# STUDENT HANDBOOK

**MSc/PG Diploma** 

Sustainable

With a comprehensively developed Curriculum considering future aspirations of the Global

and

Sri Lankan process industry

which is moving towards

a 'circular economy'...

Department of Chemical and Process Engineering, University of Moratuwa.

Process Ingineering

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# Message from Head of the Department

As the Head of the Department, I would like to take this opportunity to thank you for joining the MSc/PG Diploma in Sustainable Process Engineering study program conducted by the Department of Chemical and Process Engineering (DCPE).

The DCPE at the University of Moratuwa, Sri Lanka is one of the premier engineering departments in the country. Being operated with a vision to standardize, optimize and scaleup the production processes in a commercially viable manner through sustainable utilization of raw materials, the department has its unique mission to satisfy its objectives.



The academic staff of the DCPE consists of twenty-two fulltime members including two senior professors, seven professors and six senior lecturers, who are all well-qualified in the field and lead high quality research in a wide spectrum of areas. In addition, the Department is assisted by a dedicated team of academic support and technical staff. The Department has strong links with the industry and conducts collaborative tasks of research and development.

The MSc/PG Diploma in Sustainable Process Engineering study program is one of the two master's degree programs conducted by the department. This study program, under the name of MSc/PG Diploma in Sustainable Process Development, was first commenced in 2007 with 12 students in collaboration with the Telemark University College, Norway. It was restructured and renamed in 2018.

The postgraduates can learn the latest subject areas related to the sustainability improvements in chemical and process industries from leading academics and industry experts in international/national organizations and can attend short courses and seminars/webinars organized in parallel to the master's degree program. I trust that the graduates from this study program possess the knowledge and skills necessary to excel in a wide range of chemical and process industries in Sri Lanka and across the world.

I wish you all the best for your future endeavors in the DCPE.

Prof. (Mrs.) Shantha Egodage Head of the Department Professor Department of Chemical and Process Engineering University of Moratuwa Katubedda, Sri Lanka

# Message from the Course Coordinator

On behalf of the lecture panel, I warmly welcome all of you for the Course Program of MSc/Post-graduate Diploma in Sustainable Process Engineering at the Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka.

This part-time post-graduate degree program was initiated in year 2007 with the name of MSc/PG Diploma in Sustainable Process Development with the first batch of 12 students in collaboration with the Telemark University College, Norway. With this collaboration, there was an arrangement to offer MSc scholarships for the graduates of this degree program and Chemical and Process Engineering graduates in Norway. Since 2007, the degree program was offered for several intakes of post-graduate students as a part-time course for around 10 years.



In year 2018, the MSc/PG Diploma course in Sustainable Process Development was converted into MSc/PG Diploma course in Sustainable Process Engineering with a major curriculum revision by adopting the latest subject areas related to sustainability improvement the process industries, such as sustainability assessment tools like life cycle assessment and theories like circular economy, sustainable process design of new processes and revamping or retrofitting existing processes, simultaneous integration of safety, energy, environmental, social, and economic aspects, and process analysis and design aspects supplemented with R&D and supply chain management.

The first student intake of the MSc/PG Diploma course in Sustainable Process Engineering was admitted in year 2019 with 21 students followed by the second student intake in year 2021 that is the currently ongoing batch of students. In addition to the regular course units in the curriculum, this post-graduate degree program provides the opportunity for the candidates to join various supplementary sessions and learning activities, including Short-Courses offered parallel to the MSc Course, Guest Lectures by Foreign Professors, Guest Lectures by Industry Experts and Top Managers from renown Companies, Workshops/Seminar Sessions offered in collaboration with Industries and foreign universities, Virtual Factory Tours and Physical Field Visits to local process industries, Energy auditing and Sustainability Assessments for selected industry cases, etc.

As the present course coordinator, it's an utmost pleasure for me to witness the success of the MSc/PG Diploma program in Sustainable Process Engineering for the two student intakes so far. I strongly believe that the genuine efforts that we make through this post-graduate degree program will contribute shaping-up expert professionals in the field of Sustainable Process Engineering and bring forward new dimensions to the Sri Lankan process industry in the near future.

