Student Handbook -2019

DEPARTMENT OF CHEMICAL & PROCESS ENGINEERING

UNIVERSITY OF MORATUWA

SRI LANKA

CONTENT

THE DEPARTMENT OF CHEMICAL & PROCESS ENGINEERING

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

Vision

Delivering Chemical and Process Engineering knowledge, skills and innovation for a sustainable tomorrow

The department offers the honours degree in Bachelor of Science of Engineering in the field of Chemical and Process Engineering for the undergraduates in fields of focus areas in Environmental and Energy Engineering, Food and Biochemical Engineering, Polymer Engineering, and Petroleum Engineering while it also offers programmes for the postgraduates. The M.Sc./ PG Dip. in Polymer Technology and M.Sc./ PG Dip. in Sustainable Process Development are two taught Master's programmes available at the department and it also conducts Research programmes leading to M.Sc., M.Phil., and Ph.D. degrees. The competency and friendliness of academic and academic support staff members, the stimulating atmosphere of the department with well-equipped laboratory facilities and many valuable resources provided for the students, offer the students with a better learning environment to equip students with necessary knowledge and skills required for Chemical and Process Engineering graduates.

Being established in 1972 only with 8 undergraduates, the department proudly demonstrates much evidence for its immense growth during its journey through the years. The number of undergraduate student intake has been increased up to 80 students per batch, and at present, the student body of the Department of Chemical and Process Engineering is consisted with over 300 undergraduates studying at various levels of their bachelor's degree program, Masters students, M.Phil. students and Ph.D. students.

Research, being an integral part of the curriculum of undergraduate and postgraduate studies, not only boosts the research potential of the students but also benefits the field of Chemical and Process Engineering through the flow of huge contribution of better solutions and innovative ideas into it. The availability of well-functioning laboratory facilities with the well-guided supervision enhances the value of the research activities.

The collaboration of the Department of Chemical and Process Engineering with the industry is also huge. The industry facilitates the department with internship opportunities for the undergraduates, with competent and well-experienced mentors for the mentoring programmes that are being conducted by the department, and to organize field visits for the students in order to enhance the competencies of the undergraduates. The close relationship with the industry facilitates the prospective fresh graduates from the department to find career opportunities with ease. The Department Industry Consultancy Board strengthens the bond between the department and industry while improving the value of the degree programme to mould the proficiency of the future-graduates to fulfill the industrial requirements.

The strong affiliation between the department and industry is beneficial for the industry too. The department offers consultancy services for the industry through various industrial projects and researches to grant the industry with many valuable innovations and better solutions for the sustainable development of the industry and the country.

Mission

The Department of Chemical and Process Engineering will strive to educate, conduct research and offer consulting services with dedication, devotion and commitment and aim to be a place of excellence through internationally recognized programs for the benefit of the society

The DSI incubator provides proof for the strong bond between the department and the industry. The industry and academic institutes also provide the prospective students of Department of Chemical and Process Engineering with many academic awards and scholarship positions in recognition for their competencies.

The department not only encourages and promotes the students to associate with professional institutes and various societies and associations but also it encourages and facilitates many extra-curricular activities and sports activities, in order to enhance their knowledge and soft-skills as a prospective professional.

The time at the department under the wings of well-qualified and well-experienced academic staff, in a well-established and well-maintained stimulating environment is definitely a career developing and an exciting experience that every student should encompass.

The Department of Chemical and Process Engineering at University of Moratuwa is a blessing to every aspect as it always strives to deliver chemical and process engineering knowledge, skills and innovation for a sustainable tomorrow through education, research and consultancy services with dedication, devotion and commitment.

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'DEAR STUDENTS, WELCOME TO THE CPE FAMILY…'

"***As the Head of Department, I would like to take this opportunity to thank you for showing interest in the Department of Chemical Process Engineering (CPE) and welcome you to the Department."***

The Department of Chemical Engineering was first established by gazette notification on 15th February 1972 at Katubadda campus of University of Ceylon with only 8 students. The course was originally termed as Chemical Engineering and Fuel Science and a great support has been received from University of Leeds UK in the development stage of the degree programme. In 1998 major revision was done to the degree programme and name was changed as Chemical and Process Engineering.

Our main aim is to design processes that transform raw materials into useful and valuable products in a sustainable manner. Chemical and process engineers design/ operate chemical plant for manufacturing petroleum products, chemicals, pharmaceuticals, cement, fertilizers, cosmetics, food beverages, synthetic rubber, plastics, paints, detergents, pulp and paper or any processing products.

Department academic staff members are well qualified and consist of 23 full-time members including 1 senior professor, 6 professors and 8 senior lecturers. In addition, the department is supported by strong academic support and technical staff. Current student population in the department is around 400 including the postgraduate students.

Research is an important focus of activity and the Department has faculty who lead high quality research programmes in a wide spectrum of areas. Our Department has strong links with industry and is prepared to do collaborative research and development with them. Presently we have one of the oldest incubators for conducting product and process development for DSI Samson industries. Our alumni, around 1000, have rewarding careers in the chemical and process industries, Universities and research institutes in local as well as international organizations. Many of our most dedicated alumni made their way into outstanding leadership roles and many continue to support the Department in a variety of ways.

Historically our students have shown the excellence in sports and other extra-curricular activities. Chemical Engineering Student Society is the hub for the student activities in the department and numbers of annual events are organized by the DCPE students.

Finally, I would like to welcome you to the one of the most interesting specialization of Engineering, wishing you all the best for your future endeavors in the Department of Chemical and Process Engineering.

Professor Shantha Walpalage
Head of the Department

WHAT IS CHEMICAL AND PROCESS ENGINEERING?

Chemical and Process Engineering is the profession in which knowledge of Mathematics, Chemistry, Physics, Biology and other Natural Sciences gained by study, experience and practice is applied with judgment to develop economical ways of using materials and energy for the benefit of mankind.

More typically, they turn raw materials into valuable products. The necessary skills encompass all aspects of design, testing, scale-up, operation, control, and optimization. Hence this requires a detailed understanding of the various "unit operations", such as distillation, mixing, evaporation, crystallization and biological processes that make these conversions possible.

It's true that Chemical Engineers are comfortable with Chemistry, but they do much more with this knowledge than just mix and make chemicals. For each and every Chemical and Process Engineering affairs the knowledge of Mathematics, Physics, Chemistry and Biology are greatly utilizing, and these majors are the foundations for Chemical and Process Engineering upturns.

Resting on the above foundations the Chemical and Process Engineering sciences sprout higher and higher utilizing mass, momentum and energy transfers hand railing with Thermodynamics and Chemical Kinetics.

It would be correct to say that the term Chemical in Chemical and Process Engineering refers more towards the knowledge and experience in terms of the applied sciences whereas Process Engineering comprises of the designing, operating, maintaining and optimising of the processes that convert raw materials into finished goods.

The breadth of scientific and technical knowledge inherent in this profession has caused world scientists to describe the Chemical and Process Engineer as the "Universal Engineer".

WHY STUDY CHEMICAL AND PROCESS ENGINEERING?

You should consider a Chemical engineering degree if you want,

- **A "Career progression" along with a "Growing global profession"**
- **To make "Money" from your own passion of engineering, technological or management.**
- **To "Make a difference" not only on your economical, mental and career satisfaction but to satisfy the society's aspires and necessities**
- **A large manifold of "Occupations" with a "Diverse" professional experiences in a "Highly rated working environments"**
- **To "Travel the world" to "Express your lifestyle"**
- **To "Proof over recessions"**

CAREER OPPORTUNITIES FOR CHEMICAL AND PROCESS ENGINEERING GRADUATES

There are a countless number of industries where Chemical and Process Engineering is used in. As examples petroleum and petrochemical industries, mineral processing, advanced materials, food and beverage processing, pharmaceutical, biotechnological industries, polymer industries, ceramic industries, electronic base industries and much more. Chemical and Process engineering works hold in hands with fellow engineering disciplines such as mechanical, electrical and electronics, civil and material science.

The broad basis of their scientific, engineering, technological and management education upgrade the applications of the Chemical and Process Engineering skills in any other sister fields such as business, supply chain, process analysis, health and safety and etc. which are not seem like a trafficator of chemical and Process Engineering evolution.

Chemical Engineers might expect to work in,

- **Chemical, petroleum and petrochemical industries**
- **Power generation**
- **Steam engineering**
- **Environmental protection and Natural resource utilization**
- **Renewable energy engineering**
- **Food and beverage processing**
- **Biochemical and biomedical engineering**
- **Pharmaceutical industry**
- **Processing of electronic and photonic devices**
- **Polymer engineering**
- **Computer aided process control engineering**
- **Advanced materials manufacturing industries**
- **Ceramic industries**
- **Textile industries & etc.**

TESTIMONIALS

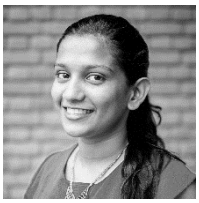
Bandara Dissanayake (2001/02 batch) Group Scientist at Procter & Gamble, Singapore

Accomplishing my childhood dream, I graduated from DCPE in 2005 as a Chemical Engineer. The depth and breadth of the curriculum helped me develop numerous skills and technical curiosity to explore untapped territories in Science and Technology. After gaining industrial and academic exposure, I moved to UK for my PhD in Chemical Engineering. After my post-doc, I joined P&G in Japan where I had the opportunity to apply all my expertise in unit operations and transport phenomena in developing manufacturing processes for cosmetics. After spending nearly a decade in Chemical Engineering as a student, Engineer and Scientist, I decided to learn something different.

I am now working as a lead Skin Scientist, leveraging image analytics and data science in redefining skin biology to develop new skin care solutions.

My passion has always been to learn and master - which led me to embark on an exciting career journey - at least- so far.

World is changing faster than ever so are the skills for future. My advice is to learn and excel in digital skills such as modelling and simulation, data science, coding to develop creative solutions to complex problems in the digital era. 'Follow your passion, embrace changes and never stop learnings'



Dinithi Warnasuriya (2012 batch) Management Trainee-Engineering, Fonterra Brands Lanka (Pvt) Ltd.

Having an ambition to establish a career in the Fast-Moving Consumer Goods (FMCG) industry, I entered University of Moratuwa with the target of graduating as a Chemical and Process Engineer. I was successful in achieving this target and I am now employed as a Management Trainee- Engineering.

The fundamentals of Chemical and Process Engineering are the concepts and applications involved in the transformation of the material and energy to useful applications. This is the "A,B,C" of the manufacturing industry which plays a significant role in the modernized world today, where everything we consume on a day to day basis, whether it's the processed food we consume or fuel that we pump to our vehicles, is a product of the mass scale manufacturing/ processing industry. Given the diversity and scale of the manufacturing industry in the modern era, the avenues that open to Chemical and Process Engineers, who are individuals with specialized knowledge, are many and vivid. The area of research is also an avenue for which Chemical and Process Engineers are high in demand today, with many companies in the manufacturing industry investing for development of processes which are eco-friendly and sustainable. A simple example is ongoing research in many parts of the world for more effective methods of waste water treatment and resource recovery from waste.

Likewise, there are many opportunities that one can pursue in the future career. My personal opinion is that, to pursue a career as a Chemical and Process Engineer, one must have a passion and a keen interest to explore on this field of specialization than a mere target of financial prospects. For a Chemical Engineer, especially in Sri Lanka, the financial benefits at the start of one's career may be very modest. The multiplication of such prospects depends on the enhancement of the level of experience and skill that is driven by one's passion to excel as a Chemical Engineer, which is a proven case for even our own senior graduates.

