SGD	
	4.3	2	Read Recommended Reading 2			5	IL	
5	5.1	2	Discuss the progress of the literature review and research objectives	2			D	AS1 due Submit the literature review
	5.2	2	Finalize the research objectives and Literature review		1		SGD, P	
	5.3	2	Read Recommended Reading 2			5		
6	6.1	2	Discuss how to collect data related to research objectives	2			L, D	AS2 start
	6.2	2	Summarize data collecting methods		1		SGD	
	6.3	2	Read Recommended Reading 1,2			4	IL	
7	7.1	2	Explain how to develop a questionnaire for the field survey	3			L, D	
	7.2	2	Read Recommended Reading 3			4	IL	

8	7.3	2	Finalize the questionnaire for the field survey		1		L,D	AS2 due (Submit the questionnaire)
	7.4	2	Check and get the printout of questionnaires			4	IL	
9	8.1	2	Conduct the field survey and fill the questionnaires		5		P, FV	AS3 start
	8.2	2	Check the filled questionnaires and fill the gaps			4	IL	
10	9.1	3	Explain data analyzing	2			L, D	
	9.2	3	Coding and entering data into a computer		3		P	
11	9.3	3	Finalize data Analysis		3		P	
	9.4	3	Check analyzed data and graphs, charts, tables etc.			5	IL	
12	10.1	4	Write research report based on objectives and results		3		P	
	10.2	4	Check accuracy			2	IL	
13	10.3	4	Continue writing research report		2		P	
	10.4	4	Check accuracy			4	IL	
14	10.5	4	Finalize research report		3		P	AS3 due Submit the final research paper
	10.6	4	Check accuracy and submit			4	IL	
15	11	5	Present finding through a Power Point Presentation		4		P	AS4 start & due
				15	30	55		

L=Lectures, P=Practical, FV=Field visit, IL=Independent Learning, SGD=Small Group Discussion, VP=Video Presentation, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4

Course Coordinator/Teaching Panel:

Teaching panel: Mr. LMAP Gunawardhana**,** Dr. PSK.Rajapakshe

Assessment Strategy

Continuous Assessments -100%

AS1 = 15 %
AS2 = 15%
AS3 = 40%
AS4 = 30 %
End Semester Examination – No

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Transport is needed for field visits

Recommended Readings:

1. Thakur.D. (1999) Research Methodology in Social Sciences, Deep and Deep publications.F-59, Rajouri Garden, New Delhi.

2. Kothari.C.R. (2004) Research Methodology, methods, and techniques, 4835/24, Ansari Road, Daryaganj, New Delhi.

3. Centre for Local Economic Strategies(1986) Research Methods Handbook, Express Networks1 George Leigh Street, Manchester M4 5DL

4. Anol Bhattacherjee (2012) Social Science Research: Principles, Methods, and practices. University of South Florida, Tampa, Florida, USA.

EMGT32042 Watershed Management

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Watershed Management
Course Code: EMGT32042 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Introduction to watershed management, Concepts of watershed management: definitions, approaches and principles, Historical overview and Sri Lankan challenge, Socio-economic and institutional context, Watershed analysis: Delineation and physical characterization, Land use and other resource uses, Anatomy and Hydro-dynamics of watershed, Hydrological processes, Watershed degradation, Watershed planning: principles, cycles of planning and tools, Stakeholder analysis and involvement, policy perspective on planning, Watershed management activities: Participatory watershed rehabilitation (erosion control, flood control, reforestation), Integration of watershed management activities and institutions, Water harvesting, agricultural and other economic development, Sustaining watersheds and modelling.

Course Aim: To provide key concepts and approaches of watershed management, watershed planning and development; introduce the applied knowledge on watershed management so that students will be able to apply knowledge and skills in their watershed planning and development through gaining the maximum benefits in sustainable manner.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify and explain concepts on theoretical and practical aspect of watershed management;
2. analyze the different natural and man- made processes in watersheds;
3. analyze current dynamic issues in watersheds and finding the solutions for successful management, and
4. apply the knowledge and skills to overcome the ultimate goal of watershed management.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduce the watershed management	1			L, D	
	1.2	1	Conduct in detail study on watershed management			5	SS	
2	2.1	1	Concepts of watershed management: definitions, approaches and principles	1			L, D	
	2.2	1	Explain principles and basic concepts of watershed management in detail referring secondary source of information.		3		D, P	
	2.3	1	Read Recommended Reading 6			6	SR	
3	3.1	1,2	Explain the historical overview and Sri Lankan challenge of watershed management	1			L, VP	
	3.2	1,2	Preparation document on historical overview and Sri Lankan challenge of watershed management as a group activity within the class.		3		SGA, P	AS1 start and due Group activity
	3.3.	1,2	Conduct a detail study on historical overview and Sri Lankan challenge of watershed management			6	SA	
4	4.1	1,2	Analyze socio-economic and institutional context	1			L, D, VP	
	4.2	1,2	Conduct in detail study socio-economic and		3		SGA, P	

			institutional context in detail referring secondary sources					
	4.3	1,2	Draft a detail note on socio-economic and institutional context			7	SA	
5	5.1	2,3	Discuss watershed analysis: Delineation and physical characterization	1			L, VP	
	5.2	2,3	List out the physical characterization of watershed		3		SGA, P	
	5.3	2,3	Draft and preparation detail note on the identified physical characterization of watershed			5	SA	
6	6.1	2,3	Discuss the land use and other resource uses	1			L, VP	
	6.2	2,3	List out the different land use other resources uses in a watershed		3		D, P	
7	7.1	1,2	Discuss Anatomy and Hydro-dynamics of watershed	1			L,VP	
	7.2	1,2	Analyze and preparation of detail note on Anatomy and Hydro-dynamics of watershed			6	SR	
8	8.1	1,2	Discuss the hydrological processes	1			L, VP	
9	9.1	2,3	Analyze the watershed degradation	1			L	
	9.2	2,3	Field visit conduct to identify the watershed degradation in selected watershed in dry zone area in Sri Lanka		3		FV, P	
10	10.1	1,2,3,4	Discuss watershed planning	1			L	
	10.2	1,2,3,4	Analyze and preparation of small document on watershed planning in Sri Lanka		3		P	
11	11.1	2,3,4	Discuss on stakeholder analysis and involvement in watershed planning	1				
	11.2	2,3,4	Find out stakeholder analysis and involvement in watershed planning of Sri Lanka			10	SA	AS2 start Submit an individual report

12	12.1	2,3,4	Discuss the watershed management activities: Participatory watershed rehabilitation (erosion control, flood control, reforestation)	1			L	
	12.2	2,3,4	List out and analyze the watershed management activities in Sri Lanka.		3		SGD, P	
13	13.1	2,3,4	Discuss the integration of watershed management activities and Wewa Cascade systems.	1			L	
	13.2	2,3,4	Identify integration of watershed management activities and Wewa cascade systems in Sri Lanka		3		GA	AS3 start and due Group report
14	14.1	3,4	Discuss water harvesting, agricultural and other economic development	1			L	
	14.2.	3,4	List out and analyze the water harvesting, agricultural and other economic development activities in Sri Lanka		3		SGD, P	AS2 due Submit an individual report
15	15.1	1,2,3	Discuss on sustaining watersheds and modelling	1			L	
	15.2	1,2,3	Analyze the importance of sustaining watersheds and modelling in Sri Lanka			10	SA	
		1,2,3,4	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, SGD=Small Group Discussion, SGA=Small Group Activity, VP=Video Presentation, SA=Self Activity, SR=Self Reading, D=Discussion, SS=Self Study, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Mr. NSK Herath

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 20%

AS3 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport is needed for field visits.

Recommended Readings:

1. Cruz, R. V. (1999). Intergrated landuse plannig and sustainable watershed management. *Journal of Philippine development, Number47, Journal Volume ofXXVI Philippine, No.Develop 1,*. https://core.ac.uk/download/pdf/6506067.pdf

2. Easter, K.W. & C.J.N. Gibbs. (1985). Implementation and Institutional Aspects of Integrated Watershed Management. Paper presented to the "Workshop on Integrated Watershed Management". East-West Center, Honolulu, Hawaii.

3. Easter, K.W. & M.M. Hufschmidt. (1985). Research for Integrated Watershed Management in Developing Countries. (Draft paper). East-West Center, Honolulu, Hawaii.

4. Kapil Dev, S. Soni, B. (2006), Land use Diversification for Sustainable Rain fed Agriculture, Atlantic publishers, New Delhi.
5. Madan, M.D, Mimi, D.S, (2013), Watershed Management, Phi learning private limited, Delhi.
6. Murty, J.V.S, (2004).Watershed Management, New age international private limited publishers, New Delhi.

EMGT 32052 Environmental Quality and Standards

Department of Environmental Management,
Faculty of Social science and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Environmental Quality and Standards

Course Code: EMGT 32052 (T15hrs: P30hrs: IL55hrs)

Course Capsule: The importance of environmental analysis, environmental pollution, quantitative and qualitative analysis, water quality analysis: Physical parameters analysis, Inorganic/chemical analysis, Microbial analysis, Pesticides residues analysis, Heavy metal analysis, BOD and COD analysis, water quality standards. Soil quality analysis: Importance of soil analysis, sampling techniques in soil analysis, sample preparation, moisture content, pH, organic carbon, pesticides residues analysis, heavy metal analysis, soil quality standards. Air quality analysis- general sampling techniques, Basic air quality analytical techniques, air quality standards. , Other environmental analysis and quality standards (food, noise etc.), Environmental quality improvement process in organizations.

Course Aim: To improve the understanding of students to apply environmental quality analysis to overcome environmental issues, to enhance the capacity of knowledge of students regarding the environment analytical techniques, to promote the understanding of environmental quality standards.

Course ILOs:

Upon successful completion of this course, the students will be able to:

1. describe the importance of environmental analysis;
2. discuss the causes and consequences of environmental pollution;
3. compare quantitative and qualitative environmental analysis;
4. explain various types of water, soil, and air quality parameters;
5. apply analytical techniques to identify the quality of the environment;
6. discuss the current international and national water, soil, and water quality standards;
7. describe other important environmental analysis and quality standards (for such as food and noise), and
8. explain Environmental quality improvement process in organization.

Lesson sequence

Week No.	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching/ Learning Methods Used	Assessment Methods
				T	P	Il		
1	1.1	1	The importance of environmental analysis	2			L	
	1.2	1,2	Literature survey –"Issues arisen due to Environmental pollution in Sri Lanka"			10	LS	
2	2	2,3	Environmental pollution and types of analysis	1			L	AS1 start Write an essay on the topic of "major environmental pollution related issue in Sri Lanka"
	3	4,6	Water quality analysis: Physical parameters analysis, Inorganic/chemical analysis, Microbial analysis	1			L	
3	3.1	4,5	Water quality analysis: Physical parameters analysis practical		3		P	PR1 start Water quality analysis: practical reports
4	3.2	4,5	Water quality analysis: Inorganic/chemical analysis practical		3		P	
5	3.3	4,5	Water quality analysis: Microbial analysis practical		3		P	AS1 due
6	4.1	4,6	Water quality analysis: Pesticides residues analysis Heavy metal analysis	1			L	

	4.2	4,5	Water quality analysis: Pesticides residues analysis practical		2		P	
7	4.3	4,5	Water quality analysis: Heavy metal analysis practical		3		P	
8	5.1	4,6	Water quality analysis: BOD and COD analysis, water quality standards.	2			L	
9	5.2	4,5	Water quality analysis: BOD and COD analysis practical		2		P	
	5.3	4,5	Comprehensive examination about institutions with water quality analytical facilities			10	LS, FS	
10	6.1	4,6	Soil quality analysis: Importance of soil analysis, sampling techniques in soil analysis, sample preparation	2			L	PR1 due
11	6.2	4,5	Soil analysis- practical 1- Soil samples preparation for analysis		3		P	PR2 start Soil quality analysis: practical reports
12	7.1	4,6	Soil quality analysis: moisture content, pH, organic carbon, pesticides residues analysis, heavy metal analysis, soil quality standards.	2			L	
	7.2	4,5	Soil analysis- practical 2- Measurement of soil quality parameters		3		P	
	7.3	4,5	Thorough examination about water, soil, air and food quality standards (Sri Lanka and all over the world)			10	IL	

13	8.1	4,6	Air quality analysis- general sampling techniques, Basic air quality analytical techniques, air quality standards.	1			L	PR2 due
	8.2	4	Air quality analysis practical		4		P	
	8.3	4,5,6	Exhaustive study on the previous studies that have been applied environmental analysis techniques to address environmental issue			15	LS	
14	9.1	7	Other environmental analysis and quality standards (food, noise ect),	1			L	
	9.2	6	Other environmental analysis practical		2		P	
	10.2	8	Literature survey on " Environmental quality improvement processes in organizations"			10	LS	
15	10.1	8	Environmental quality improvement process in organizations	2			L	
	10.3	8	Evaluation of the currently available environmental quality improvement process in a organizations- Group presentation		2		GP	AS2 start and due
		1-8	End-semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, PR1=Practical Recordings 1, PR2=Practical Recordings 2, LS=Literature Survey, FS=Field Survey, GP=Group Presentation, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel

Teaching Panel: Dr.JMSB Jayasundara, Dr.PSK Rajapakshe

Assessment Strategy:
Continuous Assessment - 40%
Assignments – 20%

AS1 - 10%

AS2 - 10%

Practical records – 20%

PR1- 15%

PR2 - 5%

End Semester Examination - 60%

End Semester Examination (Practical) - 20%
End Semester Examination - 40%

Course Organizer:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirements: transport facilities are required to visit another Faculty of Rajarata University of Sri Lanka for studying analytical techniques.