## Dr. Mahinsasa Rathnayake

Course Coordinator - MSc/PGD in sustainable Process Engineering Senior Lecturer Department of Chemical & Process Engineering University of Moratuwa Katubedda, Sri Lanka

Department of Chemical and Process Engineering

## 1. Introduction

The MSc/PG Diploma course program in Sustainable Process Engineering assists the graduates who are seeking a career in the process industry as well as to enhance existing career prospects and technological knowhow of sustainable process development of experienced professionals. The program has been designed considering future aspirations of the Global and Sri Lankan process industry which is moving towards a 'circular economy' as follows:

- Reduction in non-renewable energy sources, primary raw material intensity, and improvement of recycling, reuse, and resurces recovery concepts.
- Applications of clean energy technologies and use of advanced energy systems.
- Mitigation of product/process life cycle greenhouse gas (GHG) emissions and other environmental impacts through life cycle sustainability assessments.
- Added value from the process industry to end-user sectors with sustainability improvement strategies, design, and development.

The program focuses on the development of sustainable processes in terms of new process designs and retrofitting or revamping of existing sub-optimal processes. Simultaneous integration of safety, energy, environmental, and sustainability aspects, and process analysis and design aspects supplemented with R&D and management will be considered as key areas of study as shown in Figure 1. Theoretical knowledge and practical skills are complemented with project work in this course.



Figure 1: Brief classification of key subject areas covered in the course

Department of Chemical and Process Engineering The course units have been carefully designed so that the key pillars of the Sustainable Process Engineering are 'mastered' by the students upon completion of the program as shown in Figure 2 below. The graduates of this course with PG diploma or MSc are expected to play a key role in regional industrial development initiatives (chemical, food, water services, energy services, cement, pulp and paper, textile, water treatment, biotechnology, plastic, agricultural industry, etc.) where a wide range of opportunities are available with career advancements. Further, graduates will be eligible for admission to PhD studies in any foreign university after completion of this MSc course.

## 2. Course Structure

The first year consists of three academic semesters and the lectures normally conducted on Saturdays and Sundays. The course delivery is in hybrid mode (both online and physical sessions).



Figure 2: Mapping of course units with learning domains of Sustainable Proceee Engineering

In addition to the regular course units in the curriculum, this MSc program provides the opportunity for the candidates to join various supplementary sessions and learning activities that are arranged simultaneous to the MSc course units delivery.

These learning activities are designed with project work while improving theoretical knowledge and practical skills of the candidates with supplementary sessions as follows.

- Short-Courses offered parallel to the MSc Course
- Guest Lectures by Foreign Professors
- Guest Lectures by Industry Experts and Top Managers from renown Companies
- Workshops/Seminar Sessions offered in collaboration with Industries and foreign universities
- Virtual Factory Tours and Physical Field Visits to local process industries
- Energy auditing and Sustainability Assessments for selected industry cases

## **2.1 Graduation Requirements**

The Post-Graduate Diploma Program in Sustainable Process Engineering consists of three academic semesters with taught subjects of total 40 Credits. Those who successfully complete the Continuous Assessment components (Take-home Assignments, Quizzes, Group Works, Mini-Projects, Field Activities, etc.) and Final Examinations for the taught subjects of total 40 Credits will be eligible for the award of the Postgraduate Diploma. In addition, the completion of a MSc dissertation (thesis) of 20 Credits as individual research is required for the award of the MSc degree. The maximum duration to complete the MSc dissertation (thesis) in research is four (04) years from the date of registration in the course.

Figure 3 illustrates the pathway for graduation with graduation options in this program.



Figure 3: Pathway for graduation with graduation options in this degree program

## 2.2 Course Modules and Brief Curriculum

			Evaluation <sup>2</sup> (%)			
Code	Course Modules	Credits <sup>1</sup>	Continuous Assessments	Final Exam		
	Semester 01 (14 Ci	redits)				
CH 5010	Energy Management	3	40%	60%		
CH 5020	Environmental Biotechnology	4	40%	60%		
CH 5030	Sustainable Process Industry	3	40%	60%		
CH 5040	Chemical Engineering Principles	4	40%	60%		
	Semester 02 (12 Credits)					
CH 5050	Process Analysis and mapping	3	40%	60%		
CH 5060	Process Safety and Risk Management	3	40%	60%		
CH 5070	Sustainable Process Development Techniques	3	40%	60%		
CH 5080	Engineering Research Techniques	3	40%	60%		
	Semester 03 (14 credits)					
CH 5210	Sustainable Process Design	3	40%	60%		
CH 5230	Air Pollution Control	3	40%	60%		
CH 5240	Sustainable Supply Chain Management	3	40%	60%		
CH 5250	Process Modeling and Simulation	3	40%	60%		
CH 5200	Special Study	2	-	100		
	After Semester 03 (For Com	pletion of	MSc)			
CH 6099	MSc Dissertation	20	-	100		

<sup>1</sup> 1 credit corresponds to 14 hours of lectures or equivalent.