Sasika Gunasekara
(2007 batch)
Category Demand & Supply Planning Manager - Nestle Zone Asia Oceania & Africa (NDG)

The Chemical and Process Engineering programme at University of Moratuwa, was a turning point in my life. It provided me with not just technical skills but also the ability to think critically. The projects and activities helped me to think creatively to find new and efficient solutions to everyday problems, this way of thinking helped me to achieve accelerated growth in my corporate career. The time at university taught me also to respect everyone's way of thinking and how work can be done together while maintaining that respect. This especially helped me as Nestle is a global multinational, where success depends on the ability to satisfy the needs of everyone in every part of the world.

Gayathri Liyanage
(2008 batch)
Instructor, University of Moratuwa

The chemical and process engineering programme of university of Moratuwa, equipped me with knowledge and confidence to explore new horizons of academic and professional life. It is a very broad discipline which enables one to enter and sustain in numerous different fields. As for me, it opened doors for a career in product development in the apparel sector and then for an academic career with research opportunities in nanotechnology and sustainable energy generation. It also gave me the ability to work closely with international and government organizations related to environmental health and safety and sustainability, such as the Organization for the Prohibition of Chemical Weapons (OPCW)

The friendly and supportive environment of the department helped me immensely to enhance my interpersonal, communication and team working skills which later became very beneficial for my professional career. Further the entrepreneurial and business knowledge transferred through the academic programme prepared me to work and in a changing business environment. In conclusion, if someone is really in to the big picture and willing to take up challenges in many different fields, this engineering branch is for you!

Amali Vithanage
(2008 batch)
Product and Process Development Engineer, Phoenix Industries Ltd

Chemical and process engineering, as the name implies it is regarding converting of raw materials in to useful products. In other words, chemical engineer is the person who adds value to pristine raw material or a rubbish which is about to throw away, by following chemical and physical processes. It opens you the paths to food and bio stream, nanotechnology, polymer technology, environmental science, energy engineering, bio medical engineering and many more.

As a fresh graduate I joined Phoenix Industries Ltd which is known as the largest plastic manufacturer in Sri Lanka. It is the place where I played the role as a research and development engineer for more than 4 years. It was not an easy task to be in the first job for that long and I give the credit to my undergraduate life. It made me the person who is willing to accept any challenge and win it in my own way, most importantly how to become a dedicated and focused person on a certain goal until you get it.

It's not all about the academic stuff we learn at the university, but about the person we become after going through the degree program. The industry expects engineers who have the self-confidence, novel thinking, leadership and dynamic qualities when it comes to each and every simple task. Finally, when I look back in my past years I see a person who came to the CPE department as a normal student and came out as an engineer with added extraordinary value. So, I invite all of you to grab the opportunity at CPE department to become the dynamic, practical and most preferred engineer by the industry.

Dhanuka Anthony
(2011 batch)
Management Trainee-Operations Management, Stretchline Holdings, Indonesia

I currently work in the capacity of a Regional Management Trainee-Operation Management for Stretchline Holdings which is a part of the MAS group. I am currently based in Indonesia and will be transferred to the operations in China by the end of the year. Although I am technically not working along the traditional lines of what a Chemical & Process Engineering degree stipulates the amount of relevance is quite high. I was previously working at GSK also as a management trainee.

The best thing about the Chemical and Process Engineering at UOM is that the options it opens are limitless. You can find relevance to almost any industry in at least a few subject matters. This comes as a huge advantage when approaching the job market as it does not limit you to a small number of companies. Especially working in the manufacturing sector Unit Operations, Heat and Mass transfer etc. are subject matter that come in handy at any point in time. Apart from that soft skills improvement is definitely a big advantage in standing out in the job market.

THE JOURNEY OF DCPE

The Department of Chemical Engineering, being established by gazette notification on 15th February1972 at Katubedda Campus of University of Ceylon, had its roots in the Junior Technical Officer's course conducted by the Maradana Technical College. Initially the degree programme was termed as Chemical Engineering and Fuel Science offering the undergraduates with the degree of Bachelor of Applied Science (B. A. Sc.), which altered into Bachelor of Science of Engineering in 1980.

Being initiated with only 8 students per batch, at present the Department of Chemical and Process Engineering has been progressed to offer the students with the undergraduate degree programme in Chemical and Process Engineering for 90 students per batch of each intake to the University of Moratuwa.

Currently, the undergraduate course curriculum has expanded with several minor specialization fields for Environmental and Energy Engineering, Food and Biochemical Engineering, Polymer Engineering and Petrochemical Engineering in order to equip the students with necessary knowledge required for a prospective professional to understand and appreciate the role of a Chemical and Process Engineer in an economy for the sustainable growth.

The continuous growth of well-qualified human resource factor, well-structured course curriculum, well-equipped and well-functioning laboratory facilities, and other supporting resources ensures the improving standard of the internationally recognized programmes delivering best professionals.

The department is also improving the bond with the industry during its journey. The internships offered for the undergraduates, the huge career opportunities available for the fresh graduates, the abundance of resource persons for mentoring programmes, the facilitators for field visits, the established incubators at the department by the pillars in the industry, and the huge amount of consultancy services required from the department stand proof for the success of the department.

1972	▪ Establishment of the Department of Chemical Engineering at the Katubedda Campus of University of Ceylon ▪ Inauguration of the Department of Chemical Engineering under the Applied Science Faculty offering the Degree of Bachelor of Applied Science (B.A.Sc.) 8 students per batch only were offered with the Degree
1976	▪ Graduation of the 1st batch of students from the department
1981	▪ Introduction of the Bachelor of Science of Engineering (B.Sc. Eng.) Degree ▪ The students under E II category were given the opportunity to select Chemical, Material or Mining Engineering fields depending on their 1st year performance in which common subjects were offered to all Engineering disciplines
1986	▪ Introduction of M.Sc. course in Polymer Technology as a full-time course

1990	▪ Introduction of Polymer Engineering subject to the Chemical Engineering undergraduate curriculum for Final Part III
1991	▪ Increment of the student intake up to 15 students per batch ▪ Introduction of the subject 'Unit Operation' to the Part I Chemical Engineering Curriculum
1992	▪ Inauguration of Chemical Engineering Society
1993	▪ Conducting the three-day open day programme "Making the future happen" at department premises and the first issue of 'Chemunique' magazine ▪ Conversion of the fulltime M. Sc. Course in Polymer Technology to a part time course
1994	▪ Introduction of the optional subjects Environmental Engineering, Biochemical Engineering and Food Process Engineering to the Chemical Engineering curriculum ▪ Increment of the student intake up to 20 students per batch
1998	▪ Alteration of the title of the Chemical Engineering Department to Department of Chemical and Process Engineering
1999	▪ Increment of the student intake up to 30 students per batch
2000	▪ Initiation of student intake under a common 'Engineering' category Eliminating the E II stream ▪ Conversion of the course curriculum to semester system from session examinations systems ▪ Offering of specialization in the field of Chemical and Process Engineering for chosen undergraduates by their Level I academic performance ▪ Introduction of four fields of minor specialization (presently known as 'focus areas') namely, Food & Biochemical Engineering, Environmental Engineering, Energy Engineering and Polymer Engineering ▪ Increment of the student intake up to 50 students per batch
2001	▪ Initiation of Masters programme in Chemical and Process Engineering with a first batch of 09 students
2004	▪ Inauguration of Chemical Engineering Student Society (ChESS) ▪ Revision of the course curriculum
2005	▪ Re-establishment of the Prof. Hubert Silva Memorial Resource Centre ▪ Received the IRQUE fund ▪ Agreement with Hayleys Group to sponsor the annual Gold medal for the best Chemical and Process Engineering Student
2006	▪ Foundation stone was laid for the new Chemical Engineering Centre ▪ Obtaining new equipment under IRQUE grants
2007	▪ Initiation of Masters programme in Chemical and Process Engineering with a first batch of 12 students in collaboration with Telemark University College, Norway ▪ Initiation of offering of M.Sc. scholarships for Chemical & Process Engineering students

2008	▪ Graduation of first Ph.D. holder ▪ Signing of agreements with NCPC & Cargills ▪ Declaring of Opening of Chemical and Process Engineering Centre ▪ Inauguration of Scholarships Programme in Chemical and Process Engineering for students who have economic difficulties
2009	▪ Establishment of first food and process development incubator in Sri Lanka ▪ Establishment of a partnership with Polipto Company – petrol from waste plastics
2010	▪ Increment of the student intake further up to 80 students per batch ▪ Chosen undergraduates were offered with field specialization in Chemical and Process Engineering from Semester II onwards ▪ Combination of minor specializations of Energy Engineering and Environmental Engineering reducing the minor specializations down to three ▪ Received accreditation by the IChemE for the undergraduate degree programme ▪ Received accreditation by the IESL for the undergraduate degree programme
2011	▪ Establishment of SIL-UOM Rubber Products and Process Development Incubator at the Department
2014	▪ Initial student credit transfer program with 5 undergraduate students from Telemark University College, Norway
2017	▪ Introduction of Petroleum Engineering focus area
2018	▪ Signed an MoU with East China University of Science and Technology to boost the academic collaborations between two institutions

ACADEMIC STAFF MEMBERS

The well-qualified and dynamic group of academic staff of the department is the foremost treasure of the department who builds the professionals from the undergraduate's ready for challenges beyond university life. They provide the students with theoretical, technological and industrial strengths supporting the students' outlook towards industry. The academic staff members of the Department of Chemical and Process Engineering always strive to develop the department as a place of excellence for the students.

Having a high recognition among the academic community for their contributions towards the betterment of the field, as educators of the chemical and process engineering discipline, the staff members are easily approachable and are ever willing to address student issues, whatever they may be.

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UNDERGRADUATE DEGREE PROGRAM

Graduate Program Outcomes Profile

1. **Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to solve complex engineering problems.

2. **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

3. **Design/ development of solutions:** Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. **Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. **Modern Tool Usage:** Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.

6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. **Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broad context of technological change.

Program Educational Objectives

1. To produce graduates who pursue challenging careers, with skills to analyze and provide solutions in energy, environmental, food, polymer and other related industries and emerging areas with an appreciation of the role of Chemical Engineering in the society.
2. To produce graduates who pursue advanced studies in Chemical Engineering and related disciplines.
3. To create engineering leaders with a global focus, displaying entrepreneurship skills.

Students are selected to follow the B.Sc. in Chemical and Process Engineering (CPE) course based on their performance in semester I examination and their individual preferences. Until 2009, student intake was restricted to 50, which has been increased to 80 in 2010. This was further expanded to 90 in 2013. Currently the department of Chemical and Process Engineering offers four minor specialization streams after completion of their sixth semester, namely;

- Energy and Environmental Engineering
- Food and Biochemical Engineering
- Polymer Engineering
- Petroleum Engineering

Students have the option of following the Chemical and Process Engineering degree program by selecting subjects without any minor stream specialization.

The Department degree program is regularly being revised and renovated under collaborative effort by the academic and industrial personal with the objective of creating highly skilled graduates who meet the needs and demands in both the industry and the academia. Students have the liberty of approaching the department professionals at any time for acquiring necessary knowledge and skills during their stay in the department.

Graduation Credit Requirement

Semester	GPA Credits Normal	Non-GPA Credits
Semester 1	15	1
Semester 2	21.5	-
Semester 3	18.5	-
Semester 4	21	-
Semester 5	19	-
Industrial Training	-	6
Semester 6	5	5
Semester 7	18	-
Semester 8	17	1

Normal Minimum Credit Requirement

* A minimum total of 150 credits should be completed while completing the following minimum requirements

Overall GPA credits	135
Overall Non-GPA credits	13

Semester Coordinators

Academic level	Coordinator
Semester 1 (Dept. Coordinator)	Dr. (Mrs.) H. L. T. U. Ariyadasa
Semester 2	Prof. A.D.U.S. Amarasinghe
Semester 3	Dr. (Ms.) M.Y. Gunasekera
Semester 4	Prof. P.G. Rathnasiri
Semester 5	Dr. (Mrs.) D. S. Gunarathne
Industrial Training	Dr. H. H. M. P. Rathnayake
Semester 6	Dr. (Mrs.) O. Gunapala
Semester 7	Dr. S.A.D.T. Subasinghe
Semester 8	Dr. M. Narayana

Teaching and Learning

The knowledge is transferred to the students through a range of learning and teaching activities to fulfil the course objectives. Clearly defined assessment methods are used to measure student's success in meeting course objectives. Course outline consisting Subject Coordinator, Lecturers, Pre-requisites, Course Objective, Learning Outcome, Tentative Course Outline, Method of Grading, Recommended Text Books and Selected References for each module is distributed for students at the first lecture of the module.