Recommended Readings

1. Dan, D.Z., Yao, Y.L. and Jiang, W.J., (2008). Analysis of environmental samples. *Chinese Journal of Analysis Laboratory*, *27*(4), p.100.
2. Gupta, P.K., Gupta, P.K. and Gupta, P.K., (2007). *Methods in environmental analysis: water, soil and air* (pp. 5-127). Jodhpur, India: Agrobios.
3. Keith, L.H., Crummett, W., Deegan, J., Libby, R.A., Taylor, J.K. and Wentler, G., (1983). Principles of environmental analysis. *Analytical chemistry*, *55*(14), pp.2210-2218.

4. Edition, F., (2011). Guidelines for drinking-water quality. *WHO chronicle*, *38*(4), pp.104-8.
5. World Health Organization, (2010). WHO guidelines for indoor air quality: selected pollutants.
6. Semenkov, I. and Koroleva, T., (2020). Heavy metals content in soils of Western Siberia in relation to international soil quality standards. *Geoderma Regional*, p.e00283.

EMGT32062 Conservation Financing

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Conservation Financing
Course Code: EMGT32062 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Need of financing for environmental conservation and management, Financing and sustainable development, demand and supply of financing, Types and sources of financing, bilateral and multilateral financing, Merits and demerits of financial mechanisms, Market based instruments for financing, financing solutions for industrial pollution prevention, role of private sector in conservation financing, Clean development mechanism, Debt for nature swap, Payments for ecosystem services, Rewards for ecosystem services, Alternative financial mechanisms, Case studies.

Course Aim: To provide essential knowledge and skills on different types of conservation financial mechanisms, financial organizations in both local and global context, so that students will be able to enhance the capacity of knowledge in critically analyses the different financial instruments and able to identify and design a suitable financial mechanisms for different sectors in Sri Lanka.

Course ILOs:
Upon the successful completion of this course, the students will be able to:

1. identify the need of financing for environmental conservation in developed and developing country perspective;
2. explain the different types and sources of conservation financing and financial institutions;
3. discuss the potential of applying market based instruments for different sectors in Sri Lanka;
4. discuss alternative financing mechanism for environmental conservation and management;
5. critically analyze the merits and demerits of different financing mechanisms, and
6. design conservation financing mechanism for selected case study in Sri Lanka.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduction to CF: What is conservation financing and the need of financing for sustainable development	1			L, GD	
	1.2	1	Discuss the relationship between conservation financing and SDGs		2		P	
2	2.1	1	Demand and supply of financing for environmental conservation in developed and developing countries	2			L, GD	AS1 start
	2.2	1	Give an a detail account on the demand and supply of financing in both local and global context		3		P	
	2.3	1	Read Recommended Readings and perform extensive web searching to explore the financial need assessments for environmental conservation across the world			5	SR,SA	
3	3.1	1,2	Types and sources of conservation financing: Sri Lankan context	1			L, GD	AS1 due
	3.2	1,2	Collect details on government financing for environmental conservation in Sri Lanka			5	SS	
4	4.1	1,2	Types and sources of conservation financing: global context	1			L, GD	Q1 start and due
	4.2	1,2	Give an detail account on types and sources of CF in Sri Lankan and the global context		3		P	
5	5.1	1,2	Bi-lateral and multilateral financing sources	2			L, GD	
6	6.1	1,2	Discuss and make a report on Bi-lateral and		3		P	

			multilateral financing sources					
	6.2	1,2	Read Recommended Readings given and perform extensive Web search and collect information on bilateral and multilateral financing			10	SR, SA	
7	7.1	2,3	Discuss Clean development mechanism	1			L, GD	
	7.2	2,3	Critically examine the merits and demerits of CDM from a developing country perspective		2		P	
8	8.1	2,3	Explain Debt for nature swap	1			L, GD	
	8.2	2,3	Critically examine the merits and demerits of Debt for nature swap from a developing country perspective		2		P	
	8.3	2,3	Read Recommended Readings for CDM and debt for nature swap			5	SR	
9	9.1	3	Explain Economics/market based instruments for financing environment conservation	2			L, GD	
	9.2	3	Read Recommended Readings and collect details on economic instruments currently practice in Sri Lanka and around the world			5	SR, SA	
10	10.1	3	Examine Potentials for applying Economics/market based instruments for environment conservation in Sri Lanka		3		P	
	10.2	3	Read previous case studies/reports on market based instruments in Sri Lanka and the world			5	SR	
11	11.1	3, 4	Discuss Alternative financing mechanisms for environmental conservation and management	1			L, GD	AS2 start
	11.2	3,4	Read Recommended Readings given and perform extensive web search to find out the alternative financing mechanisms practice around the world			10	SR, SA	
12	12.1	3,4	Discuss Payments for Ecosystem Services	1			L, GD	

	12.2		Field Visit		3		FV	
13		3	Design a PES mechanism for selected case study in Sri Lanka		3			AS2 due
14	14.1	2,4	Discuss the role of private sector for financing environmental conservation	1			L, GD	Q2 start and due
	14.2	2,4	Discuss the measures can be taken to enhance private sector contribution for environmental conservation in Sri Lanka		3		P	
	14.3	2,4	Make a list of existing private sector financing mechanism in Sri Lanka			5	SA	
15	15.1	3,4,5	Conservation financing in Sri Lanka	1			L, D	
	15.2	3,4,5	Refer previous studies/reports on conservation financing in Sri Lanka			5	SS	
	15.3	3,5	Conservation financing in Sri Lanka- Potentials, challengers and way forward		3		P	
		1,2,3, 4,5	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, SA=Self Activity, SR=Self Reading, SS= Self Study, GD=Group Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, Q1=Quiz 1, Q2= Quiz 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 15%

Q1 = 05%

Q2 = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport needed for field class in 12th week.

Recommended Readings

1. Reports published by the international financing and other environmental organizations such as UNDP, UNEP, GEF, ADB, IUCN, etc. (Available in respective websites)
2. Conservation Financing: Moving beyond donor funding an investor-driven approach, Credit Suisse.
3. Scott J. Callan, Janet M. Thomas, (2013) Environmental Economics and Management: Theory, Policy and Applications**.**

EMGT32072 Environmental Technology

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Technology
Course Code: EMGT32072 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Introduction: Concept of environmental technology, Impact of technology and growing demand on environment, Environmental Pollution, standards and remedies: Air pollution, Soil pollution, Water pollution, Noise & Light pollution, Solid waste treatment, Sewage treatment and Biogas production, Greenhouse Gases and Carbon footprints, Drinking water technologies, Zero emission concept & circular economy, Energy demand & Renewable Energies: Solar power, Wind power, Hydro power, Geothermal power, Calculations of clean development mechanisms, Planning and management tools, Environmental laws, Technology and Sustainable development goals.

Course Aim: To provide the knowledge on the available environmental technologies and standards and train students to analyze environmental issues and provide solutions using available technologies.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. explain types of environmental pollutions, relevant standards and technological remedies;
2. analyze different pollution types/levels in a given situation and provide relevant solutions according to the situation;
3. calculate the carbon footprint of a given situation;
4. compare the environmental & economic benefits of using renewable energy sources;
5. explain challenges in moving into renewable energy sources;
6. describe basic environmental laws and protocols, and
7. explain the use of technology to achieve sustainable development goals.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Introduction to Environmental Technology: Use of Technology to cater the demand	2			L	
	1.2	1	Asses how Industrial revolution contributed to the technological development		1		SGD	
	1.3	1	Read Recommended Reading 2			5	SR	
2	1.4	1	Examine the increasing of demand and the effect on the environment	1		1	L	
3	1.5	2	Discuss the Pollution Types, standards and remedies: Air pollution	1			L	
	1.6	2	Measure the air pollution inside the University and Anuradhapura city (Sacred city, near schools, and etc.)		2		SGD	
	1.7	2	Read Recommended Reading 3, Chapter 15			5	SR	
4	2.1	2	Industrial Visit		6		P, FV	AS1 start Group presentation
5	2.2	2	Discuss the Pollution Types, standards and remedies: soil pollution, Water Pollution	1			L	
	2.3	2	Investigate the impacts of water and soil pollution, with special Recommended Reading to NCP		2		GA	
	2.4	2	Read Recommended Reading 3, Chapter 13			5	SR	
6	2.5	2	Discuss the Pollution Types, standards and remedies: Water pollution and drinking water technologies	1			L	
	2.6	2	Study the available drinking water		2		SGD	

			technologies in the world and their suitability to use in Sri Lanka					
	2.7	2	Read Recommended Reading 3, Chapter 13			5	SR	
7	2.8	2	Discuss the Pollution Types, standards and remedies: Noise and light	1			L	
	2.9	2	Measure the noise levels near important places. (Hospitals, Schools, Courts, and etc.)		2		SGD	AS2 start Essay type questions)
	2.10	2	Read Recommended Reading 4, Chapter 5			5	SR	
8			Mid Semester Exam		2			MSE
9	2.11	2	Explain the Solid waste treatment, Sewage treatment and biogas production	2			L	AS2 due
	2.12	2	Read Recommended Reading 4, Chapter 7			6	SR	
10	2.13		Industrial Visit		6		P, FV	
11	3.1	3	Analyze the Carbon footprint and zero emission & circular economy, Clean development mechanisms	1			L	
	3.2	3	Calculate the contribution of the electricity usage to the University's carbon footprint. Suggest methods to reduce the carbon footprint due to electricity usage.		2		P, SGD	AS3 start Essay type questions and calculations
	3.3	3	Read Recommended Reading 1			6	SR	
12	4.1	4	Examine the Energy and its demand	1		2	L, SR	AS3 due
13	4.2	4, 5	Evaluate the Use of Renewable energy sources	1				
	4.3	4,5	Identify the most suitable renewable energy Technologies to Sri Lanka.		2		P, SGD, GP	
	4.4	4,5	Read Recommended Reading 4, Chapter 19			5	SR	
14	5.1	7	Describe the Environmental laws, Technology and sustainable development goals	2			L	
	5.2	7	Investigate the readiness of Sri Lanka to		1		SGD	AS4 start

			achieve sustainable development goals.					Application questions
	5.3	7	Read Recommended Reading 3, Chapter 3			5	SR	
15	6.1	2, 3	Analyze the Planning and management tools	1			L	AS4 due
	6.2	2,3	Apply the planning and management tool for a selected institution.		2		SGD,P	
	6.3	2,3	Read Recommended Reading 3			5	SR	
		1,2,3,4,5, 7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field Visit, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, GP=Group Presentation, AS1= Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4, MSE=Mid Semester Examination, ESE=End Semester Examination

Course Coordinator/Teaching Panel

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 60 %

AS1 = 5%

AS2 = 5%

AS3 = 5%

AS4 = 5%

GP = 20%

MSE= 20%

End Semester Examination - 40 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Transport is needed for two industry visits.

Recommended Readings:

1. Reddy K, Amulya, Balachandra P (2006), Energy Environment and Development, Newdelhi, India.
2. David, Ellotte (1997), Technology for Environment, Technology for Sustainable Future, Routledge, London.
3. O' Riordan. T, (1995), Environmental Science for Environmental Management, Longman Singapore Publishers (Pte) Ltd, Singapore.
4. Pandey G.N, (1997), Environmental Management, Vikas Publishing House, New Delhi.
5. Duggal K.N, (2013), Elements of Environmental Engineering, S Chand & Company Pvt Ltd, New Delhi.

EMGT32082 Remote Sensing

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Remote Sensing
Course Code: EMGT32082 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concepts of Remote Sensing, Evolution of remote sensing for earth observation, Introduction to electromagnetic (EM) energy, Types of Remote Sensing, Advantages and disadvantages of the use of remote sensing data, Information requirement and constraints for remote sensing data selection, Image resolution and enhancement, Color composite of satellite images, Geometric correction, Visual image interpretation, Principles of digital image classification, Land use and land cover classification, Post correction and accuracy assessment, Drone mapping as a spatial data capturing method, Recent trends in Remote Sensing.