<sup>2</sup> The mean value in the evaluation scheme is the default value. It can be changed by the Lecturer/Examiner concerned, within the specified range, by announcement to the students at the commencement of the course unit.

## **2.3 Eligibility Requirements**

The degree of the **Bachelor of Science of Engineering** of the **University of Moratuwa** in a relevant field of specialization; the relevancy of the field to be judged by the Faculty and approved by the Senate of University of Moratuwa.

#### OR

Any other **Engineering degree** of at least **four years** duration, in a relevant field of specialization, from a recognized university; the recognition of the university, the acceptability of the course, and the relevancy of the field to be judged by the Faculty and approved by the Senate of University of Moratuwa.

#### OR

Any other **Engineering degree** of at least **three years** duration, from a recognized university; **AND** a minimum of **one year** of appropriate experience in a relevant field after obtaining such degree; the recognition of the university, the acceptability of the course, and the relevancy of the experience to be judged by the Faculty and approved by the Senate of University of Moratuwa.

#### OR

Any other **Science degree** of at least **four years** duration from a recognized university, **AND** a minimum of **one year** of appropriate experience in a relevant field after obtaining such degree; the recognition of the university, the acceptability of the course, and the relevancy of the experience to be judged by the Faculty and approved by the Senate of University of Moratuwa.

#### OR

Any other **Science degree** of at least **three years** duration from a recognized university, **AND** a minimum of **two years** of appropriate experience in a relevant field after obtaining such degree; the recognition of the university, the acceptability of the course, and the relevancy of the experience to be judged by the Faculty and approved by the Senate of University of Moratuwa.

#### OR

At least the **Associate Membership** (satisfying the educational requirements for Corporate Membership or similar graduate membership) of a recognized professional engineering institute in a relevant field **AND** a minimum of **one year** of appropriate experience after obtaining relevant qualification for such membership; the acceptability of the Associate Membership status of the candidate, the recognition of the institute and the relevancy of the field for this purpose shall be judged by the Faculty and approved by the Senate of University of Moratuwa

## 2.4 Course Fees

Description of Fee Structure	Amount (LKR)	
Tuition Fee (For all Semesters)	360,000.00	
Registration Fee*	1,500.00	
Examination Fee*	1,000.00	
Refundable deposit for library facilities	2,500.00	
Tuition fee can be payable in installments at the begining of each semester as follows.		
Semester 01	200,000.00	
Semester 02	80,000.00	
Semester 03	80,000.00	

\*Registration fee and Examination fee are one-time payments for all Semesters. However, if the student has repeat attempts for any subject, the registration fee of Rs. 1,500 must be paid again with the examination fee of Rs. 1,000 for each repeated subject.

## 2.4.1 Registration and Enrollment for Course Units

At the commencement of each semester, students must pay the course fee installment corresponding to that semester and register for the semester. After the payment confirmation, the enrollment for the course units in the Learning Management System – University of Moratuwa will be conducted by the Course Coordinator.

#### 2.4.2 Payment Method

All payments must be made to the bank account of 'University of Moratuwa' with the following details.

Account Name	: University of Moratuwa
Account No.	: 70993353
Bank	: Bank of Ceylon
Branch	: Katubedda

Allowed modes of payment are; payment at the bank cashier with a payment slip or online bank transfer from a personal bank account. Deposit from ATM machines is NOT allowed.

If you make online bank transfer, please make sure to type "Your Name with initials" in the Sender Remarks and "MSc in SPE" in the Beneficiary Remarks before transferring the payment. Please print the online transfer statement as a PDF.

All payment slips should be scanned and email to pg-spe@uom.lk with CC to mratnayake@uom.lk.

The original payment slips should be sent via registered post or physically handed over to the following address.