With the recently established outcome based education system (OBE), traditional lecture based teaching and learning system have been diverted to a more student-centred system. Modules are taught through a combination of lectures, practical classes, tutorials, discussions, question and answer sessions, quizzes and take-home assignments. These methods are clearly defined for each module with the learning outcomes of the individual subjects and have been modified such that the student is in an active learning process with more classroom interactions. Subject specific theories, fundamentals and concepts are delivered through lectures, aided by one or combination of; black/white board, overhead projector, multimedia, printed lecture notes and many other learning activities. Students learn by listening, seeing, taking down notes and by discussion. Lecture notes and additional resources are uploaded in Learning Management System (LMS), which is the latest IT based learning environment in University of Moratuwa. Students can access LMS through the following web address.

URL: www.online.mrt.ac.lk

Practical classes carried out in groups, 2-5 students per group, under the guidance of a lecturer and/or an instructor to develop data recording, calculation, analysis and interpretation skills. Tutorials encourage student centred learning towards application of theories to solve chemical engineering problems. Model answers for the tutorials are provided for self-learning.

Assignments, case studies and literature surveys develop a range of skills such as information gathering, identifying lessons and time management. Group or individual activities are introduced to enhance the student interaction with the classroom while maintaining a lively learning process. Group or individual presentations at the end of selected assignments are a means of developing presentation skills from the lecturer's and the colleagues' feedback.

Industrial visits are arranged to enunciate the practical applications of theories that are taught during the degree program.

The engineering product design experience is a vital element in engineering education. Students are encouraged to develop a prototype of the designed product, enhancing group learning and innovation. Final year design project allows students to apply their gathered knowledge during first three years in the university to conceptually design a process plant. The final year comprehensive design project consists of a common component where a group of students work on the literature survey, process development and the material and energy balance of an industrial scale plant and an individual component where each student does the detailed design of a major unit in the process.

Six months industrial training period at the end Semester 5 enables students to experience in-plant work in an area of their preference within the CPE programme. The students develop management skills in addition to the chemical engineering disciplines. Continuous assessment of the training progress is done under the guidance of the Director of the Department of Industrial Training. A student guide for training and training report preparation is available for the student. An E-portal containing information for students which can be accessed through Departmental intranet is in operation. This facility is expected to enhance student's self-learning abilities.

Examination and Assessment Strategy:

The performance of each student is evaluated solely by either continuous assessments (CA) or a combination of continuous assessments and end of semester examinations (WE).

Continuous Assessments Includes:

- Course work
- Assignments
- Quizzes
- Viva
- Mid-Semester exams
- Presentations and
- Reports.

All candidates should obtain at least 35% from each of CA and WE components to pass a module. This is a University requirement applicable for all modules. The completed assignments must be submitted to the lecturer on the dates of submission as detailed in the assignments. Late submissions will be compensated with reduction of marks.

Students having prolonged illnesses may provide medical reports through the Medical Officer of the university or an equally qualified doctor. Arrangements can be made through negotiation with the lecturer in person to submit assignments. Students having disabilities are encouraged to discuss with the semester coordinates and subject coordinators to make necessary arrangements.

Industrial Training is coordinated and assessed jointly by the DCPE, Industrial training division of UOM and NAITA. The students are partly assessed while undergoing training and any improvement needed to obtain a better training is encouraged at this instance. The student is assessed based on the report submitted at the end, the diary maintained during the training period and a viva assessment.

The final year Comprehensive Design Project is assessed by the interim reports, final report, presentations and viva voce examinations.

The marks are displayed on the notice board and the students are given a chance to apply for re-correction. The re-correction application is also allowed for continuous assessment results displayed on the notice board before the end of the semester.

Depending on the credits earned by the student for each module, an Overall Grade Point Average (GPA) is calculated. Each student is awarded a class at the completion of all the graduation requirements within five academic years. A documentation manual consists of curriculum and syllabi, assessment methods and other relevant information on UG programme is available in the Department.

Curriculum

The following description is followed.

C - Core Modules
E - Elective Modules
O - Optional Modules*

**Total of 2 credits to be taken from optional modules in any semester*

Module Code	Module Name	Category	Lectures hrs/week	Lab/ Assignments hrs/weeks	Credits		Norm		Evaluation	
					GPA	NGPA	GPA	NGPA	CA%	WE%
Semester 1										
MA1013	Mathematics	C	3.0	1/1	3.0	-	15.0	1.0	20	80
CS1032	Programming Fundamentals	C	2.0	3/1	3.0	-			20	80
ME1032	Mechanics	C	2.0	3/4	2.0	-			20	80
MT1022	Properties of Materials	C	2.0	3/4	2.0	-			20	80
CE1022	Fluid Mechanics	C	2.0	3/4	2.0	-			20	80
EE1012	Electrical Engineering	C	2.0	3/4	2.0	-			20	80
EL1012	Language Skill Enhancement I	C	-	3/1	1.0	-			20	80
MN1012	Engineering in Context	C	1.0	-	-	1.0			30	70
Total for Semester 1							**15.0**	**1.0**		
Semester 2										
CH1070	Chemistry for Engineers	C	2.0	3/2	2.5	-	19.5	-	30	70
CH1060	Process Engineering Fundamentals	C	2.0	3/1	3.0	-			40	60
CH1050	Fundamentals of Engineering Thermodynamics	C	2.0	3/2	2.5	-			30	70
MT2802	Material Science	C	2.0	3/2	2.5	-			30	70
ME1090	Engineering Drawing & Computer Aided Modelling	C	2.0	3/1	3.0	-			100	-
MA1023	Methods of Mathematics	C	3.0	1/1	3.0	-			30	70
EN1802	Basic Electronics	C	2.0	3/4	2.0	-			30	70
EL1022	Language Skill Enhancement II	C	-	3/1	1.0	-			30	70
DE2xxx	Humanities Elective I	E	-	-	2.0	-	2.0	-		
MN1030	Entrepreneurship Skill Development (continuing)	O	0.5	3/2	-	1.0	-	-	70	30
Total for Semester 2							**21.5**	**0.0**		

Module Code	Module Name	Category	Lectures hrs/week	Lab/ Assignments hrs/weeks	Credits		Norm		Evaluation	
					GPA	NGPA	GPA	NGPA	CA%	WE%
Semester 3										
CH2100	Fluid Dynamics	C	3.0	3/2	3.5	-	18.5	-	40	60
CH2090	Chemical Kinetics and Thermodynamics	C	3.0	3/2	3.5	-			30	70
CH2120	Biological Science Fundamentals	C	2.0	3/2	2.5	-			30	70
CH2130	Polymer Science and Technology	C	2.0	3/2	2.5	-			30	70
CH2140	Environmental Science and Technology	C	2.0	3/2	2.5	-			30	70
MA2013	Differential Equations	C	2.0	-	2.0	-			30	70
MA2023	Calculus	C	2.0	-	2.0	-			30	70
MN1030	Entrepreneurship Skill Development (continuing from S2)	O	0.5	3/2	-	1.0	-	-	70	30
Total for Semester 3							**18.5**	**0.0**		
Semester 4										
CH2024	Unit Operations I	C	3.0	3/1	4.0	-	19.0	-	40	60
CH2150	Particle Technology	C	3.0	3/2	3.5	-			40	60
CH2014	Heat and Mass Transfer	C	3.0	3/1	4.0	-			40	60
CH2110	Fuel Science and Combustion Technology	C	3.0	3/2	3.5	-			40	60
MA2033	Linear Algebra	C	2.0	-	2.0	-			30	70
MA3023	Numerical Methods	C	2.0	-	2.0	-			30	70
DE2XXX	Humanities Elective II	E	-	-	2.0	-	2.0	-		
MN 2010	Entrepreneurial Leadership	O	1.5	3/2	2.0	-	-	-	50	50
Total for Semester 4							**21.0**	**0.0**		

Module Code	Module Name	Category	Lectures hrs/week	Lab/ Assignments hrs/weeks	Credits		Norm		Evaluation	
					GPA	NGPA	GPA	NGPA	CA%	WE%
Semester 5										
CH3143	Reactor Engineering	C	3.0	3/2	3.5	-	19.0	-	40	60
CH3060	Plant and Equipment Design I	C	4.0	3/2	4.5	-			40	60
CH3054	Energy Efficiency and Conservation	C	2.0	3/2	2.5	-			40	60
CH3044	Plant Safety and Loss Prevention	C	2.0	3/2	2.5	-			40	60
MN3052	Industrial Management & Marketing	C	2.5	3/2	3.0	-			30	70
MN3042	Business Economics & Financial Accounting	C	3.0	-	3.0	-			30	70
MA3013	Applied Statistics	O	2.0	-	2.0	-	-	-	30	70
MN3010	Multidisciplinary Design, Innovation and Venture Creation	O	1.5	3/2	2.0	-			50	50
Total for Semester 5							**19.0**	**0.0**		
Industrial Training										
CH3993	Industrial Training	C	-	-	-	6.0	-	6.0		
Total for Industrial Training								**6.0**		
Semester 6										
CH3070	Plant and Equipment Design II	C	1.0	3/1	2.0	-	5.0	-	40	60
CH3080	Computer Aided Chemical Engineering	C	1.0	6/1	3.0	-			100	-
CH3950	Technical Report Writing and Presentation Skills	C	1.0	6/1	-	3.0	-	5.0	100	-
CH3900	Research Methodology	C	1.0	3/1	-	2.0			100	-
Total for Semester 6							**5.0**	**5.0**		

Module Code	Module Name	Category	Lectures hrs/week	Lab/ Assignments hrs/weeks	Credits		Norm		Evaluation	
					GPA	NGPA	GPA	NGPA	CA%	WE%
Semester 7										
CH4015	Comprehensive Design Project I	C	1.0	12/1	5.0	-	14.0	-	100	-
CH4025	Process Modelling & Simulation	C	2.0	3/1	3.0	-			40	60
CH4050	Unit Operations II	C	3.0	3/1	4.0	-			40	60
MN4022	Engineering Economics	C	2.0	-	2.0	-			30	70
CH4214	Environmental Engineering and Management	E	3.0	3/1	4.0	-	4.0	-	40	60
CH4224	Food and Bio Processing	E	3.0	3/1	4.0	-			40	60
CH4234	Polymer Processing Operations	E	3.0	3/1	4.0	-			40	60
ER4810	Petroleum Geology	E	1.5	3/2	2.0	-			30	70
CH4350	Upstream Processing of Crude Petroleum	E	1.5	3/2	2.0	-			30	70
CH4330	Process Design and Integration	E	3.0	3/1	4.0	-			40	60
CH4730	Research Project (continued in S8)	O	-	6/1	-	-	-	-	-	-
MN4062	Organization Behaviour & Management	O	2.0	-	2.0	-			30	70
MA4023	Operational Research	O	3.0	-	3.0	-			30	70
MN4030	Strategic Enterprise Management	O	1.5	3/2	2.0	-			40	60
MN3020	Entrepreneurship Business Basics	O	2.0	3/1	3.0	-			50	50
MN 4150	Project Management	O	2.0	-	2.0	-			50	50
Total for Semester 7							**18.0**	**0.0**		