Course Aim: To deliver essential theory and key approaches to develop comprehensive knowledge and practical experience of Remote sensing technologies so that students will be able to apply the principles and practical experience to analyze the remote sensing data for environmental variables at global, local, or regional level.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. describe concepts of Remote sensing and its development stages;
2. explain the use of remote sensing data for spatial data capturing;
3. interpret selecting suitable remote sensing data for analysis of environmental variables;
4. use remote sensing tools and functions to analyze the spatial data;
5. utilize drone mapping and its application as a spatial data gathering method, and
6. describe the recent development of the remote sensing.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the concepts of Remote Sensing: Definitions, Importance, advantages	1			L	
	1.2	1	Collect and read definitions and concepts of Remote Sensing using available web sources			2	SR	
2	2.1	1	Describe the evolution of remote sensing for earth observation: Explain the development stage of Remote Sensing	1			L, D	AS1 start Take home assignments about the evolution of remote sensing
	2.2	1	Read Recommended Reading 1: Chapter 1			2	SR	
3	3.1	2	Describe electromagnetic (EM) energy: Definitions, Importance, functions	1			L, D	
	3.2.	2	Read Recommended Reading 1: Chapter 2			2	SR	
4	4.1	2	Discuss types of Remote Sensing: Definitions, active and passive remote sensing	1			L, D	
	4.3	2	Read Recommended Reading 2: Chapter 6 and 7			4	IL	
5	5.1	2	Discuss advantages and disadvantages of the use of remote sensing data	1			L	
	5.2	2	Explain the advantage and disadvantage of the remote sensing data by comparing several images		2		P	
	5.3	2	Collect and read advantages and disadvantages of the use of remote sensing data using available web sources			4	SR	

6	6.1	2	Discuss information requirement and constraints for remote sensing data selection	1			L	AS1 due
	6.2	2	Discuss information requirement and constraints for remote sensing data selection		2		SGD, P	
	6.3	2	Collect and read more information requirement and constraints for remote sensing data selection using available web sources			6	IL	
7	7.1	3	Discuss image resolution and enhancement: explain image resolution types and their enhancement	1			L	AS2 start Take home assignments about resolution types in remote sensing
	7.2	3	Compare several types of remote sensing images to identify the resolution		2		SGD, P	
	7.3	3	Read Recommended Reading 2: Chapter 5			2	IL	
8	8.1	3	Discuss the color composite of satellite images: It provides more knowledge related to color composite in remote sensing	1			L	
	8.2	3	Explain main tools and functions available in ERDAS and provide hands-on training satellite data encasements		6		P	
	8.3	3	Study more using ERDAS software			10	IL	
9	9.1	4	Discuss Geometric correction: Provide usefulness and essential facts related to Geometric correction	1			L, D	
	9.2	4	Provide hands-on training on geometric correction using ERDAS software		4		SGD, P	
	9.3	4	Read Recommended Reading 1. Chapter 11			4	SR	
10	10.1	4	Discuss Visual image interpretation: Definition, types, usefulness	1			L	
	10.2	4	Provide hands-on training image interpretation using ERDAS software		2		P	

	10.3	4	Study more using ERDAS software			3	SR	
11	11.1	4	Discuss principals of digital image classification: Definitions, types, and usefulness	1			L	AS2 due
	11.2	4	Provide hands-on training on image classification		2		P	
	11.3	4	Read Recommended Reading 3. Chapter 4			3	SR	
12	12.1	4	Define land use and land cover classification: Definitions, types, and usefulness	1			L	
	12.2	4	Provide hands-on training on land cover classification		4		P	
	12.3	4	Read Recommended Reading 1. Chapter 12			3	SR	
13	13.1	4	Define land use and land cover classification post-correction and accuracy assessment: Definitions, types, and usefulness	1			L	AS3 start Practical text on image classification
	13.2	4	Provide hands-on training on accuracy assessment and post the correction		2		P	
	13.3	4	Read Recommended Reading 3. Chapter 5			4	SR	
14	14.1	5	Discuss the importance of drone mapping as a spatial data capturing method: Definitions, types, and usefulness	1			L	
	14.2	5	Provide hands-on training on capture drone mapping using Drone		2		P, GA	
	14.3	5	Collect more information related to Drone mapping as a remote sensing data capturing method using the internet			4	SR	
15	15.1	6	Discuss recent trends in Remote Sensing	1			L	
	15.2	6	Divide students into small groups and discuss the “recent trends in Remote Sensing.”		2		GA	
	15.3	6	Collect more information related to the recent			3	IL	

			trend in remote sensing using the internet					
		1,2,3,4,5, 6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

AS3 (practical text) = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Recommended Readings:

1. Campbell, J. B., & Wynne, R. H. (2011). *Introduction to remote sensing*. Guilford Press.
2. Joseph, G., & Wynne, R. H. (2008). *Fundamentals of Remote Sensing (Second Edition)*. Universities Press, India.
3. Kamusoko, C. (2019). *Remote Sensing Image Classification in R*. Springer, Singapore.

EMGT32092 Environmental Accounting and Valuation

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Environmental Accounting and Valuation
Course Code: EMGT32092 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Conventional Systems of National Accounts(SNA), System of Integrated Environmental and Economic Accounts (SEEA), Environmental accounting and sustainable development, Different accounting systems under SEEA ,Extended cost benefit analysis, Total economic value, Environmental valuation techniques, Direct market methods: productivity change method, Preventive and replacement cost method, Human capital approach, etc., Revealed PRecommended Reading Methods: Travel cost method, Hedonic pricing method, Stated PRecommended Reading Method: Contingent valuation method, Contingent ranking choice experiment, Case studies.

Course Aim: To enhance the student with in-depth theoretical knowledge on environmental accounting/green accounting and environmental valuation and exposure them to different accounting systems and environmental valuation techniques and their empirical application in both developed and developing countries.

Course ILOs:
After the successful completion of this course, the students will be able to:

1. define and compare the SNA and SEEA;
2. discuss different accounting systems under SEEA;
3. demonstrate a conceptual understanding of incorporating environmental accounting and valuation techniques in to the decision making process;
4. explain the different technique of environmental valuation that can be applicable under different context;
5. compute the welfare measurements with the application of environmental valuation techniques for different case studies, and
6. apply computer based techniques for environmental valuation techniques.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Conventional System of National Accounts (SNA)	2			L	
	1.2		Study and collect information on the evolution of national accounting practices in Sri Lanka			5	SA	
2	2.1	1	The need of alternative accounting system to capture environmental values, costs and benefits	1			L, D	AS1 start
	2.2	1	Discuss the SNA framework in Sri Lanka and weaknesses of SNA from environmental conservation point of view		3		P,D	
	2.3	1	Read Recommended Readings given and refer www.seea.un.org and find out how SNA framework practicing in developing and developed countries			5	SR	
3	3.1	1,2,3	System of Integrated Environmental and Economics Accounts(SEEA) an it's components	2			L, D	
	3.2	1,2,3	Refer www.seea.un.org and study the elements of SEEA			5	SR	
4	4.1	2,3	Discuss the elements of SEEA		3		P	AS1 due
	4.2	2,3	Refer www.seea.un.org and study how SEEA practicing around the world			5	SR	
5	5.1	2,3	Different accounting systems/thematic areas under SEEA	1			L, D	Q1 start & due
	5.2	2,3	Critically examine the different accounting		4		P	

			systems/thematic areas under SEEA					
	5.3	2,3	Refer www.seea.un.org and study further on thematic areas under SEEA			5	SR	
6	6.1	3	Role of environmental valuation in environmental accounting and public policy making	1			L	
	6.2	3	Read Recommended Readings and perform extensive web search to find out the need of environmental valuation for public policy making			5	SR	
7	7.1	3,4	Classification of environmental values: Total Economic Value of environmental resources	1			L	
	7.2	3,4	Discuss the elements of TEV of different ecosystems in Sri Lanka.		3		P	
	7.3	3,4	Refer previous studies on identifying economic values of different ecosystems in Sri Lanka			5	SR	
8	8.1	3,4	Valuation techniques: Market and non-market approaches	1			L, FV	
	8.2	3,4	Field Visit		3		P	
	8.3	3,4	Read Recommended Readings given and refer www.ecosystemvaluaton.org website and study on application of valuation techniques for real world case studies			5	SR	
9	9.1	3,4,5	Direct market methods: productivity change method, preventive and replacement cost method, human capital approach, etc.	2			L,	
10	10.1	4,5,6	Application of direct market methods: productivity change method, preventive and replacement cost method, human capital approach, etc using empirical data sets		3		D, P	AS2 start

	10.2	4,5,6	Read given Recommended Readings and refer www.ecosystemvaluaton.org website for case studies on direct market methods			5	SR	
11	11.1	3,4,5	Revealed PRecommended Reading Methods: Travel cost method, hedonic pricing method	2			L	AS2 due
12	12.1	3,4,5,6	Applications on Revealed PRecommended Reading Methods: Travel cost method, hedonic pricing method using empirical data sets		3		D,P	AS3 start
	12.2	3,4,5,6	Read Recommended Readings and refer www.ecosystemvaluaton.org website for case studies in Sri Lanka and overseas			5	SR	
13	13.1	3,4,5	Stated PRecommended Reading Method: Contingent valuation method, contingent ranking choice experiment.	2			L,P	AS3 due
14	14.1	3,4,5,6	Calculations on Stated PRecommended Reading Method: Contingent valuation method, contingent ranking choice experiment with empirical data sets		3		P,D	Q2 start & due
15	15.1	6	Explain the environmental accounting and valuation: case studies with computer applications for valuation		5		L,P,D	
	15.2	6	Find secondary data sets and compute valuation estimates for different case studies			5	SA	
		1,2,3,4,5,6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, IL=Independent Learning, SA=Self Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, Q1= Quiz 1, Q2=Quiz 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

AS3 =10%

Q1 = 5%

Q2 = 5%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Vehicle for field visit in 7th week.

Recommended Readings

1. www.seea.un.org
2. Myrick Freeman 111, The measurements of Environmental and Resource Values: Theory and Methods, Resources for the future, Washington, DC
3. Herath M. Gunathilaka, (2003). Environmental Valuation: Theory and Application, PGIA, University of Peradeniya.
4. David Pearce, (2007).Environmental Valuation in Developing Countries,Edward Elgar.
5. Nancy Bookstall and Kenneth McConnell, (2006). Environmental and Resource valuation with revealed pRecommended Reading ,Springer Nature,
6. Karl-GöranMäler, Jeffrey R. Vincent (Edited) (2005): Hand Book of Environmental Economics: Valuing Environmental Changes, Volume 2, Elsevier/North-Holland, Amsterdam.

7. Haab, Timothy C, and Kenneth E. McConnell (2002): Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation, Edward Elgar, Cheltenham, UK. Northampton MA, USA.
8. Bateman, et al (2002) Economic Valuation with Stated PRecommended Reading Techniques: A Manual, Edward Elgar Publishing, Cheltenham.
9. Patricia A. Champ, Kevin J. Boyle, Thomas C. Brown, (2003). A Primer on Nonmarket Valuation Springer Science Business Media, LLC.
10. Tom Tietenberg, Environmental and Natural Resource Economics, 8th Ed, Pearson Edu

EMGT32102 Environment and Health

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Environment and Health
Course Code: EMGT32102 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Define human health, Human health and Environment, Various factors which affect to human health, Classification of Diseases, Communicable Diseases, Non-Communicable Diseases, Indoor Environment and human health, Occupational Environment and human health impacts, Agrochemicals and human health, Food and Human Health, Health Indexes, Disease treatment system in Sri Lanka, National agencies related to health, International agencies related to Health.

Course Aim: To enhance essential knowledge, skills and attitudes of students on the relationship between environmental health and human health so that students will be able to apply knowledge, skills in their day today life in various scales such as individual, local, national regional and global levels.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify the relationship between environmental health and human health in advance;
2. explain how various occupation affect to human health and how to minimize health impacts;
3. analyze how agrochemicals affect to human health in the context of Sri Lankan environment;
4. discuss new trends of human behavior and health;
5. describe health environment of Sri Lanka comparing other countries;
6. distinguish disease treatment systems in Sri Lanka, and
7. evaluate national international health related agencies and their roles.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define human health, Analyze interrelationships between human health and Environment, Identify various factors which affect to human health, Classification of Diseases,	2			L, D	
	1.2	1	Read the given lecture materials			4	SR	
2	2.1	1	Discuss communicable diseases	1			L, D	
	2.2	1	Analyze communicable diseases in Sri Lanka		2		SGD	
	2.3	1	Read Recommended Reading 5			4	SR	
3	3.1	1	Discuss Non-Communicable diseases	1			L, D	
	3.2	1	Analyze Non-communicable Diseases in Sri Lanka		2		SGD, P	
	3.3	1	Read Recommended Reading 5			4	SR	
4	4.1	1	Explain Environmental Problems and Human Health	1			L, D	
	4.2	1	Divide students into small groups and select one environmental issue in Sri Lanka and discuss how human health can be affected due to selected environmental issue.		2		SGD, P	
	4.3	1	Read Recommended Reading 1			4	SR	
5	5.1	1	Discuss Indoor Environment and human health	1			L, D	
	5.2	1	Analyze indoor environment and health impacts of Sri Lanka		2		SGD, P	

	5.3		Read Recommended Reading 2			4	SR	
6	6.1	1,2	Describe Occupational Environment and human health impacts	1			L, D, VP	AS1 start & due Multiple choice questions covering lesson 1-6
	6.2	1,2	Analyse occupational health and safety in Sri Lanka.		2		SGD, P	
	6.3	1,2	Read Recommended Reading 4			4	SR	
7	7.1	1,2,3	Discuss Agrochemicals and human health	1			L, D	
	7.2	1,2,3	Conduct a case study to analyze how Sri Lankan farmers use chemicals and follow safety methods		2		P	AS2 Start Case study
	7.3	1,2,3	Read related articles to agrochemicals used in Sri Lanka			4	SR	
8	8.1	1,4	Explain the relationship between Food and Human Health	1			L, D, VP	
	8.2	1,4	Analyze changes of food pattern in Sri Lanka		2		P	
	8.3		Read Recommended Reading 4			4	SR	
9	9.1	1,4	Discuss Health Environment of Sri Lanka	1			L, D	
	9.2	1,4	Compare Sri Lankan health environment with other developed and developing countries		2		P	
	9.3	1,4	Read WHO and other websites related to comparison of countries in terms of health.			4	SR	
10	10.1	4	Discuss Health indexes	1			L, D	
	10.2	4	Analyse how to calculate Human Development Index related to Sri Lanka		2		P	
	10.3	4	Read Recommended Reading 4			3	SR	
11	11.1	1	Analyse CKDu in North Central Province of Sri Lanka		6		L, D, FV	AS2 due
	11.2	1	Read articles related to CKDu			3	SR	
12	12.1	5	Discuss the Poverty and health	1			L,D	

	12.2	5	Analyse why rural farmers become poor?		2		SGD	
	12.3	5	Read related articles about poverty and environment or poverty and health			3	SR	
13	13.1	6	Discuss disease treatment system in Sri Lanka	2			L, VP, D	
	13.2	6	Read Recommended Reading 1			3	SR	
14	14.1	7	Discuss national agencies related to health	1			L, D	
	14.2	7	Collect information related to national agencies		2		P	
	14.3		Read related websites			3	SR	
15	15.1	7	Explain International agencies related to Health		2		L, D	
	15.2	7	Read WHO websites and related articles			4	SR	
		1,2,3,4,5, 6,7	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field Visit, SGD=Small Group Discussion, VP=Video Presentation GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Mr. LMAP Gunawardhana

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 20%

AS2 = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement:

Transport is needed for field visits

Recommended Readings:

1. Seneviratne, H.M.M.B. (2008) Environment and Health, 121 A, Millawana Pahalagama, Mat ale.
2. Ram,L.P.T.(2008) Environmental Health and Hygiene ,Vikas Publishing House,576, Masjid Road, Jangpura, New Delhi.
3. Jeff Conant and Pam Fadem (2008) A Community Guide to Environmental Health, Hesperian Foundation, USA.
4. Essentials of Environmental Health Robert H. Friis Jones & Bartlett Learning – Second Edition – 2012.
5. Epidemiology unit. 2019. Epidemiology unit, Ministry of Health. Accessed January 13/01/2021. https://www.epid.gov.lk/web.