Dr. H. H. M. P. Rathnayake Course Coordinator, MSc/PG Diploma in Sustainable Process Engineering, Department of Chemical and Process Engineering, University of Moratuwa, Katubedda.

## **2.5 Detailed Syllabus of Course Units**

#### Semester 01

1) Ene	ergy Managen	nent		
Module Code	CH5010	Title	Energy Management	Credits: 3
Learning	Outcomes:			
On comple	etion of this m	odule, stu	idents should be able to;	
1.	Understand	energy e	fficiency, losses, and s	aving/recovery methods of
	different ener	rgy system	ns.	
2.	Apply them	along wi	ith system thinking to $a$	analyze energy systems by
	performing e	nergy aud	lits.	
3.	Apply prope	r econon	nic measures to evaluat	e the cost-effectiveness of
	energy-savin	g/recover	y methods.	
Outline S	yllabus:			
1.	Introduction	to energy	management	
2.	Energy audit	ing		
3.	Combustion	and waste	e as a fuel	
4.	Steam genera	ation and	distribution	
5.	Combined H	eat and Po	ower (CHP)	
6.	Cooling syste	ems		
7.	Energy recov	very		
8.	Alternative e	nergy sou	rces	
2) Env	vironmental B	Siotechno	logy	

#### Module **CH5020** Title **Environmental Biotechnology Credits: 4** Code **Learning Outcomes:** On completion of this module, students should be able to; 1. Understand the basic principles of biological wastewater treatment. 2. Apply these principles to analyze, evaluate, design, and simulation of wastewater treatment processes. 3. Understand the environmental management system and conduct life cycle analysis. **Outline Syllabus:** 1. Principles of biological wastewater treatment 2. Wastewater treatment technologies and design 3. Principles of biological process modeling 4. Wastewater treatment plant modeling and simulation 5. Solid waste management 6. Environmental Management systems

7. Environmental Impact Assessment and system analysis

#### 3) Sustainable Process Industry Module **CH5030** Title Sustainable Process Industry Credits: 3 Code **Learning Outcomes:** On completion of this module, students should be able to; 1. Analyze and develop processes considering their economic, social, and environmental impact. **Outline Syllabus:** 1. Introduction to process engineering 2. Key concepts, strategies, and evaluation methods in sustainable process engineering 3. Waste and its sources in process and utility systems and waste minimization strategies 4. Planning, development, design, and operations in the sustainable process industry **5.** Case study analysis on the practical implementation of sustainable processes 4) Chemical Engineering Principles Module **Chemical Engineering** Title **CH5040 Credits: 4** Code **Principles**

#### **Learning Outcomes:**

On completion of this module, students should be able to;

- 1. Describe principles of Unit Processes in Process Engineering industries
- 2. Select a suitable mode of operation and equipment for a given process
- 3. Apply material and energy balance to a variety of process equipment
- 4. *Perform* Design calculations for process equipment and evaluate the performance
- 5. Apply novel software packages for chemical engineering design calculations

#### **Outline Syllabus:**

- 1. Introduction to Chemical and Process Engineering- Concept of Unit processes
- 2. Mode of Operations Continuous, batch, steady and unsteady state processes, reactor types
- Fundamentals of transport phenomena: principles and applications Moment, Heat and Mass Transfer Unit operations - Mass Transfer separations: Distillation, Extraction, Absorption, and Stripping

Mechanical separation processes: Sedimentation, Filtration, Centrifugation

## Semester 02

5) Pro	cess Analysis and Mapping				
Module Code	CH5050 Title Process Analysis and Mapping Credits: 3				
Learning	Outcomes:				
On comple	tion of this module, students should be able to;				
1.	Understand the basics of process maps				
2.	Understand the different applications of process maps in the industry				
3.	Evaluate different types of process maps used in the industry				
<b>Outline</b> S	/llabus:				
1.	Process mapping basics				
2.	Conceptual modeling using diagrams and maps				
3.	Applications of process mapping				
4.	Suitability of process maps in business process renovation projects				
5.	Knowledge maps and their applications				
6.	Identification of process improvement opportunities				
7.	Automation emerging from process mapping				
8.	Process mapping and QMS				
9.	Value stream maps and process efficiency				
10.	Process evaluation using swim-lane-value-stream-maps (SLVSM) as a tool				