Module Code	Module Name	Category	Lectures hrs/week	Lab/ Assignments hrs/weeks	Credits		Norm		Evaluation	
					GPA	NGPA	GPA	NGPA	CA%	WE%
Semester 8										
CH4034	Comprehensive Design Project II	C	1.0	12/1	5.0	-	9.0	-	100	-
CH4044	Process Dynamics and Control	C	3.0	3/1	4.0	-			40	60
MN4900	Professional Ethics	C	1.0		-	1.0	-	1.0	100	-
CH4244	Clean Technology	E	3.0	3/1	4.0	-	8.0	-	40	60
CH4254	Renewable Energy Engineering	E	3.0	3/1	4.0	-			40	60
CH4264	Polymer Engineering and Mould Design	E	3.0	3/1	4.0	-			40	60
CH4274	Design of Polymer Products	E	3.0	3/1	4.0	-			40	60
CH4284	Food Engineering and Hygienic Plant Design	E	3.0	3/1	4.0	-			40	60
CH4390	Biochemical Engineering	E	3.0	3/1	4.0	-			40	60
CH4340	Natural Resource Process Engineering	E	3.0	3/1	4.0	-			40	60
CH4360	Downstream Processing of Oil, Gas & Petrochemicals	E	3.0	3/1	4.0	-			30	70
CH4370	Petroleum Process Operations, Economics, and Law	E	3.0	3/1	4.0	-			30	70
CH4730	Research Project (continuing from S7)	O	-	6/1	2.0	-	-	-	100	-
MN4122	Human Resource Management and Industrial Relations	O	2.0	-	2.0	-			30	70
MN4042	Technology Management	O	2.0	-	2.0	-			30	70
MN4112	Production and Operations Management	O	2.0	-	2.0	-			30	70
MN4072	Small Business Management & Entrepreneurship	O	2.0	-	2.0	-			30	70
MN4170	Global Entrepreneurship	O	1.5	3/2	2.0	-			40	60
MN4010	Business Plan Development	O	1.5	3/2	2.0	-			70	30
MA4013	Linear Models and Multivariate Statistics	O	3.0	-	3.0	-			30	70
MN4800	Supply Chain Management	O	2.0	-	2.0	-			40	60
Total for Semester 8							**17.0**	**1.0**		
To be taken from Optional Modules (Any Semester)							**2.0**			
Minimum Requirement for Graduation (Total of 150 credits)							**135.0**	**13.0**		

Requirements for Focus Area

Focus Area	Subject Code	Name	Credits
Energy and Environmental Engineering	CH4214	Environmental Engineering and Management	4
	CH4244	Clean Technology	4
	CH4254	Renewable Energy Engineering	4
Food and Biochemical Engineering	CH4224	Food and Bio Processing	4
	CH4284	Food Engineering and Hygienic Plant Design	4
	CH4390	Biochemical Engineering	4
Polymer Engineering	CH4234	Polymer Processing Operations	4
	CH4264	Polymer Engineering and Mould Design	4
	CH4274	Design of Polymer Products	4
Petroleum Engineering	ER4810	Petroleum Geology	2
	CH4350	Upstream Processing of Crude Petroleum	2
	CH4360	Downstream Processing of Oil, Gas & Petrochemicals	4
	CH4370	Petroleum Process Operations, Economics, and Law	4

Requirements for Entrepreneurship Minor

Students following the Chemical and Process Engineering program can obtain a minor in entrepreneurship by fulfilling following subject requirements.

Module Code	Module Name	Category	Lectures hrs./week	Lab/ Assignments hrs./weeks	Credits		Norm		Evaluation (%)	
					GPA	NGPA	GPA	NGPA	CA%	WE%
MN1030	Entrepreneurship Skill Development	C	1.0	3/1	-	2.0		2.0	70	30
MN2010	Entrepreneurial Leadership	C	1.5	3/2	2.0	-	2.0	-	50	50
MN3010	Multidisciplinary Design, Innovation and Venture creation	C	1.5	3/2	2.0	-	2.0	-	50	50
MN3020	Entrepreneurship Business Basics	C	2.0	3/1	3.0	-	3.0	-	50	50
MN4010	Business Plan Development	C	1.5	3/2	2.0	-	2.0	-	70	30
MN4022	Engineering economics	E	2.0	-	2.0	-		-	30	70
MN4030	Strategic Enterprise Management	E	1.5	3/2	2.0	-	2.0	-	40	60
MN4042	Technology Management	E	2.0	-	2.0	-		-	30	70
MN4112	Production and Operations Management	E	2.0	-	2.0	-		-	30	70
MN4170	Global Entrepreneurship	E	1.5	3/2	2.0	-		-	40	60

Modules Offered to Other Fields of Specialization

Module Code	Module Name	Category	Lectures hrs./week	Lab/ Assignments hrs./weeks	Credits		Evaluation (%)	
					GPA	NGPA	CA%	WE%
Semester 4								
CH2803	Process Engineering	E	1.5	3/2	2.0	-	30	70
Semester 8								
CH4350	Petroleum Refining and Petrochemical Industry	E	1.5	3/2	2.0	-	30	70

Modules

Semester II

<table>
<tr><td>Module Code</td><td>CH1070</td><td>Module Title</td><td colspan="4">Chemistry for Engineers</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 - Identify fundamentals of chemistry including atomic structure, chemical bonding and chemical& physical properties of substance
• LO2 - Describe principles of electrochemistry to evaluate the interaction between electrical energy and chemical charge
• LO3 - Describe concepts of organic chemistry to identify different organic reaction mechanisms
• LO4 - Describe principles of natural product chemistry for manufacturing key industrial chemicals
• LO5 - Apply analytical chemistry knowledge in chemical compounds' quantitative analysis
• LO6 - Identify properties of solutions and calculate the solubility product constant
• LO7 - Apply fundamentals of chemical equilibria for predicting the spontaneity of reactions</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Atomic Structure and Chemical bonding: Atomic structure, Chemical Structure, Shapes of molecules
• Properties of Solids and Liquids: Intermolecular and intra-molecular interactions, Physical Properties
• Properties of Gases: Gas laws, Ideal gas equations, Gas mixtures and partial pressures, Kinetic molecular theory, Molecular effusion and diffusion, Real gases
• Phase Equilibria: Definitions of phase, Component and degrees of freedom, Phase rule and its Derivations, Definition of phase diagram, Phase equilibria for one component system Liquid vapor equilibrium for two component systems, Three component systems
• Properties of Solutions: Factors affecting solubility, solubility constant
• Chemical Equilibria: Criteria of thermodynamic equilibrium, Exoergic and endoergic reactions, Equilibrium constants and their quantitative dependence on temperature, Pressure and concentration, Free energy of mixing and spontaneity, Relations of various equilibrium constants
• Acid base Equilibria: Strengths of acids and bases, Ionization of weak acids and bases, Ionization constants, Ionic product of water
• Electrochemistry: Quantitative aspects of Faraday's laws of electrolysis, Rules of oxidation/reduction of ions based on half-cell potentials, Chemical cells, Nernst equation; Standard electrode potential
• Applied Organic Chemistry and Reaction Mechanisms: Organic Compounds, Types of organic reactions and their mechanisms, The use of organic reaction mechanisms in industrial applications
• Analytical Chemistry: Quantitative and qualitative analysis, Sampling, Sample preparation and choice of analytical method, Chromatographic techniques; GC, HPLC, Spectrometric methods; IR, UV/visible
• Natural Products and Industrial Applications: Classification of natural products on the basis of chemical structure and their applications</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH1060</td><td>Module Title</td><td colspan="4">Process Engineering Fundamentals</td></tr>
<tr><td>Credits</td><td>3.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 - Select unit operations necessary for a given process
• LO2 - Identify resources required for a process based on internal and external constraints
• LO3 - Select the best solving method of material balance for a given subsystem
• LO4 - Estimate resource requirements and process parameters using material and energy balance
• LO5 - Explain the importance of the steps associated with the process scaling up applying to the chemical and process industry
• LO6 - Choose the appropriate utility type for a given process.
• LO7 - Develop a process flow sheet</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to Process Engineering
• Natural resources: Sources of materials; materials from geosphere, hydrosphere atmosphere and biosphere; Sources of energy- renewable and nonrenewable
• Process Development: Concept of process development, design constraints, steps involved in process design
• Unit Operations: Definitions and applications of different unit operations
• Flow sheeting: types of diagrams, instrument identification
• Material Balance: Balances for non-reacting systems and reacting systems with single and multiple reactions
• Energy Balance: Balances for non-reacting systems and reacting systems with single and multiple reactions
• Utilities and instrumentation: Steam production and distribution, types of boilers and steam traps, cooling water and tower, air compressors, positive displacement and dynamic pumps, types of valves, pipes and piping</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH1050</td><td>Module Title</td><td colspan="4">Fundamentals of Engineering Thermodynamics</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 - Describe first and second laws of Thermodynamics
• LO2 - Recognize connections between thermodynamics tools and process engineering
• LO3 - Explain the concept of thermodynamic process and describe the different types of processes
• LO4 - Estimate heat and work quantities and thermal efficiency and the difference between various forms of energy
• LO5 - Evaluate and distinguish thermal energy conversion in engineering cycles and devices
• LO6 - Apply thermodynamics for energy balance and designing of processes</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to Engineering Thermodynamics: The anatomy of thermodynamics, Thermodynamic equilibrium and equilibrium state, Reversible processes
• The First Law of Thermodynamics: Internal energy, Enthalpy, Heat capacity, Application of first law for open systems
• Behavior of Fluids: PVT behavior of fluids, Ideal gas, Compressibility factor
• The Second Law of Thermodynamics: Heat engines and Carnot cycle, Ideal gas Carnot cycle, Absolute temperature scale, Entropy function, Entropy and spontaneity of natural processes, Entropy change, Introduction to open systems, Applications of second law, The third law of thermodynamics
• The Thermodynamic Network: Free energy functions, Clausius inequality and the fundamental equation, Thermodynamic network, Measurable quantities, Calculation of Enthalpy (H) and Entropy (S) as functions of P and T
• Heat Effects: Computational path, Heat effect due to change of Temperature and Pressure, Heat effect due to change of Phase, Mixing heat effect, Enthalpy concentration diagrams, Heat of formation in solution
• Thermodynamics of Pure Substances: Phase diagram, Solid liquid equilibrium, Liquid vapor equilibrium, Thermodynamic property data,
• Refrigeration Cycle: Thermodynamic approach towards refrigeration</td></tr>
</table>

Semester III

Module Code	CH2120	Module Title	Biological Science Fundamentals			
Credits	2.5	Hours/Week	Lectures	2.0	Pre – requisites	None
GPA/NGPA	GPA		Lab/Assignments	3/2		

Learning Outcomes

After completing this module, the students should be able to;

- LO1 - *Describe* major areas and applications in biotechnology
- LO2 - *Describe* major metabolic pathways and identify the properties of macro/micro molecules in food chemistry
- LO3 - *Describe* main classification, structures and functions of microorganisms and their applications in biotechnology
- LO4 - *Describe* growth requirements and methods of measuring microbial growth
- LO5 - *Identify* basic techniques in microbiology/food chemistry
- LO6 - *Identify* microbial food spoilage methods and apply appropriate control techniques
- LO7 - *Describe* applications of microbes in process industries