EMGT41012 Research Project Proposal Formulation

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Research Project Proposal Formulation
Course Code: EMGT 41012 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Concepts Student research, Contents and Structures of the Research Proposal, Defining a Topic, Literature Review, Formation of Research Problems and Hypothesis, Setting General and Specific Objective, Conceptual and Analytical Frameworks, Research Methodology, Collection of the Data, Data Processing, Statistical Techniques, Preparation of the Figures and Table, Preparation of the Recommended Reading List, Preparation of the Proposal.

Course Aim: The aim of this course is to provide guidelines and directions for developing a research proposal so that students will be able to develop a comprehensive proposal in environmental management at the level of advanced.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. define, describe and distinguish the main components of the research proposal;
2. select appropriate research tile;
3. write a comprehensive literature review;
4. construct problems statements, research objective, and hypothesis;
5. prepare a methodological framework for research;
6. define the data analysis methods;
7. demonstrate preparation of the useful figures, tables, limitation, and Recommended Reading list using software;
8. create a comprehensive research proposal, and
9. develop presentation skills.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define the student research: Definitions, Importance of student research	1			L, D	
	1.2	1	Read Recommended Reading 1: Chapter 1			3	SR	
2	2.1	1	Describe the contents and structures of the research proposal: Definitions, content, structures	1			L, D	
	2.2	1	Collect more information related to the content and structure of the proposal using the internet			3	IL	
3	3.1	2	Defining a topic: Definitions, the importance of the topic	1			L, D	AS1 start Take home assignments about the literature review of the research
	3.2.	2	Read additional materials to define the topic			3	IL	
4	4.1	3	Discuss methods of literature review: concepts, principles	1			L, D	
	4.2	3	Explain the way of doing a literature review		2		P	
	4.3	3	Read additional materials to find arrangements of the literature review			3	IL	
5	5.1	4	Explain the formation of research problems and hypothesis: Definitions, the importance of research problems	1			L	
	5.2	4	Explain how to define research problem and hypothesis		2		P	

	5.3	4	Read Recommended Reading 1: Chapter 2			3	SR	
6	6.1	4	Describe setting general and specific objective: explain the importance of the objectives of the research	1			L	
	6.2	4	Discuss how to set objectives and their importance to conduct the research		2		SGD, P	
	6.3	4	Read additional materials to find types of objectives in the research			3	IL	
7	7.1	5	Explain conceptual and analytical frameworks of the research	1			L	AS1 due
	7.2	5	Discuss the conceptual and analytical frameworks of the research		2		SGD, P	
	7.3	5	Read additional materials to find more information on the framework of the research			3	IL	
8	8.1	5	Discuss research methodology: Define, components	1			L	AS2 start Take home assignments about the methodology of the research
	8.2	5	Explain the methodology of the research with examples		2		P	
	8.3	5	Read Recommended Reading 1. Chapter 4			3	IL	
9	9.1	6	Discuss collection of the data: define, categories of the data, primary and secondary	1			L, D	
	9.2	6	Identify the method of collect the data and its classification		2		SGD, P	
	9.3	6	Read Recommended Reading 1. Chapter 6			3	SR	
10	10.1	6	Discuss data processing: editing, cording, classification, tabulation	1			L	
	10.2	6	Provide training processing of the data		4		SGD, P	

	10.3	6	Read Recommended Reading 1. Chapter 7			3	SR	
11	11.1	6	Discuss analysis and statistical techniques: primary and secondary data analysis methods	1			L, R	
	11.2	6	Provide training on analysis of data using statistical techniques		4		P	
	11.3	6	Read Recommended Reading 1. Chapter 9			3	SR	
12	12.1	7	Discuss preparation of the figures and table	1			L	
	12.2	7	Provide hands-on preparation of figures and tables		4		P	
	12.3	7	Provide training on preparation of figures and tables			4	IL	
13	13.1	7	Discuss limitations of the research	1			L	
	13.3	7	Read additional materials to find more information on the limitations			4	SR	
14	14.1	7	Discuss preparation of the Recommended Reading list	1			L	AS2 due
	14.2	7	Provide hands-on training on preparing Recommended Reading list with the stranded Recommended Reading method		4		P	
	14.3	7	Study more related to the Recommended Reading management with some software			4	SR	
15	15.1	8,9	Discus preparation of the proposal	1			L	
	15.2	8,9	Discuss the way of writing proposal related to Environmental Managements		2		GA	
	15.3	8,9	Prepare the proposal			10	IL	AS3 Individual proposal presentation
				15	30	55		

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

AS3 = Proposal presentation = 30%

Final proposal = 30%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															

Transport Requirement: None

Recommended Readings:

1. Gupta, S. (2019), Research Methodology and Statistical Techniques. Deep and Deep Publications, India.
2. Somekh, B., & Lewin, C. (Eds.). (2005). Research methods in the social sciences. Sage publishers.
3. Cavallo, R. (2013). Systems methodology in social science research: recent developments.
4. El-Omar, E. M. (2014). How to publish a scientific manuscript in a high-impact journal. Advances in Digestive Medicine, 1(4), 105-109.
5. Winchester, C. L., & Salji, M. (2016). Writing a literature review. Journal of Clinical Urology, 9(5), 308-312.

EMGT41022 Data Analysis in Environmental Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Data Analysis in Environmental Management
Course Code: EMGT41022 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Statistical analysis of environmental data, using various software's for environmental data analysis, qualitative data analysis, quantitative data analysis, data presentation using charts and graphs ,correlation regression, validation and forecasting, factorial analysis, time series models and forecasting, spatial-data analysis, climate data analysis, data analysis, environmental risk analysis, environmental model analysis.

Course Aim: To enhance the knowledge and skills of using various statistical and other software's available to perform environmental data analysis so that students will be able to perform the environmental data analysis using primary and secondary data, interpret results and make conclusions.

Course ILOs:
After the successful completion of this course, the students will be able to:

1. define and use statistical applications in environmental related data;
2. identify various intermediate statistical analysis methods;
3. perform quantitative and qualitative data analysis using SPSS, STATA, AMOS, NVIVO, etc.;
4. apply time series analysis for environmental forecasting, and
5. apply and analyze spatial data.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss Role of statistics in environmental research	1			L, D	
	1.2	1	List down importance of statistics in environmental research		2		P	Q1 start & due
	1.3	1	Investigate of different types of available statistical softwares			5	LS	
2	2.1	1,2	Explain Statistical analysis of environmental data	1			L, D	
	2.2	1,2	Introduce different softwares available for data analysis		2		P	
3	3.1	1,2	Compute application for environmental data	1			L, D	
	3.2	1,2	Introduce SPSS software for statistical data analysis		2		P	
	3.3	1,2	Entering given set of data to data view and variable view tabs in SPSS			10		AS1 start
4	4.1	2,3	Explain Quantitative data analysis environmental research	1			L, D	
	4.2	2,3	Descriptive data analysis using SPSS software		2		P	
	4.3	2,3	Analyze mean, mode, median and standard deviation of given set of data			5		
5	5.1	2,3	Data presentation using charts and graphs	1			L, D	AS1 due
	5.2	2,3	Data presentation (scatter plot, bar charts , pie charts ect) using SPSS software		2		P	Q2 start & due
	5.3	2,3	Data presentation through charts and graphs for a given data set			5		
6	6.1	2,3	Discuss Correlation regression, validation and	1			L, D	

			forecasting					
	6.2	2,3	Determination of correlation coefficient, regression equation and forecasting using SPSS software		2		P	
7	7.1	2,3	Explain Qualitative data analysis in environmental research	1			L, D	
	7.2	2,3	Analyzing qualitative data using SPSS software		2		P	
8	8.1	2,3	Explain Qualitative data analysis in environmental research	1			L, D	
	8.2	2,3	Analyze qualitative data using SPSS software		2			
9	9.1	2,3	Explain Factorial analysis of variance for environmental data	1			L, D	
	9.2	2,3	Apply of ANOVA for environmental data analysis		2			
	9.3	2,3	Applying ANOVA test for given set of data			10		
10	10.1	4	Explain Time series models and forecasting	1			L, D	
	10.2	4	Apply of time series models for data analysis		2		P	
11	11.1	4	Time series models and forecasting	1			L, D	
	11.2	4	Application of time series forecasting models for data analysis		2		P	
12	12.1	5	Spatial-data analysis	1			L, D	
	12.2	5	Apply of spatial data analysis		2		P	
13	13.1	2	Monte-carlo risk assessment	1			L, D	
	13.2	2	Monte-carlo risk assessment using computer applications		2		P	
	13.3	1,2,3,4.5	Comprehensive quantitative and qualitative analysis for empirical data			15		AS2 start
14	11.1	2,3,4,5	Analyze Climate data analysis	1			L, D	
	14,2	2,3,4,5	Study of climate change using statistical analysis software		2		P	

15	15.1	2	Explain Environmental model analysis using Vensim Software	1			L, D	AS2 due
	15.2	2	Basic Analysis of environmental data using Vensim Software		2		P	
	16.3	2	Study about application of Vensim Software in research programmes			5	LS	
		1,2,3 4,5	End Semester Examination *End-semester practical examination*	15	30	55		ESE, ESP

L=Lectures, P=Practical, D=Discussion, ESE=End-semester examination, ESP=End Semester Practical Examination, Q1=Quiz 1, Q2=Quiz 2, AS1=Assignment 1, AS2=Assignment 2

Course Coordinator/Teaching Panel:

Teaching panel: Dr.PSK.Rajapakshe, Dr. JMSB Jayasundara, Dr. Manjula Ranagalage, Mr. LMAP.Gunawardana.

Assessment Strategy

In Course (Continuous) Assessment - 40 %

Quiz - 10%

Q1 = 5%

Q2 = 5%

Assignments - 30%

AS1 = 10%

AS2 = 20%

End Semester examination - 60%

End Semester Theory Examination - 30 %

End Semester Practical Examination - 30 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Freeman. Marascuilo, L. A., &Serlin, R. C. (1988), *Statistical methods for the social and behavioural sciences*. New York.
2. Zhihua Zhang,, *Environmental Data Analysis: Methods and Applications,* Berlin : De Gruyter
3. By Ricardo A. Olea (2008), *Basic statistical concepts and methods for earth scientists,*publisher.
4. Bryan F. J. Manly, (2009),Statistics for Environmental Science and Management, *2nd Edition, publisher, country*
5. Vensim, https://vensim.com.
6. SPI, https://climatedataguide.ucar.edu/climate-data/standardized-precipitation-index-spi

EMGT41032 Advanced Solid and Hazardous Waste Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Advanced Solid and Hazardous Waste Management

Course Code: EMGT41032 (T15hrs: P30hrs: IL55hrs)

Course Capsule: An introduction with contemporary problems and future trends, Scientific approach for municipal solid waste characterization, classification, generation rate and composition of solid wastes, Risk assessment of solid and hazardous waste, Different treatment facilities (chemical/physical/biological treatment) and unique requirements of hazardous waste management, Relevant environmental regulations for site investigations, site selection, Regulatory permitting process for solid and hazardous waste management, Principles of transfer and transport facilities for hazard waste, Storage facilities (containment and run-on/run-off management systems), Leachate collection and gas collection system in the landfill.

Course Aim: To develop required solid and hazardous waste management practical knowledge to obtain waste management skills in the living and working environment for ecological sustainability.