## 6) Process Safety and Risk Management

Module Code	CH5060	Title	Process Safety and Risk Management	Credits: 3		
	Learning	Outcome	s:			
	On comple	etion of the	is module, students should be able to;			
	1.	<i>Identify</i> h	nazards in the chemical and process industry			
	2.	Apply apprisks	propriate technologies or measures to reduce pro	ocess hazards and		
	3.	Analyze ł	hazards and risks in the chemical and process in	dustry		
	4.	Evaluate	hazards and risks in the chemical and process in	ndustry		
	5.	Assess an	nd manage hazards and risks in the chemical and	l process industry		
	Outline Syllabus:					
	1.	hazards i	dentification and structured analysis tools:			
	2.	hazards a assessme	assessment (Fire, explosion, and toxic releases cent):	onsequence		
	3.	risk term	inology and quantified risk analysis (QRA) tech	iniques:		
	4.	Inherent a	safety and risk management strategies (passive, al):	active,		
	5.	Operating factors in	g procedures; Industrial and Process Safety system safety:	ems; Human		
	6.	Managen	nent of change; Process safety culture:			
	7.	Learn fro	om experience: accident case histories:			

## 7) Sustainable Process Development Techniques

Module Code	CH5070	Title	Sustainable Process Development Techniques	Credits: 3
Learning	<b>Outcomes:</b>			
On compl	etion of this 1	nodule, s	tudents should be able to;	
1.	Describe su	stainable	process development techniqu	es and methodologies
2.	Apply sustai	inable pro	ocess development techniques	
3.	Analyze and	l evaluate	alternative processes	
4.	Select envir	onmental	ly sustainable processes	
5.	Select econo	omically	and environmentally sustainabl	le processes
6.	Select techn	ologicall	y and environmentally sustaina	ble processes
Outline S	yllabus:		<u> </u>	
1.	Life Cycle A	Assessme	nt for Environmental Performa	nnce;
2.	Life Cycle t	hinking f	or social and inherently safer c	hemical processes
3.	Design for s	sustainabi	lity and eco-design	
4.	Cleaner Pro	duction A	Assessment	
5.	Process inte	gration s	olutions for waste avoidance (w	vater pinch)
6.	Sustainable	develo	pment mechanisms (SDM)	): (Clean Development
	Mechanism	(CDM) a	and carbon trading)	
7.	Sustainabili	ty assess	ment tools: (carbon footprint,	water footprint, ecological
	footprint, G	HG quan	tification methods)	
8.	Source Red	uction an	d Waste Minimization	
9.	Resource re	covery fr	om waste and recycling technic	ques
10	. Environmer	ntal Acco	unting	
11	. Industrial S	ymbiosis	and Circular Economy approa	ch
9) <b>F</b>	du contu a D -		a chui an ag	
ð) Eng	gineering Re	search I	ecnniques	
Module	CITEOOO	Title	Engineering Research	Creaditar 2

Code	CH5080	Title	Engineering Research Techniques	Credits: 3

#### **Learning Outcomes:**

On completion of this module, students should be able to;

**1.** *Understand* the basic concepts and methodologies needed to conduct research from the inception of the research problem to the dissemination of new knowledge as a publication.

#### **Outline Syllabus:**

- 1. Research problem formulation
- 2. Literature review
- 3. Research proposal writing
- 4. Ethics in engineering research
- 5. Experimental planning and designing
- 6. Data analysis
- 7. Synthesizing and preparation of a research article

#### Semester 03

#### 9) Sustainable Process Design

Module Code	CH5210 Title Sustainable Process Design Credits: 3			
Learning	Outcomes:			
On comple	etion of this module, students should be able to;			
1.	Define and identify a sustainable process and its key parameters			
2.	Evaluate the environmental impact of a proposed design			
3.	In-depth <i>analysis</i> of an existing design and its impact on society throughout the life cycle			
4.	Communicate SPD and its effects to the management			
5.	Align organizational elements and production processes for SPD			
Outline S	yllabus:			
1.	An introduction to Sustainable Process Design (SPD)			
2.	A life-cycle approach to design assessment – In-depth study on raw material to the			
	waste stream of a process design			
3.	Environmental impact assessment (EIA) and its link to SD			
4.	Reconsideration of existing designs: examples from the industry			
5.	Sustainable Design strategies – Innovation, Low-Impact Raw Materials, Optimized Manufacturing, Efficient Distribution, Low-Impact Use etc.			
6.	Sustainable process design optimization with data and machine intelligence			
7.	Participatory approaches to SPD			
8.	Case studies – Several case studies related to a process design covering the selection			
	of raw materials, identification, and calculation of key design parameters,			
	commissioning for optimum operating conditions, and waste disposal.			
10) Air	Pollution Control			
Module Code	CH5230 Title Air Pollution Control Credits: 3			
Learning	Outcomes:			