Outline Syllabus

- **Introduction to Biotechnology:** Definitions, Major areas and Applications
- **Techniques in microbiology/food chemistry:** Sterile techniques, Culture media, Methods of obtaining pure cultures, Equipment and Instruments
- **Food chemistry and metabolic pathways**
  - Carbohydrates: Classification, Structure and Function of carbohydrates
  - Proteins: Classification, Structure and Function of proteins
  - Lipids: Classification, Structure and Function of lipids
  - Vitamins & Minerals: Classification, Structure and Functions
  - Enzymes: Classification, Structure, Mechanism of action
- **Microbial classification:** Naming and Classification of microorganisms
- **Structure of microorganisms I:** Characteristics and Structure of bacteria, Characteristics and Structure of fungi
- **Structure of microorganisms II:** General characteristics of virus, Viral structure, Viroid, Prions
- **Microbial growth**: Growth requirements, Bacterial division, Generation time, Phases of growth, Measurement of growth
- **Microbial food spoilage and control methods:** Factors influencing growth of microorganisms in food, Food borne diseases, Food preservation
- **Application of microbes in process industries I:** Fermentation technology, Industrial products- Vitamin production, Enzyme production, Food and beverage production, Antibiotics production, Organic acids production, Amino acids production, Production of single cell proteins
- **Application of microbes in process industries II:** Biosensors, Bioethanol, Biodiesel, Microbial fuel cells, Bioremediation, Soil microbiology and biogeochemical cycles, Bio pesticides, Biofertilizers, Biofilms, Bio- preservation, Bioterrorism, Bioleaching

<table>
<tr><td>Module Code</td><td>CH2130</td><td>Module Title</td><td colspan="4">Polymer Science and Technology</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Define the basic parameters of polymer science
• LO2 - Categorize polymers into elastomers thermoplastics, thermosets and further into types to homopolymers and copolymers
• LO3 - Describe a suitable polymerization mechanism for synthesis of a given polymer
• LO4 - Identify the most suitable polymer/s for a given application
• LO5 - Distinguish the type of latex using their characteristics
• LO6 - Match the product specifications by selecting correct loading of compounding ingredient/s
• LO7 - Prepare a rubber compound for a given formulation
• LO8 - Explain the importance of using polymer blends and composites over a single polymer for specific applications</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Classification of polymers
• Polymerization
• Coordination polymerization, ring opening polymerization, polymerization with special catalysts (metallocene)
• Polymerization processes
• Polymer Types
• General characteristics of polymers
• Degradation and stabilization of polymers
• Latex technology
• Structure and property relationships of rubbers
• Rubber Compounding
• Plastic technology
• Surface coatings and adhesives
• Polymer blends and composites</td></tr>
</table>

Module Code	CH2090	**Module Title**	Chemical Kinetics and Thermodynamics			
Credits	3.5	**Hours/Week**	**Lectures**	3.0	**Pre – requisites**	None
GPA/NGPA	GPA		**Lab/Assignments**	3/2		

Learning Outcomes

After completing this module, the students should be able to;

- LO1 - *Explain* basic principles of chemical thermodynamics and chemical processes
- LO2 - *Describe* and understand the chemical equilibrium
- LO3 - *Describe* and use the concepts of free energy and chemical potential
- LO4 - *Understand* the application of partial molar quantities
- LO5 - *Analyze* chemical equilibrium in ideal and non-ideal systems
- LO6 - *Apply* chemical engineering thermodynamics to chemical engineering unit operations

Outline Syllabus

- Introduction to Chemical Thermodynamics
- The First Law of Thermodynamics
- Thermodynamics Analysis of Process
- Principles of Phase Equilibrium
- Phase Equilibrium
- Properties of Solutions
- Fugacity
- Chemical Reaction Equilibrium

<table>
<tr><td>Module Code</td><td>CH2100</td><td>Module Title</td><td colspan="4">Fluid Dynamics</td></tr>
<tr><td>Credits</td><td>3.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 - Understand the general concepts of a fluid
• LO2 - Recognize different flow patterns
• LO3 - Explain the fundamentals of fluid flow, different systems of units, dimensional consistence, and hydrodynamic flow meters
• LO4 - Apply mass, momentum and energy balances
• LO5 - Analyze and solve problems in both compressible and incompressible fluid flow</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to Fluid Dynamics
• Mass, Energy, and Momentum Balances
• Fluid Friction in Pipes
• Flow in Chemical Engineering Equipment
• Boundary Layer Theory
• Turbulent Flow
• Introduction to CFD</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH2140</td><td>Module Title</td><td colspan="4">Environmental Science and Technology</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Identify how environment gets polluted.
• LO2 - Describe basic processes used in wastewater treatment and in air pollution control in the industry.
• LO3 - Describe basics of solid and hazardous waste management techniques
• LO4 - Identify role of authorities and the industry requirements with respect to discharge and emission of pollutants in Sri Lanka.
• LO5 - Apply the environmental monitoring systems to understand the environmental performance.
• LO6 - Analyze reasons behind environmental pollution related problems</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Water Pollution and Wastewater Characteristics
• Wastewater related environmental problems
• Introduction to wastewater treatment processes
• Air Pollution and Atmospheric Pollutants
• Air pollution related environmental problems
• Introduction to Air pollution control equipment
• Basics of Solid and hazardous waste management
• Environmental Monitoring
• National environmental protection regulations</td></tr>
</table>

Semester IV

<table>
<tr><td>Module Code</td><td>CH2014</td><td>Module Title</td><td colspan="4">Heat and Mass Transfer</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Recognize the heat and mass transfer related problems in the process industry
• LO2 - Describe basic principles of heat conduction, convection, radiation and heat transfer with phase change
• LO3 - Describe basic principles of mass transfer
• LO4 - Demonstrate the ability to design heat exchangers
• LO5 - Demonstrate the ability understand the concepts related to mass exchanger design
• LO6 - Apply mass conservation equation to analyze mass transfer problems
• LO7 - Analyze heat transfer problems using conservation equations</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Heat Conduction
• Steady State Heat Conduction
• Transient Heat Conduction
• Heat Convection
• Force Convection
• Natural Convection
• Heat Transfer with Phase Change
• Thermal Radiation
• Design of Heat Exchangers
• Mass Transfer
• Molecular Mass Transfer
• Convective Mass Transfer
• Design concepts of Mass Exchangers</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH2024</td><td>Module Title</td><td colspan="4">Unit Operations I</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Identify different methods of binary distillation.
• LO2 - Summarize basic principles of liquid-liquid extraction, leaching, modes of operation and selection of solvents.
• LO3 - Apply material and energy balance to binary distillation, absorption, stripping and extraction applications.
• LO4 - Select suitable equipment for mixing, determine power consumption and carry out scale up calculations.
• LO5 - Evaluate number of theoretical stages in binary distillation, adsorption, stripping and extraction.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction to Mass Transfer Operations – Vapor-liquid Equilibrium
• Introduction to Binary Distillation Methods
• Multistage Batch Distillation
• Continuous Distillation with Reflux
• Number of Theoretical Stages for Separation
• Advanced Binary Distillation
• Distillation Analysis by Non-Constant Molar Overflow Methods
• Introduction to Gas Absorption & Stripping
• Determination of Number of Ideal Stages
• Introduction to Solvent Extraction
• Liquid-Liquid Extraction
• Leaching (Solid-Liquid Extraction)
• Super Critical Extraction
• Classification of Mixing Operation
• Liquid Mixing Equipment
• Mechanically Agitated Vessels</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH2150</td><td>Module Title</td><td colspan="4">Particle Technology</td></tr>
<tr><td>Credits</td><td>3.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Derive governing equations for the motion of particle/s in a fluid.
• LO2 - Calculate and Analyze size, shape, size distribution of a particle system.
• LO3 - Develop equations to determine characteristics of fluid flow in packed beds and fluidized beds.
• LO4 - Design equipment for classification of particles, Solid/Liquid separation and gas cleaning through the knowledge of particle motion.
• LO5 - Describe fundamentals of Nano-technology and its applications.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Particle Dynamics
• Particle Statistics
• Flow of fluids through porous solid beds
• Fluidization
• Solid Liquid Separation
• Filtration
• Centrifugation
• Dust and Mist Separation from Gas Streams
• Nano Technology</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH2110</td><td>Module Title</td><td colspan="4">Fuel Science and Combustion Technology</td></tr>
<tr><td>Credits</td><td>3.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Select the required refining processes for specified fuel specifications
• LO2 - Analyze the quality of a given petroleum fraction
• LO3 - Describe basics and principles associated with nuclear energy in nuclear reactors
• LO4 - Identify suitable lubricant properties required for different lubrication application conditions
• LO5 - Identify characteristics of solid fuels
• LO6 - Apply combustion theories to calculate energy production by combustion of fuels in thermal energy producing units.
• LO7 - Design of burners and furnaces</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Properties of fuels
• Petroleum science
• Refinery processes
• Major refinery products
• Solid Fuels
• Nuclear Energy
• Lubrication
• Combustion</td></tr>
</table>

Semester V

<table>
<tr><td>Module Code</td><td>CH3054</td><td>Module Title</td><td colspan="4">Energy Efficiency and Conservation</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 - Evaluate energy projects in the process industry.
• LO2 - Describe methods of energy conversion in the process industry.
• LO3 - Analyze energy systems by performing energy audits.
• LO4 - Identify Energy losses in different energy systems.
• LO5 - Apply the energy recovery methods to maximize energy efficiency of a process.
• LO6 - Utilize the energy management practices in the process industry.
• LO7 - Derive Environment friendly and sustainable Energy approaches for processes.
• LO8 - Criticize on possible solutions to the existing energy crisis in a constructive way.
• LO9 - Calculate the energy efficiencies and parameters of Energy Systems by applying the governing equations for energy engineering, Thermodynamic principles and chemical aspects.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction – Energy Problem
• Economics of energy saving schemes
• Energy Conversion
• Energy Recovery
• Energy in buildings
• Combined Heat and Power
• Energy Management Practices</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH3044</td><td>Module Title</td><td colspan="4">Plant Safety and Loss Prevention</td></tr>
<tr><td>Credits</td><td>2.5</td><td rowspan="2">Hours/ Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre-requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Tutorials</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the student will be able to:
• LO1 - Describe the relationship between safety, health and environmental hazards associated with work
• LO2 - Describe basic principles related to occupational and process hazards
• LO3 - Discuss basics of safety in plant site layout, operation, maintenance and modification and basics of incident reporting, investigation and management.
• LO4 - Identify hazards in chemical and process industry.
• LO5 - Identify role of authorities and the industry requirements with respect to health and safety at work in Sri Lanka and basics of related international practices.
• LO6 - Apply appropriate technologies or measures to reduce occupational hazards and process hazards
• LO7 - Analyze hazards in chemical and process industry
• LO8 - Evaluate hazards in chemical and process industry</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to occupational hazards, work, health and productivity
• Toxicity and chemical safety
• Fire, Flammability and Explosion
• Personal protective equipment, Ergonomics, Industrial diseases
• Noise and ventilation, thermal radiation
• Basics of plant layout design for safety and inherent safety
• Safety in plant operation, maintenance and modification
• Identification and quantification of hazards in process plants
• SHE incident and near miss reporting, investigation and management
• Dispersion and distribution of accidental releases to atmosphere
• Legal background: Health and safety at work
• Precautionary principle, responsible care and human factors in safety</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH3143</td><td>Module Title</td><td colspan="4">Reactor Engineering</td></tr>
<tr><td>Credits</td><td>3.5</td><td rowspan="2">Hours/ Week</td><td>Lectures</td><td>3.0</td><td rowspan="2">Pre-requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Tutorials</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the student should be able to:

• LO1 – Discuss value addition to cheap raw materials by chemical reactions
• LO2 – Design batch reactors, plug flow reactors (PFRs), continuous stirred tank reactors (CSTRs) and catalytic reactors for the chemical industry.
• LO3 – Compare and select a suitable reactor or a system for an application or a condition
• LO4 – Analyze chemical reactor performance using the distribution of residence time
• LO5 – Analyze the importance of chemical reactions to mankind</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Mole balances: Batch reactors Continuous- flow reactors, Continuous stirred tank reactors, Tubular reactor, Industrial reactors
• Conversion and reactor sizing: Design equations, Batch systems, Flow systems, Reactors in series
• Rate laws and stoichiometry: The reactor rate constant, The reaction order,
• Constant-Volume reaction systems
• Isothermal reactor design
• Non-isothermal reactor design
• Catalysis and catalytic reactors: Catalysts, Surface reaction, Desorption, Diffusion
• Distributions of residence times for chemical reactors</td></tr>
</table>

Module Code	CH3060	Module Title	Plant and Equipment Design I			
Credits	4.5	Hours/ Week	Lectures	4.0	Pre-requisites	None
GPA/NGPA	GPA		Lab/Tutorials	3/2		

Learning Outcomes

After completing this module, the student should be able to:

- LO1 – *Gain* an understanding of Pressure Vessel Design philosophy
- LO2 – *Understand* ASME code and use its formulae for economical and safe design of pressure vessels and its components
- LO3 – *Learn* how to apply a membrane theory of thin shells of revolution for estimation of stresses in cylindrical, spherical and conical shells, flat covers, ellipsoidal, torispherical and toriconical end closures
- LO4 – *Estimate* the requirements for compensation in openings
- LO5 – *Select* the type of Supports for vertical and horizontal vessels, Design of base plate and support lugs, Evaluate anchor bolt requirements, and Design saddle supports
- LO6 – *Consider* Elastic buckling of long cylinders, buckling modes, Collapse of process vessels under external pressure, Design for stiffening rings
- LO7 – *Design* tall towers under combine load at high wind and seismic conditions
- LO8 – *Understand* the operational principals of common sensors design and recommend suitable instrumentation for measurement of required process parameters.