Course ILOs:

Upon the completion of this course unit, students will be able to:

1. explain contemporary issues in solid and hazardous waste in the world;
2. identify fundamental properties hazardous wastes;
3. analyze the risk factors of solid and hazardous wastes;
4. discuss different treatment facilities(chemical/physical/biological treatment);
5. recognize the relevant environmental regulations and permitting process for hazardous wastes, and
6. recognize current problems of waste disposal sites in Sri Lanka (leachate collection and gas collection from landfills.

Lesson Sequence:

Week	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Define and discuss the contemporary problems and future trends of hazardous waste	1		5	D, L	
2	2.1	1,2	Discuss case histories of solid and hazardous waste mismanagement	1		5	D, L, VP, RM	
3	3.1	1,2	Discuss scientific approach for municipal solid waste characterization	1	2	2	D, P, L,	
4	4.1	1,2,3	Discuss classification, generation rate and composition of solid wastes, risk assessment of solid and hazardous waste	1		5	D, L	Small group presentations
5	5.1	2,3	Discuss need of solid waste and hazardous waste management	1	4	4	D, P, L,	AS1 start & due
6	6.1	3,4	Visit the different treatment facilities (Chemical/Physical/Biological Treatment) and special requirements		8	5	D, FV,	
7	7.1	1,2,3,4	Mid semester examination and discussion after examination		2		MSE	MSE(MCQ)

8	8.1	4,5	Explain key management technologies (minimization, remediation, treatment and disposal, landfill disposal, solidification and immobilization)	1	2		P, L	
9	9.1	4.5	Explain key management technologies (minimization, remediation, treatment and disposal, landfill disposal, solidification and immobilization)	1	2	4	D, L	
10	10.1	4,5	Discuss radioactive waste treatment/technologies, applications	1	2	4	D, P, L	
11	11.1	4,5	Explain relevant environmental regulations for site investigations, site selection	1	2	3	L, P	
12	12.1	4,5	Explain the regulatory permitting process for solid and hazardous waste management	1	2	1	L, P	
13	13.1	4,5	Discuss principles of transfer and transport facilities for hazardous waste	1		5	L, D	
14	14.1	6	Explain principles of hazardous waste storage facilities (containment and run-on/run-off management systems)	1	2	1	P, L	
15	15.1	6	How to design the leachate collection system for landfills	1	2	6	P, L	AS2 start & due Submit an individual
	15.2	6	Landfill gas collection system	2		5	L	

		1,2,3,4,5,6	End-semester examination	15	30	55	ESE	

L=Lectures, P=Practical, FV=Field Visit, D=Discussion, VP=video Presentation, *RM=Reading Material, IL=Independent Learning, AS1=Assignment 1, AS2=Assignment 2, MSE=Mid Semester Examination, ESE=End Semester Examination*

Course Coordinator/Teaching Panel:

Teaching panel: Mrs. MMSA Marasinghe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 = 10%

Small group = 05%

Mid semester examination = 15%

End Semester examination = 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: This course is planned to visit a hazardous waste management plant in Colombo (10 hrs).

Recommended Readings: E-book (PDF available)

1. LaGrange, Michael D., P.L. Buckingham, and J.C. Evans. (2001).Hazardous Waste Management. 2nd Edition.
2. Vesilind, P.A., Worrell, W., and Reinhart, D., (2002) “Solid Waste Engineering,” Brooks/Cole.
3. Tchobanoglous, G., Theisen, H and Vigil, S., (1993) “Integrated Solid Waste Management,” McGraw-Hill, New York.
4. Pfeffer, J.T., (1992) “Solid Waste Management Engineering,” Prentice-Hall.
5. Wentz, C., (1995). “Hazardous Waste Management.” McGraw-Hill, New York, 1995.
6. Tadesse T. (2003).Solid and Hazardous Waste Law. *Environ Eng*. (August):341-350.

EMGT41042 Marine Environment and Aquatic Resources Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title: Marine Environment and Aquatic Resources Management
Course Code: EMGT41042 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Introduction to Marine Environment, Coastal and Marine Geomorphology, Coastal Ecosystems, Marine and Coastal Ecology, Coastal and Marine Aquaculture , Marine and, Marine and Coastal Tourism, Socio-economics and Coastal Livelihoods, Fisheries Economics and Marketing, Urbanization and Coastal Developments , Coastal Pollution, Legislations of the Sea and other Conventions, Marine Biodiversity Conservation, Management of Coastal Water Resources , Coastal and Marine Disasters preparedness and management, Integrated Coastal Zone Management (ICM).

Course Aim: To provide the sound theoretical and practical knowledge on aquatic environments namely fresh, brackish and marine ecosystems and the knowledge of the principles of marine and aquatic resources management so that students will be able to apply the knowledge and the principles accurately in the process of aquatic resources assessment, evaluation, development and the management.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. identify and describe the numerous and valuable resources of the coastal regions and in the oceans;
2. identify and defend the diversity of marine organisms, ecosystems, their biology, biogeography and interactions with other organisms and adaptations to their environments;
3. discover the different conditions on the socio economic and coastal livelihoods;
4. analyze the impacts of coast and coastal environments, resulting from natural and anthropogenic activities;
5. apply the international legislations and national legislations of the coastal resources and governing the rights and responsibilities of nations and the local coastal environments. and
6. evaluate the significance, and manage marine and coastal resources in a sustainable manner.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain what is Marine Environment	1			L, D	
	1.2	1	Preparation of small leaflet on precious assets of marine environment			5	SA	
2	2.1	1,2	Analyze coastal and marine geomorphology	1			L, VP, D	
	2.2	1,2	Explain coastal and marine geomorphology referring to secondary sources of information.		3		D, P	
	2.3	1,2	Read Recommended Reading 7			5	SR	
3	3.1	1,2	Explain the physical and chemical properties of the ocean and seas	1			L, VP	
	3.2	1,2	Analyze ocean waves as a source of hazard and as a resource		3		SGA, P	
	3.3.	1,2	Read given material for further studies			5	SR	
4	4.1	2	Discuss the coastal ecosystem, marine and coastal ecology	1			L, D, VP	
	4.2	2	Field visit conduct to selected marine and coastal area		3		FV, P	
	4.3	2	Read Recommended Reading 1 & 4			5	SR	
5	5.1	3	Discuss the coastal and marine aquaculture	1			L, VP	
	5.2	3	Analyze the states of two selected areas of coastal and marine aquaculture and prepare a document to identify the differences among the		3		SGA, P	

			two selected areas.					
	5.3	3	Read Recommended Reading 6			5	SR	
6	6.1	3	Discuss the relationship between marine and coastal tourism	1			L, D	
	6.2	3	Preparation of powerpoint presentation to identification the effects to the marine and coastal environment due to tourism industry		3		SGA, P	
7	7.1	3	Discuss on the socio-economics and coastal livelihoods	1			L, VP	
	7.2	3	List out the different livelihoods strategies in relation to coastal environment and analyze their impacts to the coastal environment			10	SA	
8	8.1	3	Discuss on the fisheries economics and marketing	1			L, D	
9	9.1	3,4	Discuss the importance of urbanization and coastal developments	1			L, D	
	9.2	3,4	Analyze importance of urbanization and coastal developments in Sri Lanka and preparation of documentary video as group activity		3		SGA, P	
10	10.1	4	Discuss marine and coastal environmental hazards	1			L	
	10.2	4	List out the different coastal pollution sources and suggest to minimize the impact from coastal pollution		3		SGD, P	
11	11.1	5	Discuss legislations of the sea and other conventions	1			L, D	
	11.2	5	Draft a analytical report on legislations of the sea and other conventions in Sri Lanka			10	SA	AS1 start Submit an individual report
12	12.1	6	Discuss the marine biodiversity conservation	1			L, D	

	12.2	6	List out and analyze the different approaches of marine biodiversity conservation in Sri Lanka		3		SGD, P	AS2 start and due Group Presentation
13	13.1	6	Discuss the management of coastal water resources	1			L	
	13.2	6	Divide students into small groups and collect information on management approaches of coastal water resources in Sri Lanka.		3		GA	
14	14.1	5,6	Discuss on coastal and marine disasters preparedness and management	1			L	
	14.2.	5,6	Identify different approaches of coastal and marine disasters preparedness and management in Sri Lanka		3		SGA, P	AS1 due Submit an individual report
15	15.1	5	Discuss on the Integrated Coastal Zone Management (ICM)	1			L	
	15.2	5	Analyze the importance of Integrated Coastal Zone Management (ICM) in the present world.			10	SA	
		1,2,3,4,5	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, FV=Field visit, SGD=Small Group, SGA=Small Group Activity VP=Video Presentation, GA=Group Activity, SA=Self Activity, SR=Self Reading, D=Discussion, AS1= Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 20%

AS2 = 20%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport is needed for field visits

Recommended Readings:

1. André Monaco, Patrick Prouzet. (2015). *Marine Ecosystems: Diversity and Functions.* John Wiley & Sons, Inc.

2. Edgar, G. et al. (2014). Global conservation outcomes depend on marine protected areas with five key features. *Nature*. 506: 216-220.

3. Garrod, B., & Gossling, S. (Eds.). (2008). *New Frontiers in Marine Tourism*. New Frontiers in Marine Tourism. Oxford: Elsevier.
4. Halpern, B. S., et al. (2008). A Global Map of Human Impact on Marine Ecosystems. *Science* 319(5865):948– 952.

5. Halpern, B. S., et al. (2010). Placing marine protected areas onto the ecosystem-based management seascape. *Proceedings of the National Academy of Sciences* 107(43):18312–18317.

6. Kesavan, P. C., and M. S. Swaminathan. (2006). Managing extreme natural disasters in coastal areas. Philosophical Transactions of the Royal Society of London A: *Mathematical, Physical and Engineering Sciences* 364(1845):2191–2216.

7. N.C. Smoot, D.R. Choi, M.I. Bhat. (2002). *Marine Geomorphology*. Xlibris Corporation.

8. Pomeroy, R. S., et al. (2006). Coping with disaster: Rehabilitating coastal livelihoods and communities. *Marine Policy* 30(6):786–793.

9. Sindermann, C. J. (1995). *Ocean Pollution: Effects on Living Resources and Humans.* CRC Press.

EMGT41052 Application of Disaster Management

Department of Environmental Management,

Faculty of Social Sciences and Humanities

Rajarata University of Sri Lanka

Course Plan

Course Title: Application of Disaster Management
Course Code: EMGT41052 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Disaster risk assessment based on hazard, exposure, vulnerability and capacity; Disaster management plan preparation; Disaster damage and need assessment; Disaster information management; Communication in disaster situations; Camp management in disaster occasions; Requirement of 'First aid' in disaster situations; Case studies for previous major events of Tsunami, landslides, floods, droughts and cyclones.

Course Aim: To provide the theoretical knowledge and practical skills of disaster management so that the students would be able to apply the knowledge and skills to prepare for disasters and to handle disasters situations minimizing the damage.

Course ILOs:

Upon successful completion of this course unit, students will be able to:

1. explain the procedures of conducting a disaster risk assessment, preparing disaster management plans, disaster damage and a need assessments and to involve in performing them;
2. describe and make use of disaster information management systems and disaster communication systems
3. explain the process of 'Camp Management' in disaster situations and to involve in such functions';
4. identify the kinds of 'First aid' required to affected persons in emergency situations and to involve in conducting first aid, and
5. analyze the impacts, management measures and risk factors of tsunami, landslides, floods, droughts and cyclones.

Lesson Sequence:

Week No.	Lesson No.	Related ILO/s	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Explain disaster risk factors -Hazard, Exposure, Vulnerability, Capacity and their indicators	2			L, D	
	1.1.1	1	Ref.3- Chap. 2.5, Determinants of risk (Cardona et al)			4	IL	
2	1.2	1	Discuss Disaster risk assessment - (Risk = Hazard × Exposure × Vulnerability ÷ Capacity)	2			L, D	
	1.2.1	1	Practical session of risk assessment on a given hypothetical data set		2		GA, D, P	
	1.2.2	1	Ref.3- chap. 2.6 – 2.7, Determinants of risk (Cardona et al)			4	IL	
3	2.1	1	Dicuss Preparation of disaster mitigation plans, preparedness and response plans	2			L, D	AS1 start Individual report
	2.2	1	Reviewing few existing plans and briefing the contents		1		GA, D, P	
	2.3	1	Fef.5- Reed cha. 1, 2 Sri Lanka National Disaster Management Plan			4	IL	
4	3.1	1	Perform a disaster damage and need assessment	2			L, D	
	3.2	1	Reviewing few existing assessment reports and briefing the contents		1		GA, D, P	
	3.3	1	Ref. 7- Reed part1 (Sri Lanka PDNA report)			4	IL	
5	4.1	2	Explain Importance of disaster information management systems	2			L, D	AS1 due
	4.2	2	Examining the available disaster information management systems (online)		2		GA, D, P	
	4.3	2	Ref. 9– ‘Desinventar’ disaster data base			4	IL	