Learning Outcomes:

On completion of this module, students should be able to;

- 1. *Understand* air pollution, principles of atmospheric environmental pollution management
- 2. *Design* air pollution control equipment and processes.

#### **Outline Syllabus:**

- 1. Introduction to air pollution
- 2. Atmospheric pollution problems and their impact assessment
- 3. Atmospheric pollution monitoring
- Control technologies for air pollution Stack emission modelling, Particulate emission control: Technologies and equipment design
   Cosseque pollutante control: observation, adcorption, biological, thermal destrict

Gaseous pollutants control: absorption, adsorption, biological, thermal destruction and advanced methods

# 11) Sustainable Supply Chain Management

Module Code	CH5240	Title	Sustainable Supply Chain Management	Credits: 3			
Learning	Outcomes:						
On comple	etion of this m	odule, stu	idents should be able to;				
1.	<i>Understand</i> th	Understand the principles of supply chain management					
2.	Apply sustain	ability pr	inciples in supply chain managem	nent			
3.	Analyze supp	ly chain o	operations				
4.	Evaluate sust	ainable si	upply chain performance				
5.	Assess and ma	anage sus	stainable supply chains				
6.	Evaluate and	appraise	emerging supply chain sustainab	ility models and			
	strategies						
Outline S	yllabus:						
1.	Introduction t	to sustain	able supply chain management				
2.	Design for en	vironmer	nt				
3.	Sustainable s	ourcing					
4.	Green manufa	acturing					
5.	Green wareho	ousing					
6.	Green transpo	ortation					
7.	Collaboration	and mul	ti-stakeholder partnerships				
8.	Assessment a	nd Certif	ication tools and methodologies				
9.	Strategic Cor	porate Su	stainability				
10	. Emerging sup	oply chair	n sustainability concepts and strate	egies			

12) Process Modeling and Simulation					
Module Code	CH5250 Title Process Modeling and Simulation Credits: 3				
Learning	Outcomes:				
On comple	etion of this module, students should be able to;				
1.	Formulate dynamic models based on the mechanisms that drive the systems,				
	with special emphasis on simplifying assumptions.				
2.	Apply methods for simulating (solving) the resulting mathematical models.				
3.	Apply basic techniques for model analysis.				
Outline S	yllabus:				
1.	Formulation of dynamic models based on material, momentum, and energy				
	balances.				
2.	Mass conservation in reactions.				
3.	Overview of constitutive equations (reaction kinetics, thermodynamic models,				
	transport laws).				
4.	Modeling of coupled systems (co- and counter-current flow, recirculation,				
E	etc.).				
5.	Elementary systems theory: solution of linear models, stability.				
0. 7	A courses and sources of error in numerical work				
7.	Numerical solution of sets of linear- and non-linear equations				
0. 9	Interpolation and extrapolation				
10	Numerical differentiation and integration				
11	Numerical solution of ordinary differential equations and systems of equations.				
12	. Boundary-value problems for ordinary differential equations.				
13	. Partial differential equations.				
14	. Optimization and curve fitting.				
15	. The use of computer tools for numerical computations.				

#### 13) Special Study

Module Code	CH5200	Title	Special Study	Credits: 2		
Learning Outcomes:						
On completion of this module, students should be able to;						
1.	Understand the theoretical nature of the case.					
2.	Analyze a case to explain the practical nature of a process or system in the					
	real-world scenario.					
Outline Syllabus:						
1.	This is a course in project work, preferably in co-operation with industry.					
2.	The assignm	ents will	normally be of a cro	oss-disciplinary nature. It may		
	necessitate that the students attain theoretical understanding within a specific					
	subject field	not cove	red in the ordinary cou	rses. Assignments can also be		
	research-rela	ted. The	work can be of the	oretical, experimental, and/or		
	practical natu	ıre.		, I ,		
3.	The project v	work is to	be carried out as indiv	vidual work, i.e., single student		
	should carry	out a proi	ect alone.	, , , , ,		
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#### After Semester 03,