Outline Syllabus

- Classification of process equipment
- Structure of ASME Boiler and Pressure Vessel Codes
- Design preliminaries
- Membrane theory of thin shells of revolution under internal pressure
- Compensation for openings
- External pressure vessels
- Pressure vessels under combine load
- Design of skirt supports
- Design of lug supports
- Instruments and Instrumentation system
- Pressure sensors technology and Common pressure transducers
- Temperature scales and temperature measuring instruments
- Basics of flow measurement. differential pressure flow meters

Industrial Training

<table>
<tr><td>Module Code</td><td>CH3993</td><td>Module Title</td><td colspan="3">Industrial Training</td></tr>
<tr><td>Credits</td><td>6.0</td><td rowspan="2">Hours/Week</td><td rowspan="2">-</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>NGPA</td></tr>
<tr><td colspan="6"><u>Aim:</u>
To apply theoretical knowledge satisfactorily to industrial environment, improve practical skills and learn good practices in industry</td></tr>
<tr><td colspan="6"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Apply knowledge and principles of chemical and process engineering
• LO2 – Understand industrial systems, procedures, and practices. (i.e., administration, financial, general management, logistics, HSE, legal, etc.)
• LO3 – Design solutions for industrial/engineering problems in the industry using modern tools and techniques. (i.e., Instrumentation, IT tools, software platforms, knowledge-based data, experimental design, etc.)
• LO4 – Develop soft skills, such as teamwork, communication, time management, leadership, and understanding of professional ethics.</td></tr>
<tr><td colspan="6"><u>Outline syllabus</u>
1. Knowledge and principles of chemical and process engineering:
Process flow sheeting, process plant design/maintenance/troubleshooting, Energy efficiency and conservation, Health-Safety-Environmental aspects of chemical processes, Process instrumentation and software platforms/process control systems, Quality control/assurance and analytical testing for process development
2. Industrial systems, procedures, and practices:
Administration/financial/general management/logistics/HSE/legal practices in an industrial organization, Practices of professional ethics/personal relations, Organizational practices for process efficiency improvement</td></tr>
</table>

Semester VI

<table>
<tr><td>Module Code</td><td>CH3070</td><td>Module Title</td><td colspan="4">Plant and Equipment design II</td></tr>
<tr><td>Credits</td><td>2.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH3060</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Describe Piping Engineering Fundamentals
• LO2 – Use Piping code for economical and safe design of piping system and its components
• LO2 – Relate the knowledge in Principals of Fluid Dynamics and Thermodynamics for designing of turbines and compressors for transmission and power generation.
• LO4 – Recognize characteristics, capabilities and limitations of heat exchangers
• LO5 – Select suitable heat exchangers for specified applications
• LO6 – Design heat exchangers of improved quality and profitability operation</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Piping Engineering and role of Piping engineer in various field
• Turbo Machines
• Gas Turbine Compressors
• Heat Exchangers</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH3900</td><td>Module Title</td><td colspan="4">Research Methodology</td></tr>
<tr><td>Credits</td><td>2.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>NGPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Understand research experimentation and measurement systems
• LO2 – Use computerized Data-acquisition systems
• LO3 – Apply different sampling and statistical methods
• LO4 – Analyze and interpret data
• LO5 – Plan and document Experiments</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to research experimentation
• General characteristics of measurement systems
• Computerized Data-Acquisition systems
• Sampling methods and Statistical analysis of experimental data
• Guidelines for planning and documenting experiments</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH3080</td><td>Module Title</td><td colspan="4">Computer Aided Chemical Engineering</td></tr>
<tr><td>Credits</td><td>3.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>6/1</td></tr>
</table>

Learning Outcomes

After completing this module, the students should be able to;

- LO1 – *Identify* limitation of analytical methods for solving chemical and process engineering problems
- LO2 – *Recognize* potential of using numerical methods for chemical and process engineering applications
- LO3 – *Recognize* suitable software tools for chemical and process engineering applications
- LO4 – *Describe* the concept of numerical modeling
- LO5 – *Rearrange* a process model into a computer model
- LO6 – *Apply* software tools to analyze chemical and process engineering applications

Outline Syllabus

- **SCI LAB**
  Introduction to use open source software to solve Chemical Engineering problems. Introduction to SCILAB software and basic operations, Polynomials and Curve fitting, Solving of differential equations, Simulation tool box

- **ASPEN PLUS**
  Introduction to the software, Mass Balance on a mixing unit, Material Balance, Modeling and Simulation of a Distillation Column, Modeling and Simulation of a Reactor, Process Economic Analysis, Introduction to Aspen Plus Dynamics

Module Code	CH3950	Module Title	Technical Report Writing and Presentation Skills			
Credits	3.0	Hours/Week	Lectures	1	Pre – requisites	None
GPA/NGPA	NGPA		Lab/Assignments	6/1		

Learning Outcomes

After completing this module, the students should be able to;

- LO1 – *Describe* the mechanism of an operation / process
- LO2 – *Distinguish* on informal and formal report writing
- LO3 – *Develop* informal/ formal laboratory reports for an experiment/ research work
- LO4 – *Develop* feasibility reports based on the data available
- LO5 – *Develop* progress reports for a project describing its status
- LO6 – *Summarize* the content of a technical report to the audience

Outline Syllabus

- **Definition** - Synonym, formal definitions, classifying the item, differentiating the item
- **Describing Mechanisms** - Outline for description of a mechanism, definition and purpose, overall appearance, identification of main parts
- **Mechanisms in Operation** - Outline for describing a mechanism in operation, definition of function, explanation of operating principle
- **Describing Processes** - Outline for describing a process, description of sequences of action
- **Informal Reports and Memoranda** - Types of informal reports, informal recommendation reports
- **Formal Reports** - Outline and the structure of a formal report
- **Informal Laboratory Reports** - Outline and the structure of an informal laboratory report
- **Formal Laboratory Reports** - Outline and the structure of a formal laboratory report
- **Design Reports** - Design reports versus lab reports, design report outline
- **Technical Proposals** - Technical report structure
- **Feasibility Reports** - Selecting criteria, feasibility report structure, presenting and interpreting data
- **Progress Reports** - Progress report structure
- **Non – Technical Proposals** - Non – technical proposal structure
- **Non-Technical Reports** - Non – technical report structure
- **Oral Reports** - Oral and written reports

Semester VII

<table>
<tr><td>Module Code</td><td>CH4015</td><td>Module Title</td><td colspan="4">Comprehensive Design Project I</td></tr>
<tr><td>Credits</td><td>5.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>12/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 - Develop complex design problem-solving skills
• LO2 - Conduct a design project with a significant degree of engineering competence
• LO3 - Conduct a process feasibility study based on a project brief.
• LO4 - Apply mass balance, energy balance to a process plant and Prepare flow sheets and process flow diagram for the design
• LO5 - Develop technical report writing and presentation skills
• LO6 - Develop skills on working in design teams</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Feasibility study- Economic, risk, safety, health and environmental feasibilities of the selected design
• Site selection and Plant layout
• Material balance calculation for each unit and the complete plant
• Development of the Material flow sheet
• Energy balance calculation
• Development of Energy flow sheets</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4730</td><td>Module Title</td><td colspan="4">Research Project</td></tr>
<tr><td>Credits</td><td>2.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>-</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>6/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Review literature critically and identify research gaps/problem
• LO2 – Develop new experimental set ups/ models/strategies
• LO3 – Construct new ideas or approaches independently
• LO4 – Develop self-integrity under challenging environment
• LO5 – Analyze data obtained from experiment or modelling and drawn conclusions
• LO6 – Evaluate results in the context of related literature
• LO7 – Produce research findings as a published material</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Introduction to research methodologies
• Literature review
• Problem identification and finding alternative solutions
• Methodology development with developing an experimental rig, demonstration models and/ or mathematical models
• Results analysis</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4025</td><td>Module Title</td><td colspan="4">Process Modelling and Simulation</td></tr>
<tr><td>Credits</td><td>3.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>2.0</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Describe systems and models, main elements of dynamic modelling.
• LO2 – Identify process parameters to develop a mathematical model of a system.
• LO3 – Construct state space models and linearize non-linear systems.
• LO4 – Develop numerical models of a process and build up computer models for simulations by using computer aided tools (MATLAB/SIMULINK).
• LO5 – Evaluate dynamics of the systems and processes
• LO6 – Analyze and optimize processes by using simulation studies.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• System and Model
• Energy balance
• Spatial description and the mass balance
• Species and substances
• The momentum balances
• The energy balances
• Temperature profile from the energy balance
• Energy balance for a CSTR
• Energy balance for a gas storage and transportation.
• Comparison of energy forms
• Laplace transformation, Transfer function
• Solution of linear models
• Analysis of models
• Numerical methods</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4050</td><td>Module Title</td><td colspan="4">Unit Operations II</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2024</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Describe principles in Unit operations (multi-component distillation, humidification, crystallization, adsorption, evaporation and drying)
• LO2 – Select suitable mode of operation and equipment for a given separation process covered under the module
• LO3 – Apply material and energy balance to the process equipment
• LO4 – Analyze a given separation process and perform chemical engineering design calculations
• LO5 – Design tray and packed distillation columns and column internals</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Distillation: Multi-component Distillation Bubble point and dew point calculations of multi-component mixture, Multi-component flash Distillation., Column Distillation, Key components, Fenske equation, Underwood equation, Approximate short cut methods and exact calculation procedures, Design of tray and packed distillation columns and column internals.
• Evaporation: Single and Multiple effect evaporators, area calculations, Heat and mass balance, Evaporation equipment, Vapor recompression in multiple effect evaporators.

• Adsorption: Types of adsorbents, Adsorption equilibrium, modes of adsorption, single stage, cross flow, countercurrent and fixed adsorption unit design calculations, Breakthrough curves, adsorption regeneration

• Humidification Operations: Mechanism for Humidification operations, Simultaneous heat and mass transfer, Adiabatic and non-adiabatic operations. Equipment used for the operation and size calculations.