6	5.1	2	Explain Importance of proper communication in disaster situations- Early warnings and Incident Command System (ICS)	2			L,D	AS2 start Individual report
	5.2	2	Identifying communication gaps in disaster situations in Sri Lanka and make proposals		2		P	
	5.3	2	Ref. 8– Disaster Communication in Vulnerabilities (Moorthi, R, 2018)			4	IL	
7	6.1	3	Discuss Camp management in disaster situations	1			L, D	
	6.2	3	Identifying camp management issues in disaster situations in Sri Lanka and make proposals		2		P	
	6.3	3	Ref 2- Camp Management Tool Kit - http://cmtoolkit.org/media/transfer/doc/chapter_1.pdf			3	IL	
8	7.1	4	Discuss First aid in disaster management	2			L, D	AS2 due
	7.2	4	Identifying specific types of first aid for each disasters		2		GA, D, P	
	7.3	4	Ref 1 - Reed Emergency Safety and First aid Hand Book (A booklet)			3	IL	
9	8	1, 2	Conduct Field study- Data collection survey on risk assessment, plan preparation and disaster communication in a selected vulnerable community in Sri Lanka		6		FV	AS3 start Group report & presentation
10	9.1	5	Conduct Case study 1- Lessons learned from Tsunami 2004 event in Sri Lanka		2		GA, D, P	
	9.2	5	Ref 4 – Reed lessons learned from Tsunami Sri Lanka			5	IL	
11	10.1	5	Conduct Case study 2- Lessons learned from major landslides in Sri Lanka		2		GA, D, P	
	10.2	5	Ref 6- Reed chap 3.3. JICA (2017) report			5	IL	
12	11.1	5	Conduct Case study 3 - Lessons learned from major floods in Sri Lanka		2		GA, D, P	

	11.2		Ref 6- Reed chap 3.2. JICA (2017) report			5		
13	8 (cont.)	1, 2	Assignment 3 presentations and discussion of the findings from field study		2		GA, D, P	
14	12.1	5	Conduct Case study 4 - Lessons learned from major drought events in Sri Lanka		2		GA, D, P	
	12.2	5	Ref 6- Reed chap 3.4. JICA (2017) report			5		
15	13.1	5	Conduct Case study 5 - Lessons learned from major Cyclone events		2		GA, D, P	
	13.2	5	Ref 6- Reed chap 3.5. JICA (2017) report			5		
		1-5	End Semester Examination	15	30	55		ESE

L=Lectures, D=Discussion, GA=Group Activity, P=Practical, FV=Field Visit, IL=Independent Learning, AS1=Assignment 1, AS2=Assignment2, AS3=Assignment 3, ESE=End Semester Examination

Course Coordinator/ Teaching Panel

Teaching Panel: Mr. WMSB Wanninayake, Mr. LMAP Gunawardhana

Assessment Strategy:

In course (continuous) assessment - 40%

AS1 = 10% (Individual)

AS2 = 10% (Individual)

AS3 = 20% (Group; 15 for report and 05 for presentation)

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: Transport facilities for field study

Recommended Readings:

1. Bhutan Government, (2009), Emergency Safety and First aid Hand Book
2. Camp Management tool kit, http://cmtoolkit.org/media/transfer/doc/chapter_1.pdf
3. Cardona, et al, (2012) - Determinants of risk-(IPCC report chapter)
4. Dilanthi Amaratunga et al, 2008, Lessons learned from Tsunami Sri Lanka. Publisher.
5. DMC, (2014). Sri Lanka National Disaster Management Plan 2013 - 2017, Colombo: Disaster Management Centre.
6. JICA, (2017). Data Collection Survey on Disaster Risk Reduction Sector in Sri Lanka, s.l.: Japan International Cooperation Agency.
7. MDM, (2016), Sri Lanka Post Disaster Need Assessment, Colombo
8. Moorthi, R, (2018), Disaster Communication in Vulnerabilities, Research gate
9. VUSSC, (2013), Course Manual on Disaster Management, Version 1.0., Virtual University for Small States of the Commonwealth (VUSSC), Canada.

EMGT41062 Geo-informatics Application for Environmental Analysis

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Geo-informatics Application for Environmental Analysis
Course Code: EMGT41062 (T15hrs: P30hr: IL55hrs)

Course Capsule: Overview of the application of Geoinformatics for environmental-related research, Application of Geoinformatics for climate Changes, urban heat island identification, Soil erosion area identification, disasters management, land use and land cover changes, utility management, Waste Management, urban green cover identification, water quality management, watershed management, urban volume calculation, forest cover changes, analysis of life quality and Application of Multi-criteria analysis for environmental-related studies. Removed repeated words

Course Aim: To provide knowledge and skills in application of Geo-informatics techniques to use it for solutions and planning than traditional planning concepts so that students will be able to apply geoinformatics solutions for real-world problem-solving.

Course ILOs:
Upon successful completion of this course unit, students will be able to:

1. define, describe and distinguish the application of geo-informatics approaches;
2. choose appropriate spatial data to solve real-world application;
3. discover geo-informatics techniques to find a better solution for real-world application;
4. prepare a spatial thinking pattern to discover the new geo-informatics approaches;
5. develop skills to prepare the methodologies for spatial data management, and
6. demonstrate scientific and technical presentation skills related to a spatial data-related research topic.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss the overview of the application of Geoinformatics for environmental-related research	1			L, D	
	1.2	1	Collect and read examples and overview of the application of Geoinformatics using available web sources			2	SR	
2	2.1	2,3,4,5,6	Explain the applicability of Geoinformatics for climate Changes	1			L, D	AS1 Start (Take home assignment on Application of Geoinfromatice application for climate changes identification)
	2.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application to analyze the climate changes		2		SGD, P	
	2.3	2,3,4,5,6	Collect and read examples and overview of the application of Geoinformatics for climate change using available web sources			2	SR	
3	3.1	2,3,4,5,6	Explain the applicability of Geoinformatics for urban heat island identification	1			L, D	
	3.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application to analyze urban heat island identification		2		SGD, P	
	3.3	2,3,4,5,6	Read Recommended Reading 1			2	SR	
4	4.1	2,3,4,5,6	Discuss the application of Geoinfromatices for Soil erosion area identification	1			L, D	AS1 Due

	4.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for Soil erosion area identification		2		SGD, P	
	4.3	2,3,4,5,6	Read Recommended Reading 2			4	SR	
5	5.1	2,3,4,5,6	Explain the applicability of Geoinformatics for disaster management	1			L	AS2 start Take home assignments about the application of Geoinformatics for disaster management
	5.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for disaster management (landslides, floods, etc.)		2		SGD, P	
	5.3	2,3,4,5,6	Collect and read examples and overview of the application of Geoinformatics for disaster management			4	SR	
6	6.1	2,3,4,5,6	Application of Geoinformatics for land use and land cover changes	1			L	
	6.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for land use and land cover changes identification		2		SGD, P	
	6.3	2,3,4,5,6	Read Recommended Reading 5			5	SR	
7	7.1	2,3,4,5,6	Application of Geoinformatics utility management	1			L	
	7.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for utility managements		2		SGD, P	
	7.3	2,3,4,5,6	Read Recommended Reading 6: Chapter 26 and 28			2	SR	
8	8.1	2,3,4,5,6	Application of Geoinformatics for Waste Management	1				
	8.2	2,3,4,5,6	Provide hands-on training on the use of		2		SGD, P	

			Geoinfromatices application for waste management					
	8.3	2,3,4,5,6	Collect and read examples and overview of the application of Geoinformatics for waste management			10	IL, SR	
9	9.1	2,3,4,5,6	Application of Geoinformatics for urban green cover identification	1			L, D	AS2 due
	9.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for urban green cover identification		2		SGD, P	
	9.3	2,3,4,5,6	Read Recommended Reading 7			4	SR	
10	10.1	2,3,4,5,6	Application of Geoinformatics for water quality management	1			L	
	10.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for water quality		2		SGD, P	
	10.3	2,3,4,5,6	Read Recommended Reading 8			3	SR	
11	11.1	2,3,4,5,6	Application of Geoinformatics watershed management	1			L	AS3 start Take home assignments about the application of Geoinformatics for watershed management
	11.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for watershed management		2		SGD, P	
	11.3	2,3,4,5,6	Collect and read examples and overview of the application of Geoinformatics watershed management			3	SR	
12	12.1	2,3,4,5,6	Application of Geoinformatics for urban volume calculation	1			L	
	12.2	2,3,4,5,6	Provide hands-on training on the use of Geoinfromatices application for urban volume		2		SGD, P	

			calculation					
	12.3	2,3,4,5,6	Read Recommended Reading 9			3	SR	
13	13.1	2,3,4,5,6	Application of Multi-criteria analysis for environmental-related studies	1			L	AS3 due
	13.2	2,3,4,5,6	Provide hands-on training on the use of Multi-criteria analysis for environmental-related studies		2		SGD, P	
	13.3	2,3,4,5,6	Read Recommended Reading 10 and 11			4	SR	
14	14.1	2,3,4,5,6	Application of Geoinformatics for forest cover changes	1			L	
	14.2	2,3,4,5,6	Provide hands-on training on the application of Geoinfromatices for forest cover change identification		2		SGD, P	
	14.3	2,3,4,5,6	Read Recommended Reading 12			4	SR	
15	15.1	2,3,4,5,6	Application of Geoinformatics for analysis life quality	1			L	AS4 Classroom practical test
	15.2	2,3,4,5,6	Provide hands-on training on the application of Geoinfromatices for access the life quality		4		SGD, P	
	15.3	2,3,4,5,6	Read Recommended Reading 13			3	SR	
		1,2,3,4,5,6	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, SR=Self Reading, D=Discussion, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, AS4=Assignment 4, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Mahinda

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

AS3 =10%

AS4 (Classroom practical test) = 10%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

1. Ranagalage, Manjula, Ronald C. Estoque, and Yuji Murayama. *"An urban heat island study of the Colombo metropolitan area, Sri Lanka, based on Landsat data (1997–2017).*" ISPRS International Journal of Geo-Information 6.7 (2017): 189.
2. Dissanayake, D. M. S. L. B., Morimoto, T., & Ranagalage, M. (2019). *Accessing the soil erosion rate based on RUSLE model for sustainable land use management: A case study of the Kotmale watershed, Sri Lanka*. Modeling Earth Systems and Environment, 5(1), 291-306.
3. Perera, E. N. C., Jayawardana, D. T., Ranagalage, M., & Jayasinghe, P. (2018). *Spatial multi criteria evaluation (SMCE) model for landslide hazard zonation in tropical hilly environment: A case study from Kegalle.* Geoinform. Geostat. Overv. *Of*, *7*, 2.

4. Alahacoon, N., Matheswaran, K., Pani, P., & Amarnath, G. (2018). *A decadal historical satellite data and rainfall trend analysis (2001–2016) for flood hazard mapping in Sri Lanka*. Remote Sensing, 10(3), 448.
5. Ranagalage, M., Wang, R., Gunarathna, M. H. J. P., Dissanayake, D. M. S. L. B., Murayama, Y., & Simwanda, M. (2019). Spatial forecasting of the landscape in rapidly urbanizing hill stations of South Asia: A case study of Nuwara Eliya, Sri Lanka (1996–2037). *Remote Sensing*, *11*(15), 1743.
6. Kresse, W., Danko, D. M. (Eds.). (2012). *Springer handbook of geographic information*. Springer Science & Business Media.
7. Ranagalage, M., Estoque, R. C., Handayani, H. H., Zhang, X., Morimoto, T., Tadono, T., & Murayama, Y. (2018). *Relation between urban volume and land surface temperature: A comparative study of planned and traditional cities in Japan*. Sustainability, 10(7), 2366.4
8. Gunaalan, K., Ranagalage, M., Gunarathna, M. H. J. P., Kumari, M., Vithanage, M., Srivaratharasan, T., & Warnasuriya, T. W. S. (2018). *Application of geospatial techniques for groundwater quality and availability assessment: A case study in Jaffna Peninsula, Sri Lanka*. ISPRS International Journal of Geo-Information, 7(1), 20.
9. Ranagalage, M., & Murayama, Y. (2018). *Measurement of urban built-up volume using remote sensing data and geospatial techniques*. Tsukuba Geoenviron. Sci, 14, 19-29.
10. Saaty TL, Vargas LG, (2012) *Concepts & applications of the analytic hierarchy process (2nd edn).* Kluwer Academic Publishers, Netherlands.
11. Estoque, R. C. (2012). Analytic hierarchy process in geospatial analysis. In *Progress in geospatial analysis* (pp. 157-181). Springer, Tokyo.
12. Ranagalage, M., Gunarathna, M. H. J. P., Surasinghe, T. D., Dissanayake, D., Simwanda, M., Murayama, Y., & Sathurusinghe, A. (2020). Multi-Decadal Forest-Cover Dynamics in the Tropical Realm: Past Trends and Policy Insights for Forest Conservation in Dry Zone of Sri Lanka. *Forests*, *11*(8), 836.
13. Dissanayake, D. M. S. L. B., Morimoto, T., Murayama, Y., Ranagalage, M., & Perera, E. N. C. (2020). Analysis of life quality in a tropical mountain city using a multi-criteria geospatial technique: A case study of Kandy City, Sri Lanka. *Sustainability*, *12*(7), 2918.
14. Samarawickrama, U., Ranagalage, M., & Piyaratne, D. *"Textbook on Analysis of Urban Heat Island"*, LAP Lambert Academic Publishing, German, 2017.

EMGT41072 Application of Environmental Management Systems

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Application of Environmental Management Systems
Course Code: EMGT41072 (L15hrs: P30hrs: IL55hrs)

Course Capsule: Initial Environmental Review (IER) process, Guidelines for environmental inspections, Environmental management system designing for small and medium enterprises, Contemporary developments in Environmental Management Systems (EMS) standards, EMS practices in Sri Lanka, policy, aspects, objectives, program, resources, communication and documentation.