## 14) MSc Dissertation

Module Code	CH6099	Title	Dissertation	Credits: 20		
Learning Outcomes:						
On compl	etion of this m	nodule, stu	idents should be able	to;		
1. <i>Review</i> literature critically and <i>identify</i> research gaps/problem						
2.	. Develop new experimental set ups/ models/strategies					
3.	Construct new ideas or approaches independently					
4.	Develop self-integrity under challenging environment					
5.	Analyze data obtained from an experiment or modeling					
6.	Evaluate results in the context of related literature					
7.	Produce research findings as a published material					
Outline S	yllabus:					
1.	The main the	esis should	d incorporate an exper	rimental and/or theoretical topic.		
2.	The work is to be carried out on an individual basis, even when more students					
	work on the	same or re	elated topics.			

3. Assignments are suggested by the tutors (researchers). The students have the opportunity to suggest topics in which they are interested. In this case, the tutor will still have to be the author of the assignment texts.

## 3. Lecture Panel and Resource Persons



7. Dr. (Mrs.) R.M.D.S. Gunarathne	
8. Dr. S.A.D.T. Subasinghe	
9. Dr. H.H.M.P. Rathnayake	
10. Dr. (Mrs.) G.S.M.D.P. Sethunga	
11. Dr. (Mrs.) T.P. Keerthisinghe	
Visiting Staff:	
<ol> <li>Dr. Asoka Fonseka Chief Operations Officer - Link Natural Products Pvt Ltd.</li> </ol>	
<ol> <li>Ms. Gayani de Alwis</li> <li>Supply Chain Consultant &amp; Chairperson (WiLAT)</li> </ol>	
<ol> <li>Dr. Deshai Botheju</li> <li>Consultant - Safety and Sustainability</li> <li>Management &amp; Design- Norway</li> </ol>	

Guest Lecturers:	
<ol> <li>Prof. Sachin Mandavgane Head/ Professor Department of Chemical Engineering Visvesvarya National Institute of Technology (VNIT), Nagpur, India.</li> </ol>	
<ol> <li>Dr. Nuwan Wimalana</li> <li>Director / Consultant / Lecturer / Corporate</li> <li>Trainer</li> <li>Sri Lankan Medium Enterprises</li> </ol>	
<ol> <li>Mr. Indika Kumara</li> <li>Head of 3P/2P Operations</li> <li>Unilever Sri Lanka Ltd</li> </ol>	
4. Mr. Chandana Weerabahu Director-Supply Chain George Steuart Consumer Pvt Ltd	
5. Mr. Rushanth Chandrabose Director – Technical Industrial Solutions Lanka Pvt Ltd	
6. Mr. Chanaka Mahawaththa Product Manager Forbes Marshall (Pvt) Ltd	

# 4. Subject Coordinators:

Code	<b>Course Modules</b>	Subject Coordinator
CH 5010	Energy Management	Dr. (Mrs.) R.M.D.S. Gunarathne
СН 5020	Environmental Biotechnology	Prof. P.G. Rathnasiri
СН 5030	Sustainable Process Industry	Prof. A.D.U.S. Amarasinghe
СН 5040	Chemical Engineering Principles	Dr. (Mrs.) G.S.M.D.P. Sethunga
СН 5050	Process Analysis and mapping	Dr. (Mrs.) G.S.M.D.P. Sethunga
СН 5060	Process Safety and Risk Management	Dr. M.Y. Gunasekara
СН 5070	Sustainable Process Development Techniques	Dr. H.H.M.P. Rathnayake
СН 5080	Engineering Research Techniques	Prof. P.G. Rathnasiri
CH 5210	Sustainable Process Design	Dr. H.H.M.P. Rathnayake
CH 5240	Sustainable Supply Chain Management	Dr. H.H.M.P. Rathnayake
СН 5250	Process Modeling and Simulation	Prof. M. Narayana
СН 5230	Air Pollution Control	Senior Prof. (Mrs.) B.M.W.P.K. Amarasinghe
CH 5200	Special Study	Dr. H.H.M.P. Rathnayake

## 5. Contact Details

Postal Address:

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