• Crystallization: Principles of crystallization, Nucleation, Kinetics of crystallization, Heat and mass balance, yield, equipment and design calculations

• Drying: Use of psychometric charts, Vapor - gas mixtures and their properties, Principles of drying, Rate of drying, critical moisture content and falling rate period Mechanism of drying processes, Heat and Mass transfer in drying processes, Batch and continuous drying, Equipment sizing and selection.</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4214</td><td>Module Title</td><td colspan="4">Environmental Engineering and Management</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2140</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Discuss environmental management systems
• LO2 – Describe international protocols related to global environmental problems
• LO3 – Apply environmental accounting in project analysis
• LO4 – Formulate solid and hazardous waste management strategies for given cases
• LO5 – Assess environmental impacts
• LO6 – Select suitable pollution control techniques for a pollution control system
• LO7 – Design environmental pollution control equipment to meet discharge standards</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Wastewater Engineering
• Air Pollution Control
• Solid Waste Management and Engineering
• Hazardous Waste Management
• History of Environmental Management and Development of Quality Management
• Greening of the supply chain
• Environmental impact assessment principles and process;
• Methods of assessing environmental impacts
• Basics of Environmental Accounting
• Environmental Management Systems
• International protocols related to global environmental problems</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4224</td><td>Module Title</td><td colspan="4">Food and Bio Processing</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2120</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Evaluate food processing techniques and preservation methods.
• LO2 – Calculate and Model temperature, time, nutrients level, microbial destruction in different thermal technologies.
• LO3 – Derive equations on microbial and enzyme kinetics
• LO4 – Design biological reactors and processes through the knowledge of microbial kinetics.
• LO5 – Describe the use and the applications of enzymes in the industry.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction to Food and Bio Processing
• Food Preservation and Shelf Life
• Thermal Processing of Food
• Thermal Process Calculations
• Thermal Process Methods
• Low Temperature Operations
• Food Packaging
• Introduction to Bioprocess Engineering
• Microbial Growth Kinetics
• Fermentation Systems
• Enzyme Kinetics
• Bio Hazards and Bio-safety</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4234</td><td>Module Title</td><td colspan="4">Polymer Processing Operations</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;
• LO1 – Identify and describe the polymer processing operations related to latex, rubber and plastic processing
• LO2 – Discuss the influence and importance of processing parameters on polymer operations
• LO3 – Apply rheological and heat transfer principles to optimize the polymer processing operations
• LO4 – Recognize the machineries used for polymer processing
• LO5 – Analyze products defects that can be appeared during respective polymer processing operations
• LO6 – Demonstrate the ability to select the most appropriate processing technique(s) for a newly design polymer product to manufacture</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Heat transfer ion polymer systems
• Rubber Processing Techniques - Mastication, mixing, cross-linking, forming/ shaping; extrusion, calendaring and moulding
• Determination of processing characteristic and rheological properties
• Plastic Processing Techniques- Moulding, Extrusion, Calendaring, Casting and forming
• Latex processing techniques- Dipping, Foaming, Casting and thread manufacturing Basic calculations of selected polymer processing equipment</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4350</td><td>Module Title</td><td colspan="4">Upstream Processing of Crude Petroleum</td></tr>
<tr><td>Credits</td><td>2.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1.5</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/2</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Explain Formation, Composition and Characterization of Crude Petroleum
• LO2 – Describe Separation of Product Fluids
• LO3 – Explain Treatment of Produced Fluids
• LO4 – Describe Field Processing and Treatment of Natural Gas</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
Analysis of Crude Petroleum
• Oil and Gas: From Formation to Production
• Composition and Characteristics of Crude Petroleum

Separation of Produced Fluids
• Two-Phase Gas–Oil Separation
• Three-Phase Oil–Water–Gas Separation

Treatment of Produced Fluids:
• Emulsion Treatment and Dehydration of Crude Oil
• Desalting of Crude Oil
• Crude Oil Stabilization and Sweetening
• Storage Tanks and Other Field Facilities
• Produced Water Treatment

Field Processing and Treatment of Natural Gas
• Overview of Gas Field Processing
• Sour Gas Treating
• Gas Dehydration
• Separation, and Fractionation of
• Natural Gas Liquids</td></tr>
</table>

Module Code	CH4330	Module Title	Process Design and Integration			
Credits	4.0	Hours/Week	Lectures	3	Pre – requisites	None
GPA/NGPA	GPA		Lab/Assignments	3/1		

Learning Outcomes

After completing this module, the students should be able to;

- LO1 –*Describe* and *Distinguish* process design methods.
- LO2 – *Conduct* process economics when selecting utilities and infrastructures.
- LO3 – *Apply* Pinch analysis to optimize heat recovery in a process.
- LO4 – *Evaluate* Utility Systems.
- LO5 – *Design* Heat Exchanger networks.
- LO6 – *Perform* pinch analysis for Reactors, Distillation Columns and Evaporators.
- LO7 – *Demonstrate* the ability to use software tools to design processes.

Outline Syllabus

- Introduction to Process Design and Integration
- Introduction to Pinch Analysis
- Pinch Analysis Calculations I
- Pinch Analysis Calculations II
- Pinch analysis and Heat recovery
- Heat Exchanger Network Design I
- Heat Exchanger Network Design II
- Heat Exchanger Network Design III
- Combined Heat and Power generations
- Heat Integration of reactors
- Heat Integration of Separators
- Process Economics
- Introduction to Simulation
- Tools for Process Design

Semester VIII

<table>
<tr><td>Module Code</td><td>CH4034</td><td>Module Title</td><td colspan="4">Comprehensive Design Project II</td></tr>
<tr><td>Credits</td><td>5.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>1</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH4015</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>12/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;
• LO1 – Appraise key decisions to be made and relevant assessment criteria for equipment selection
• LO2 – Design a selected process equipment in detail, including chemical, mechanical and operational aspects
• LO3 – Identify the type of material and method of fabrication suitable for the equipment
• LO4 – Select control schemes and instrumentation
• LO5 – Describe the startup, shut down, operational, and maintenance procedure
• LO6 – Analyze safety and economic aspects of the equipment
• LO7 – Develop technical report writing and drawing skills</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

Students will work individually to perform detail design of a selected process equipment in the plant studied under CH4015 module.
• Selection of appropriate equipment
• Revisit Mass Balance and Energy Balance
• Calculation of dimensions of the unit
• Mechanical design
• Selection of material
• Thickness calculation
• Internals, supports and others
• Description of fabrication
• Mechanical drawings
• Piping and Instrumentation
• Startup- Shut down
• Safety and Control
• Others- Economic aspects etc.</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4044</td><td>Module Title</td><td colspan="4">Process Dynamics and Control</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Describe the behavior of 1st, 2nd and higher order dynamical systems.
• LO2 – Analyze linear dynamical systems using mathematical tools such as Laplace transforms etc.
• LO3 – Set up simple feedback loops using PID controllers and development of control modules
• LO4 – Implement various PID tuning methods for controllers
• LO5 – Design and Develop feedback and feed-forward controllers and obtain a hands-on experience in doing this via simulation and experimentally on lab scale apparatus by using LabVIEW.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction to Process Dynamics & Control
• Dynamic Behavior and Linear State Space Models
• Transfer Functions and Empirical Models
• Introduction to Feedback Control
• PID Controller Tuning
• Auto-tuning Techniques
• Controller equipment
• Frequency-Response Analysis
• Various control methods and control structures
• Cascade and Feed-Forward Control
• Control-Loop Interaction
• Plant wide Control
• Fuzzy logic control system</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4244</td><td>Module Title</td><td colspan="4">Clean Technology</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Identify resource recovery techniques for waste
• LO2 – Describe recycling techniques
• LO3 – Apply source reduction, waste minimization, energy efficient improvements and process integration solutions for pollution prevention/ minimization in industry.
• LO4 – Apply clean technologies in the process industry.
• LO5 – Select environmentally friendly processes and technologies.
• LO6 – Analyze environmentally friendly product and process designs
• LO7 – Assess cleaner production in the process industry</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction to Clean Technology
• Energy Efficiency Improvements
• Introduction to the Concept of Cleaner Production
• Cleaner Production Assessment
• Eco design
• Source Reduction and Waste Minimization
• Resource recovery from waste; recycling techniques
• Process integration solutions for waste avoidance
• Life Cycle Assessment (LCA)
• Process and technology selection
• Carbon foot print and water foot print
• GHG emission reduction or removal enhancement
• Good manufacturing practices, Eco efficiency
• Clean Technology Case Studies</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4254</td><td>Module Title</td><td colspan="4">Renewable Energy Engineering</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Recognize renewable resources in Sri Lanka
• LO2 – Describe applications of renewable energy.
• LO3 – Demonstrate the ability to design renewable energy system for practical applications
• LO4 – Understand optimization of renewable energy utilizations with the available energy resources
• LO5 – Analyze viability of renewable energy systems
• LO6 – Design and implement of a renewable energy system</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction of Biomass and biofuels
• Power from the wind
• Solar Energy
• Hydro-power
• Energy systems, storage and transmission</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH 4264</td><td>Module Title</td><td colspan="4">Polymer Engineering & Mould Design</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2130</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Identify and describe the important engineering principles applicable to polymers.
• LO2 – Discuss the influence and importance of engineering properties on physical testing of polymers.
• LO3 – Apply knowledge gains on polymer engineering to optimize the manufacture of polymer products.
• LO4 – Recognize the software used for design and fabrication of moulds for polymer products
• LO5 – Demonstrate the ability to design simple mould/die to manufacture polymer product
• LO6 – Design a mould and die for a defined product</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Rubber-like elasticity
• Polymer Rheology
• Viscoelastic properties of polymers
• Facture Mechanics of polymers
• Design of moulds for polymer products
• Design of extruder dies
• Computer Aided Design Analysis and Fabrication of Moulds</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4274</td><td>Module Title</td><td colspan="4">Design of Polymer Products</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre - requisites</td><td rowspan="2">CH2130
CH4234</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>
After completing this module, the students should be able to;
• LO1 – Apply the knowledge on the various properties of polymers in selecting suitable polymers.
• LO2 – Analyze the processing characteristics and optimize the required properties for polymer products
• LO3 – Select the suitable processing conditions to manufacture defect-free products
• LO4 – Identify failure mechanisms of polymer products used under different service environments.
• LO5 – Describe assembly techniques required for designing and manufacturing of polymer products
• LO6 – Design of simple engineering polymer products</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>
• Basic design concepts
• Features and assemblies of commodity and engineering rubber products
• Modes of deformation
• Basic calculation on designing of simple engineering products
• Design of plastic products
• Determination of average molar mass and molar mass distribution
• Solution properties of polymers
• Analysis of polymers by chromatography and spectroscopy
• Mechanical properties of polymers
• Determination of thermal properties of polymers
• Processing characteristics of polymer
• Surface properties and morphology of polymer
• Determination of electrical properties of polymers</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4284</td><td>Module Title</td><td colspan="4">Food Engineering and Hygienic Plant Design</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2120
CH4224</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Demonstrate knowledge on common food processing and preservation techniques for safe and quality food production
• LO2 – Develop an awareness on the modern food chain (supply chain process, food legislation, and various tech-economic issues)
• LO3 – Develop simple understanding on nutrition and dietetics
• LO4 – Design plant and equipment which is in agreement with standards and guidelines for hygienic design
• LO5 – Apply hygienic standards in operations and maintenance</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Basic principles of human nutrition
• Food engineering operations
• Food plant operations and supply chain issues
• Future trends in food processing
• Hygienic practices
• Hygienic plant design
• Hygienic equipment design
• Verification and certification of hygienic food processing plants</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4390</td><td>Module Title</td><td colspan="4">Biochemical Engineering</td></tr>
<tr><td>Credits</td><td>4</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2120
CH4224</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1– Explain techniques used for generating genetically modified microorganisms to synthesize bio-based products
• LO2 – Evaluate different cell cultivation methods, bioreactors and modes of operation.
• LO3 – Estimate the sterilization requirement of media and equipment.
• LO4 – design suitable reactors for cell culture with mixing, determine power consumption, and carry out scale up calculations.
• LO5 – Select appropriate instrumentation and controls in cell culture
• LO6 – Evaluate separation techniques used in bio-industry</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Isolation of industrially important microorganisms
• Gene expression and protein synthesis in microorganisms
• Genetically modified/engineered micro organisms
• Industrial applications of genetically engineered organisms
• Medium Formulation, cell nutrients
• Stoichiometry of microbial growth and product formation
• Sterilization of fermentation media and air
• Sterilization kinetics
• Cell cultivation
• Bioreactors – modes of operation, types of reactors, design of agitated bioreactors, design of agitated bioreactors, measurements, instrumentation and control, aeration and agitation in bioreactors, scale-up criteria for bioreactors
• Recovery and purification of bio-products
• Fermentation economics</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4340</td><td>Module Title</td><td colspan="4">Natural Resource Process Engineering</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">None</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Understand the availability of natural resources for industrial use
• LO2 – Explain currently available processes to convert natural resources to value added products
• LO3 – Develop processes to add value to natural resources available in Sri Lanka
• LO4 – Develop Socio, Economic, Technical and Financial Evaluation of Industrial Processes
• LO5 – Identify safety, health and environmental aspects of industrial processes</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