Course Aim: To provide opportunity to learners for receiving real world experience with the establishment of and maintenance of environmental management systems in public and private institutions and other entities so that students will be able to take leadership in establishing EMS for institutions.

Course ILOs:
Upon successful completion of this course, the learners will be able to:

1. conduct initial environmental review for given production and services entities;
2. design environmental management systems for given production and service entities, and
3. analyze the system application performance by various institutions and other entities

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/ Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Familiarizing with a methodological framework for IER process	1			L	AS1 start Preparing report of IER
	1.2	1	Learn phase-vise steps in IER process		2		P	
	1.3	1	Read (Cango, Giulido and Trucco 1999)			4	IL	
2	2.1	1	Discuss examples of IER reports	1			L	
	2.2	1	Study contents of IER		2		P	
	2.3	1	Analyze (Cascade Environmental Resource Group 2020)			4	IL	
3	3.1	1	Examine Environmental inspection and investigation	1			L	
	3.2	1	Learn guidelines for environmental inspection and investigation		2		P	
	3.3.	1	Read (Opondo 2012)			4	IL	
4	4.1	2,3	Identifying gaps in compliance and practices in SMEs	1			L	
	4.2	2,3	Learn the gaps in EMS of SMEs		2		P	
	4.3	2	Read (EaPGREEN 2015)			4	IL	
5	5.1	2,3	Recommended tools to promote green practices	1			L	
	5.2	2	Learn information-based instruments and creating market demand for green practices		2		P	
	5.3	2	Read (EaPGREEN 2015)			4	IL	
6	6.1	2	Contemporary developments in Environ mental Management Systems (EMS)	1			L	

			standards					
	6.2	2	Compare ISO14001 standard of 2004 and 2015		2		P	
	6.3	2	Read (ISO 2016)			4	IL	
7	7.1	2	Review EMS practices in Sri Lanka	1			L	AS1 due
	7.2	2	Compare EMS practices		2		P	
	7.3	2	Read ((Gunawardhana and Jayawickrama 2015)			4	IL	
8	8.1	2	Structuring EMS proposal	1			L	AS2 start Preparing EMS proposal
	8.2	2	Learn Structures of EMS reports		2		P	
	8.3	2	Web search on EMS proposal structures			4	IL	
9	9.1	2	Environmental Leadership in institutions	1			L	
	9.2	2	Discuss role of leadership in EMS		2		SGD	
	9.3	2	Web search for environmental leadership			4	IL	
10	10.1	2	Institutional mission, and Environmental policy	1			L	
	10.2	2	Analyze institutional Environmental policies		6		P	
	10.3	2	Read (ISO 2016)			4	IL	
11	11.1	2	Environmental aspects, obligations and actions	1			L	
	11.2	2	Prioritize environmental aspects		2		P	
	11.3	2	(ISO 2016)			3	IL	
12	12.1	2	Setting environmental objectives	1			L	
	12.2	2	Set objectives for selected institutions		1		P	
	12.3	2	(ISO 2016)			3	IL	
13	13.1	2	Analyzing required resources for EMS	1			L	
	13.2	2	Estimate required resources for selected institutions		1		P	

	13.3	2	(ISO 2016)			3	IL	
14	14.3	2	Communicating EMS plans	1			L	AS2 due
	14.4	2	Prepare communication material for selected institutions		1		SGD	
	14.5	2	(ISO 2016)			3	IL	
15	15.1	2	Preparing document information	1			L	
	15.2.	2	Establish required documentation		1		P	
	15.3		(ISO 2016)			3	IL	
		1,2,3	End Semester Examination	15	30	55		ESE

L=Lectures, P=Practical, IL=Independent Learning, SGD=Small Group Discussion, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara, LMAP Gunawardhana

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: A bus for 35 persons for one day

1. **Recommended Readings**

2. Cango, Enrico, De Augusto Giulido, and Paolo Trucco. (1999.) "A METHODOLOGICAL FRAMEWORK FOR THE INITIAL ENVIRONMENTAL REVIEW (IER) IN EMS IMPLEMENTATION." *Journal of Environmental Assessment Policy and Management* 1 (4): 505-532.
3. Cascade Environmental Resource Group. (2020). *Initial Environmental Review 2037, 2039 & 2043 Sea to Sky Highway (Hwy 99), Mount.* A review report, Mount Currier, Canada: Cascade Environmental Resource Group Ltd.
4. EaPGREEN. (2015). *Promoting better environmental performance of SMEs.* Project report, Thibilici, Armania: EaPGREEN.
5. Gunawardhana, LM AP, and KG GS Jayawickrama.(2015). "Comparison and review of Environmental Management Systems among the government institutions in Sri Lanka." *Journal of Social Sciences - Sri Lanka* 7 (1): 10.
6. ISO. (2016). *Environmental management systems - General guidelines on implementation.* Guidelines, ISO.
7. Opondo, Gerphas Keyah. (2012). *HARMONIZED ENVIRONMENTAL INSPECTION AND INVESTIGATION MANUAL FOR EAST AFRICA.* Book, East African Network for Environmental Compliance and Enforcement.

EMGT41082 Advanced Environmental and Natural Resources Economics

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Advanced Environmental and Natural Resources Economics
Course Code: EMGT41082 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Renewable resources: regeneration function, Optimal management of renewable resource, Tragedy of the commons, Tragedy of privatization, Economics of forest management, Biological and economic efficiency, Economics of fisheries management: maximum sustainable yield and maximum economic yield, Economics of non-renewable resource management: dynamic optimization, Sensitivity analysis, Back stop technology, green paradox, inter-temporal resource allocation, Solow model, Hartwick rule, Generalized resource scarcity, Economics of pollution control, deriving optimal pollution level

Course Aim: To provide in-depth theoretical knowledge and enhance necessary skills on different economic models applicable for renewable and non-renewable resource management and pollution control so that the students will be able to design/propose appropriate models to manage natural resources economically more efficient and equitable manner.

Course ILOs:
Upon successful completion of this course, the students will be able to:

1. define and explain various advanced concepts in environmental economics;
2. demonstrate the ability to explain and compare the different economic models applicable for renewable resources management;
3. demonstrate the ability to explain and compare different economic models applicable for non-renewable resources management;
4. discuss and design the advanced economic models applicable for pollution control.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Discuss advance concepts and principles in environmental and natural resource economics	1			L, D	
	1.2		Read Recommended Readings given and see how economic models can be used to analyses environmental problems and finding solutions			5	SR	
2	2.1	2	Explain Renewable resources: Regeneration function, optimal management of renewable resources	2			L, D	AS1 start & due
3	3.1	2	Explain Renewable resources: Tragedy of the commons, Tragedy of privatization.	1			L, D	Q1 start & due
	3.2	2	Discuss what happened to the renewable resources in Sri Lanka after the independence and examine the economic and environmental implications of such changers		5		P	
	3.3	2	Read Recommended Readings given and see how renewable resource management is important to achieve SDGs			5	SR	
4	4.1	2	Discuss economics of fisheries management: basic concepts, maximum sustainable yield and maximum economic yield	2			L, D	
5	5.1	2	Discuss how economic models and principles can be used for sustainable management of inland fisheries in the NCP		5		P	AS2 start & due
	5.2	2	Read case studies on economics of fisheries management around the world			5	SR	

6 7	6.1	2	Explain economics of forest management: basic concepts, biological and economic efficiency	2			L, D	
	6.2	2	Read case studies on economics of forest management around the world			5	S	
	7.1	2	Discuss how economic models and principles can be used for sustainable utilization of forest resources in Sri Lanka		5		P	
8	8.1	2	Static and dynamic efficiency	1			L, D	Q2 start & due
	8.2	2	Read Recommended Readings and find out the importance and differences between static and dynamic efficiency of renewable resources			5	SR	
9	9.1	3	Explain economics of non-renewable resource management (Coal, Gas, Oil, etc.)	1			L, D	
	9.2	3	Read Recommended Readings and case studies			5	SR	
10	10.1	3	Discuss Non-renewable resources (Basic model, Issues in accordance with the discount rate)	1			L, D	
	102	3	Study the role of OPEC with respect to manage the oil prices in world market		5		P	
	10.3	3	Read case studies on managing price of oil in international market			5	SR	
11	11.1	3	Discuss dynamic optimization with respect to nonrenewable resources management Sensitivity analysis, Back stop technology, Green paradox	1			L, D	AS3 start & due
	11.2	3	Read case studies on dynamic optimization of nonrenewable resources			5	SR	
12	12.1	3	Explain Inter-temporal resource allocation	1			L, D	
	12.2	3	Read case studies on nonrenewable resource			5	SR	

			management					
13	13.1	3	Discuss Non-renewable resources: Alternative models	1			L, D, P	P start & due
	13.2	3	Read case studies on alternative models			5	SR	
14	14.1	3	Discuss how alternative models (such as Solow model, Hartwick rule, Resource curse) can be applied for the sustainable management of nonrenewable resources		5		P	
15	15.1	4	Explain pollution control: optimal pollution level, policy instruments for pollution control	1			L, D	
	15.2	4	Discuss the potential of using economic models for pollution control in Sri Lanka		5		P	
		4	Read case studies on application of economic instruments for pollution control in the world			5	SR	
		1,2,3, 4	End Semester Examination	15	30	55		ESE

L=Lectures, D=Discussion, P=Practical, SR=Self Reading, AS1=Assignment 1, AS2=Assignment 2, AS3=Assignment 3, Q1=Quiz 1, Q2=Quiz 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. PSK Rajapakshe

Assessment Strategy

In Course (Continuous) Assessment - 40 %

AS1 = 10%

AS2 =10%

Practical 1 =10%

Q1 = 05%

Q2 = 05%

End Semester Examination - 60 %

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: None

Recommended Readings:

8. Tom Tietenberg, Environmental and Natural Resource Economics, 8thed, Pearson Edu.
9. Roger Perman, etc, 4thed, Natural Resource and Environmental Economics, PearsonEdu.
10. Scott J. Callan, Janet M. Thomas,(2013) Environmental Economics and Management: Theory, Policy and Applications, 5th ed, Cengage Learning Publishers.
11. Thomas Sterner and Jessica Coria, Policy Instruments for Environmental and Natural Resource Management 2nd ed, Routledge.

EMGT41092 Climate Change Management

Department of Environmental Management,
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Climate Change Management
Course Code: EMGT41092 (T15hrs: P30hrs: IL55hrs)

Course Capsule: Global climate governance, climate change policies, climate action, climate policy of Sri Lanka, sectoral impacts, socioeconomic impacts, climate risks and vulnerability, national adaptation plans, technology needs for adaptation, mitigation plans, greenhouse gas inventory, technology needs for mitigation, technology transfer, education, training, and awareness and networking, non-mainstream climate actions, challenges to climate change management.

Course Aim: To expose learners to gain real life experience on climate change management so that students will be able to contribute productively and efficiently to the 'climate action'.

Course ILOs:
Upon successful completion of this course unit, the learners will be able to:

1. describe governance and policy issues of climate change;
2. analyze climate change impacts and risks;
3. examine the technology needs for climate change management;
4. analyze the practice of knowledge transfer in climate change, and
5. propose strategies for climate change management.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching/Learning Methods	Assessment Methods
				T	P	IL		
1	1.1	1	Analyze the issues in global climate governance in a historic perspective	1			L	AS1 start Multiple Choice Questions covering lessons 1-7
	1.2	1	Learn how to conduct a web search on climate change		2		P	
	1.3	1	Conduct web search on global climate governance			4	IL	
2	2.1	1	Review climate change policies across the globe	1			L	
	2.2	1	Learn to analyze climate policies		2		GA	
	2.3	1	Conduct web search on climate policies of countries			4	IL	
3	3.1	1	Evaluating the climate policy of Sri Lanka	1			L	
	3.2	1	Discuss issues in the climate policy of Sri Lanka		2		SGD	
	3.3.	1	Prepare a note on climate policy of Sri Lanka			4	IL	
4	4.1	2	Investigate the sectoral impacts of climate change	1			L	
	4.2	2	Discuss the sectoral impacts of climate change in Sri Lanka		2		SGD, P	
	4.3	2	Read Recommended Reading 5, 7, 12			4	IL	
5	5.1	2	Evaluate Socioeconomic impact of climate change	1			L	
	5.2	2	Estimate dimensions of socioeconomic impact of climate change		2		P	

	5.3	2	Read Recommended Reading 10			4	IL	
6	6.1	2	Estimate climate change risks and vulnerabilities	1			L	
	6.2	2	Estimate distribution of climate risk in Sri Lanka		2		P	
	6.3	2	Read risk estimation methodology from web sources			4	IL	
7	7.1	2	Introduce national adaptation plans for climate change in Sri Lanka	1			L	AS1due
	7.2	2	Divide adaptation plans to various sectors in development		2		P	
	7.3	2	Conduct web search on application of sectoral climate change adaptation			4	IL	
8	8.1	3	Examine the technology needs for climate change adaptation	1			L	AS2 start Individual presentation
	8.2	3	Discuss technology actions for climate change adaptation		2		P	
	8.3	3	Read Recommended Reading 1			4	IL	
9	9.1	3	Examine the technology needs for climate change mitigation	1			L	
	9.2	3	Discuss technology actions for climate change mitigation		2		P	
	9.3	3	Read Recommended Reading 3			4	IL	
10	10.1	3	Inventorying greenhouse gases	1			L	
	10.2	3	Analyze GH inventory of Sri Lanka		6		FC	
	10.3	3	Read Recommended Reading 3			4	IL	
11	11.1	3	Study Technology transfer needs for CC management	1			L	
	11.2	3	Discuss technology needs for climate change management		2			

	11.3	3	Read materials relevant technology need for climate change management			3	IL	
12	12.1	4	Learn education, training and awareness requirements	1			L	
	12.2	4	List education, training and awareness needs for Sri Lanka		1		P	
	12.3	4	Read relevant material from climate change secretariat publications			3	IL	
13	13.1	4	Examine the climate change network of Sri Lanka	1			L	
	13.2	4	List CC networks and their roles in Sri Lanka		1		P	
	13.3	4	Read materials from climate change secretariat			3	IL	
14	14.3	5	Evaluate the role of non-mainstream climate actions	1			P	AS2 due
	14.4	5	List non-mainstream climate action agencies		1		P	
	14.5	5	Prepare a note on the role selected agency at climate action			3	IL	
15	15.1	5	Analyze future challenges to climate change management	1			L	
	15.2.	5	Conduct SWOT analysis for future climate action for Sri Lanka		1		P	
	15.3	5	Read materials from CC secretariat			3	IL	
		1,2,3,4,5	End Semester Examination	15	30	55		ESE

L=Lectures, P = Practical, FC=Field Class, IL=Independent Learning, SGD=Small Group Discussion, GA=Group Activity, AS1=Assignment 1, AS2=Assignment 2, ESE=End Semester Examination

Course Coordinator/Teaching Panel:

Teaching panel: Dr. JMSB Jayasundara

Assessment Strategy

In Course (Continuous) Assessment - 40%

AS1 = 20%

AS2 = 20%

End Semester Examination - 60%

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Field Visit															
Continuous Assessments															
End Semester Examination	**After two weeks study leave**														

Transport Requirement: a bus for one day for 40 persons

Recommended Readings:

1. Climate Change Secretariat. (2014). Technology Needs Assessment and Technology Action Plans for Climate Change Adaptation. Colombo, Sri Lanka: Ministry of Environment and Renewable Energy.
2. Climate Change Secretariat. (2016). National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016 - 2025. Colombo: Ministry of Mahaweli Development and Environment.
3. Climate Change Secretariat. (2014). Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation. Colombo, Sri Lanka: Ministry of Environment and Renewable energy.
4. Department of Meteorology. (2018). "Multi Model Ensemble climate change projections for annual and seasonal rainfall in Sri." Sri Lanka Journal of Mereology 19-27.
5. Dharmasena, P B. (2017). "Agriculture in the context of climate and drought." Proceeding of the National Conference on Understanding and Managing Unsettled Drought. Mihintale: Rajarata University of Sri Lanka. 47-53.
6. IPCC. (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC.

7. Jayasundara, J.M.S.B., and W.W.A. Shanta, . (2005). "Study on Changes of Rainfall in the Mahaweli Upper Watershed in Sri Lanka Due to Climate change and Develop a Correlation Model for Global Warming." Proceedings of the International Conference on Monitoring, Prediction and Mitigation of Water- Related Disasters, Kyoto University, Kyoto, Japan, 12-15 January 2005. Kyoto: Disaster Prevention Research Institute Kyoto University. 451 -456.
8. Masson-Delmotte, V. et al. (2018). IPCC 2018: Synthesis Report. Geneva, Switzerland: World Meteorological Organization.
9. Jayasundara, JMSB, (2017). Proceedings of the National Conference on Understanding and Managing Unsettled Drought, "Managing Drought as a Societal Hazard", July 2017, Mihintale, Department of Environmental Management and Department of Social Sciences.
10. Jayasundara, JMSB. (2019), Socioeconomic analysis of climate change in Sri Lanka in the Third National Communication, Climate Change Secretariat, Colombo.
11. Ministry of Mahaweli Development and Environment. (2016). Readiness plan for implementation of intended nationally determined contributions. Colombo: Ministry of Mahaweli Development and Environment.
12. National Research Council. (2012). Climate Change: Evidence, Impact and Choices: PDF Booklet. Washington DC: National Academies Press.
13. The World Bank. (2015). Climate-smart agriculture in Sri Lanka. CSA country profile for Africa, Asia, and Latin America and the Caribbean series. Washington D.C.: The World Bank Group.
14. UNFCCC. (2015). Adoption of the Paris agreement. UNFCCC.

EMGT42013 Industrial Training

Department of Environmental Management
Faculty of Social Sciences and Humanities
Rajarata University of Sri Lanka
Course Plan

Course Title : Industrial Training
Course Code: EMGT42013 (300 notional hours: 280 training hours; 20 individual learning hours)

Course Capsule: real world working experience with a relevant private or public entity in the field of environmental management in the capacity of Trainee Environmental Manager.

Course Aim: The aim of this course unit is to expose learners to the world of work for training to perform various functions of environmental managers which comes under environmental management graduate profile.

Course ILOs:
Upon successful completion of this course, the students will be able to:

1. prepare well documented report to show progress of gaining work experience related to environmental management;
2. establish high performance in adaptation to working environment and completing tasks assigned by supervisors, and
3. demonstrate mindset required for high profile job market.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1	1,2,3	Getting started	1	2	4	L,P,IL	
2	2	2	Environmental management training	0	5	1	IT	PM
3	2	2	Environmental management training	0	5	1	IT	PM
4	2	2	Environmental management training	0	5	1	IT	PM
5	2	2	Environmental management training	0	5	1	IT	PM
6	2	2	Environmental management training	0	5	1	IT	PM
7	2	2	Environmental management training	0	5	1	IT	PM
8	2	2	Environmental management training	0	5	1	IT	PM
9	2	2	Environmental management training	0	5	1	IT	PM
10	2	2	Environmental management training	0	5	1	IT	PM
11	2	2	Environmental management training	0	5	1	IT	PM
12	2	2	Environmental management training	0	5	1	IT	PM
13	2	2	Environmental management training	0	5	4	IT	PM
14	2	2	Environmental management training	0	5	4	IT	PM
15		1,3	Performance evaluation	0	5	4	P, IL	IP, ITR
				1	72	27		

IT= Industrial Training, IP=Individual Presentation, PM=Performance Monitoring, ITR=Industrial Training Report

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Ranagala, Dr JMSB Jayasundara, Dr. PSK Rajapakshe, Mrs. MMSA Marasinghe, Dr. DMSLB Dissanayake, Mr.NSK Herath, Mr.WMSB Wanninayake, Mr. LMAP Gunawardhana.

Assessment Strategy

In Course (Continuous) Assessment - 100%
End Semester Examination - NA

Organization of the course:

Activity	Week of the Semester														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Theory															
Practical															
Independent Learning															
Continuous Assessments															

Transport Requirement: No

Recommended Readings: No

EMGT42026 Dissertation

Department of Environmental Management,
Faculty of Social Sciences and Humanities,
Rajarata University of Sri Lanka
Course Plan

Course Title: Dissertation
Course Code: EMGT42026 (P42hrs: IL558hrs)

Course Capsule: Finding a research gap and finalizing a research topic with the help of relevant supervisor, Design the research including the methodology, Collecting relevant primary and secondary data after designing a questionnaire and conducting survey, Finalizing chapter one introduction which includes: Background, research objectives, Hypothesis/research questions, Methodology (data collection, analysis ,presentation, sampling), study area, limitation, chapter outlines of the dissertation, Finalizing chapter two : Literature review (Conducting scientific literature review related to the selected topic) Finalizing chapter three: Results and discussion, Finalizing chapter four : Conclusions and recommendations ,Preparing the dissertation according to given instructions, Submitting final version of the dissertation and make correction, Submitting dissertation to the Examination Branch.

Course Aim: To provide comprehensive guidance with essential knowledge, skills and attitudes for undertaking scientific research in the field of environmental management so that students will be able to conduct independent scientific research to fill the various gaps in the field of environmental management at local, regional and global level where necessary in their future career.

Course ILOs:
Upon successfully completion of this course unit students will be able to:

01. identify research gap and select a research topic particularly in the field of environmental management at the level of acceptable manner;
02. design a reach conceptual framework to visualize the methodology;
03. create a data collecting formats for filed survey and plan the survey for collecting relevant data;
04. conduct surveys using acceptable scientific techniques and respecting social, ethical norms and values;
05. justify a selected research topic presenting relevant information scientific manner;
06. construct a scientific literature;
07. analyze data using relevant computer software using statistical, GIS and narrative analysis techniques;
08. organize and present findings or results of the research compressive manner;
09. compose conclusions and summarize the research findings;
10. adapt guidelines, instructions and meet deadlines;
11. produce a successful high-quality dissertation as the form of written report, and
12. write an abstract based on findings of the research.

Lesson Sequence:

Week	Lesson No.	Related ILO	Lesson Title	Time (hours)			Teaching Methods	Assessment Methods
				T	P	IL		
1	1	1	Finding a research gap and finalizing a research topic with the help of relevant supervisor		3	5	P,IL	IS
2	2	2	Design the research including the methodology		3	8	P,IL	IS
3	3.1	3,4	Collecting relevant primary and secondary data after designing a data collecting formats and conducting survey		3	50	P,IL	IS
4	3.2	3,4	Collecting relevant primary and secondary data after designing a questionnaire and conducting survey		3	50	P,IL	IS
5	4	5	Finalizing chapter one introduction which includes : Background, research objectives, Hypothesis/research questions, Methodology (data collection, analysis ,presentation, sampling), study area , limitation , chapter outlines of the dissertation.		3	40	P,IL	IS
6	5.1	6	Finalizing chapter two : Literature review (Conducting scientific literature review related to the selected topic)		3	50	P,IL	IS
7	5.2	6	Finalizing chapter two : Literature review (Conducting scientific literature review related to the selected topic)		3	50	P,IL	IS
8	6	7	Finalizing data formats (Questionnaires /interviews etc.)		3	50	P,IL	IS
9	7.1	8	Data analyzing		3	40	P,IL	IS
10	7.2	8	Data analyzing		3	40	P,IL	IS
11	8	9	Finalizing chapter three: Results and discussion		3	100	P,IL	IS
12	9	10	Finalizing chapter four : Conclusions and recommendations		3	30	P,IL	IS
13	10	11	Preparing the dissertation according to given instructions and final submission		3	20	P,IL	IS
14	11	12	Preparation of abstract for conference		3	20	P,IL	VP
15	12	1-12	Completing and submitting dissertation to the Examination Branch			5	P.IL	
			Total hours		42	558		
			Dissertation evaluation					DE

P=Practical, IL=Independent Learning, IS=Individual Supervision, DE=Dissertation Evaluation, VP=Viva Presentation

Course Coordinator/Teaching Panel:

Teaching panel: Prof. RM Ranagala, Dr. JMSB Jayasundara, Dr. PSK Rajapakshe, Mr.NSK Herath, Mrs. MMSA Marasinghe, Dr. DMSLB Dissanayake, Mr.WMSB Wanninayake, Mr. LMAP Gunawardhana

Assessment Strategy

In Course (Continuous) Assessment - 40%

- IS - 20%
- VP -20%

End Semester Examination: (DE) = 60 %

- Introduction - 10%
- Literature review - 10%
- Data collection and analysis - 15%
- Value of finding /Results - 15%
- Monitoring - 10%

Organization of the course:

Activity	Week of the Semester														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Theory															
Practical															
Independent Learning															
Continuous assessments															
End Semester dissertation evaluation	After submission of dissertation to the exam branch within given time														

Transport Requirement: No

Minimum standard: This is an individual and independent undergraduate research work which will be guided by a postgraduate qualified staff member and meet the outcome of the course within the given time frame. Supervisors will be appointed early in the year four semester one during the time of preparing research project proposals by the department. Supervisors will closely work with students and encourage them to publish research findings at the undergraduate conference or using other modes of knowledge dissemination methods. In order to pass this course unit, students must meet the minimum standard prescribed for the dissertation. Minimum standards and formatting given in the following table.

1	Language	English
2	Number of words	Minimum 10,000
3	Number of Pages	Minimum 50
4	Paper size	A4
5	Writing	Dissertation must be typed and prepare using computers
6	Recommended Reading style	APA
7	Font	Time New Romans
8	Font Size	Topic -16 Capital and Bold, Heading- 14 Bold Initial letter should be capital, Text- 12
9	Line space	1.5
10	Paper setting	Top-1 Bottom-1 Right -1 Left-1.5
11	Paper orientation	Portrait (landscape where required)
12	Printing	One side
13	Number of chapters	Four =1. Introduction, 2. Literature review, 3. Results and Discussion, 4. Conclusions, List of Recommended Readings.
16	Dissertation formatting	● Front page **:** According to given format by the department ● Supervisor and student declaration ● Dedication : students will write for acknowledging ● Abstract : Students should write an abstract to show summary of findings ● Table of content : Automated ● List of figures ● List of tables ● List of annexure
17	Students' progress report	Students must collect the format of progress report from the department when starting their research and fill through the semester. Students should be responsible for getting supervisor's signature through the semester and finally attach it to the end of the dissertation.
18	Plagiarism	Plagiarism is the violation of academic integrity so that students will be punished if plagiarism was captured by rejecting the dissertation.
19	Nature of the dissertation	This is a six credit subject compulsory to complete the degree program and individual and independent research. Sometimes students may carry their research while getting industrial training i.e. selecting an issue related to the industry selected for involving industrial training.