• Introduction to natural resources
• Value added products
• Value addition processes
• Safety- Health and Environmental Impact
• Process feasibility
• Socio-economic impacts
• Value addition for waste by products</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4360</td><td>Module Title</td><td colspan="4">Downstream Processing of Oil, Gas & Petrochemicals</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH2110</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;
• LO1 – Select suitable hydrocarbon fuels for different applications
• LO2 – Describe functionalities of Production Processes and Technologies to produce hydrocarbon fuels based on their applications
• LO3 – Describe production routes &processes for the synthesis of petrochemicals and their derivatives.
• LO4 – Perform material and energy balance calculations for the production processes.</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

Idealization of Petroleum products
• Automotive Fuels - Volatilities, combustion characteristics
• Fuels for Power Generation - Combustion characteristics, handling properties
• Solvents – Volatilities, Characterization
• Lubrication Oils – Characterization and Applications
• Waxes and bitumen - Types properties and uses
Liquid Fuel Processing
• Petroleum Refining - Refinery Processes and Processing [Distillation – Atmospheric& vacuum, Thermal Processing, Catalytic Processing],
• Conditioning & Polishing Processes,
• Product Handling, Utilities Management,
• HSE Management Systems
Gaseous Fuel Processing
• Principles of Gas conditioning and Processing
• Transport Processes and Separation Process
• Cryogenic & Compression Operations in Gas Processing.
• Storage and Product Handling.
Petrochemical Processing
• Classes of Petrochemicals and their Production Processes
• Petrochemicals and their derivatives; Polymers, Base Chemicals and Fertilizers</td></tr>
</table>

<table>
<tr><td>Module Code</td><td>CH4370</td><td>Module Title</td><td colspan="4">Petroleum Process Operations, Economics, and Law</td></tr>
<tr><td>Credits</td><td>4.0</td><td rowspan="2">Hours/Week</td><td>Lectures</td><td>3</td><td rowspan="2">Pre – requisites</td><td rowspan="2">CH4193
CH3044</td></tr>
<tr><td>GPA/NGPA</td><td>GPA</td><td>Lab/Assignments</td><td>3/1</td></tr>
<tr><td colspan="7"><u>Learning Outcomes</u>

After completing this module, the students should be able to;

• LO1 – Evaluate current trends in oil and gas industry
• LO2 – Analyze economics of Petroleum Processing
• LO3 – Describe Laws pertaining to Petroleum Operations
• LO4 – Design Procedures for Safe Operation of Petroleum Processing facilities</td></tr>
<tr><td colspan="7"><u>Outline Syllabus</u>

Trends in Petroleum Industry
• National legal instruments related to petroleum oil and gas industry;
• International standards, guidelines and directives related to oil and gas industry, Exploration & Production,
• Effects of Regional Politics and Activities towards Petroleum Industry

Economics of Petroleum Processing
• Trends in Petroleum Industry-
• Financial instruments,
• Commercial Operations in Petroleum Industry

Petroleum Law
• Local Laws Pertaining to Petroleum Industry
• International Laws Pertaining to Petroleum Industry
• Case Studies

Safe Operation of Petroleum Facilities
• Introduction to Process Safety in oil & gas facilities,
• Safety Instrumented systems (SIS),
• Emergency shutdown (ESD) systems,
• Design of Systems for Safe Operations</td></tr>
</table>

Module Code	CH4350	Module Title	Petroleum Refining and Petrochemical Industry			
Credits	2.0	Hours/Week	Lectures	1.5	Pre – requisites	None
GPA/NGPA	GPA		Lab/Assignments	1.5		

Learning Outcomes

After completing this module, the students should be able to;

- LO1 – *Describe* production processes for petrochemicals
- LO2 – *Select* required refining processes for specified fuel specifications
- LO3 – *Select* suitable fuels for specific applications

Outline Syllabus

Petroleum Refining

- Refinery Configurations;
- Thermal & Catalytic Processes
- Refinery Offsite Facilities
- Refining economics

Petroleum Product Characterization

- Liquid Fuel Characterization
- Gaseous Fuel Characterization,
- Transportation and Storage of Fuels

Petrochemical Processing

- Classes of Petrochemicals and their Production Processes
- Petrochemicals and their derivatives; Polymers, Base Chemicals and Fertilizers

Note: Offered to ER students

Comprehensive Design Project

CH4015, CH4034 – Comprehensive Design Project is the ultimate course for the B.Sc. Chemical Engineering Degree. It will allow the students to bring together much of their previously learnt engineering knowledge on a real, practical problem. It contributes 10 credits gained in semesters 6, 7 and 8.

The project is also quite different from the majority of the subjects that the students will be doing in the initial semester. It is a team effort and an open-ended project, where student get the opportunity to work as a team on open-ended projects with real industrial complications. Communication amongst members is vital. There is no ‘’right’’ solution! - Just the “best” solution in the time available.

One of the goals of this subject is to introduce students to an industrial periphery where real life processes and problems will have to be addressed. The academic staff will endeavour to give advice and support as the student proceed in the project. The group will be managed by its members. There needs to be a leader who co-ordinates activities. It is the responsibility of the group members to ensure that the project progresses at an appropriate rate. Good communication within the group is essential and this will be reflected in your final report. It will show the students’ effort at teamwork and communication ability. As a UGC accredited B.Sc. Chemical Engineering degree program, DCPE places a high priority on this subject as part of your entry into the profession.

- In this unit, student will be encouraged and facilitated to develop the ability and desire to: Work as a team on open ended problems within tight time constraints in such a way that all members contribute individually as well as collectively with proper communication
- Apply fundamental chemical and environmental engineering principles and available data from literature to design and analyse chemical processes
- Make critical design decisions in a safe, creative, practical and cost-effective manner
- Report the work in formal, concise, and in an organized manner

Industrial Training

As a partial fulfillment of the B. Sc. in Chemical and Process Engineering degree program, at the end of semester 5 it is compulsory for students to register for the Industrial Training Module during the 6th Semester. Under this Module students are placed in a real industrial environment for 24 weeks period of time. Industrial Training module has been designed to provide industrial experience for the students. This is the first and the last opportunity given for working in an industry as a budding Chemical and Process Engineer before the student gets their degree qualifications.

In order to have background knowledge about Industrial Training and to make Industrial Training more fruitful, a series of presentations are arranged in Semester 5. In these presentations invited experts from industry address the students on the topic "How to get the maximum benefit of Industrial Training with the intention for having a successful future carrier." In addition, senior Process Senior engineering students who have been to Industrial Training also make presentations and share their industrial experience with. Further, the Industrial Training Coordinator of the Department facilitates the students in industrial training placement process.

In the Industrial Training program, the student is supposed to use the theoretical and experimental knowledge gained as an undergraduate in the industrial environment and to improve the practical skills, management skills and interpersonal skills. Development of these skills is highly important to become a qualified engineer. Further, the student is educated about important areas such as product manufacturing processes, treatment processes, process design, process modification, process optimization, problem identification and problem solving.

During the stay in an industry the student is supposed to manage a technical diary and a handbook covering the engineering, technical and managerial matters. Student's performance on Industrial Training is closely monitored and examined by a member of the academic staff, Industrial Training Division and NAITA, by visiting the relevant industry. After successful completion of the training program, students are supposed to submit a technical report on their training to the Industrial Training Division and the same to the DCPE. In line with that, students have to present their training experience before a panel of academic staff at the DCPE. There, students' level of knowledge and experience on industrial training are evaluated. Finally, progress in industrial training is evaluated through a viva voce & a presentation (individual) by a panel comprising a member of academic staff of DCPE, a member of Industrial Training Division and a member of NAITA.

Awards Available for DCPE Students

Award Ceremony

Thusitha Senevirathne Memorial Scholarship

Awarded for the CPE undergraduate who has obtained the highest GPA in the first attempt in Level 3 Semester 1 Examinations, provided that the student obtains an Overall GPA of 3.7 or above.

Thusitha Senevirathne Memorial Award

Awarded for the CPE undergraduate who is specializing in the field of Environmental Engineering and has obtained the highest GPA in Level 3 and Level 4 at the first attempt, provided that the student obtains an Overall GPA of 3.7 or above

Unilever Award

The CPE undergraduate who obtains the highest marks for the Final Year Comprehensive Design Project, provided that he obtains a grade A receives this award.

Convocation Awards

Gold Medal awarded by the Hayleys Group

Awarded to the undergraduate of the DCPE who obtains the highest Overall GPA at the BSc. Engineering Degree Examination, provided that the student obtains an Overall GPA of 3.8 or above and is awarded at the General Convocation.

Most Outstanding Graduand of the year

This prestigious awarded is presented to the most outstanding graduate of the year of the Faculty of Engineering and is awarded at the General Convocation. The awardee is expected to displaying an exceptional academic standing with a GPA exceeding 3.7; First Class Honors, also demonstrating excellent leadership qualities, and also a person who has made a significant contribution through participation and service to the university and community.

Vidya Jyothi Professor Dayantha S. Wijeyesekera Award

This prestigious awarded is presented to the most outstanding graduate of the year of the University of Moratuwa and is awarded at the General Convocation. The awardee is expected to displaying an exceptional academic standing with a GPA exceeding 3.7; First Class Honors, also demonstrating excellent leadership qualities, and also a person who has made a significant contribution through participation and service to the university and community.

INDUSTRY COLLABORATION

Mentoring

Mentoring is to support and encourage students to manage their own learning and behavioural while maximizing and enhancing their potential, soft-skills, performance, and becoming a competent and a self-confident person. Unique and distinguished industrial personals from related industries are connected with students through the department in order for the students to get an intimate experience in the industry surroundings. During a period of 13 weeks in semester IV, each group of students are assigned a mentor and students travel to the mentor's organization. Some of the key elements focused by the mentors are leadership skills, communication skills, teamwork, attitude, etiquette, and personal grooming. This course provides the students a virtuous opportunity to extend themselves as a well- rounded person who are well equipped for the future.

Department Industry Consultative Board Meeting (DICB)

Department Industry Consultative Board (DICB) Meeting aids the department to meet industry representatives from several recognized industries. This has benefits for both parties. While the department seeks industry expertise to revise and renew its curriculum to meet the dynamic demand in the field, industry get the assistance of the department to address their various problematic situations.

Consultancy Services

The department is at all times approached by the industry to seek solutions for their problems and to assist in enhancing their performance. Department might act like a third party in assisting them while sometimes directly engaged in the research and development work under a contract with the interested party. Students who are enthusiastic in engaging in these works might have a chance to work with the academic staff and gain an invaluable knowledge and experience.

Field Visits

The department arranges field visits for their students to visit the industries and get an insight of the processes, working environment and the knowledge. This allows the students to expand their knowledge and experience which otherwise be limited to lectures and books

Incubators

SIL-UOM Rubber Products and Process Development Incubator

Samson's Compounds and Samson sons International PLC, sister companies of the DSI Samson Group of companies has jointly set up a Research and Development unit, SIL-UoM Rubber Production & Process Development Incubator for Rubber based Products and Process development with the Department of Chemical and Process Engineering. The objective of this unit is to conduct research and develop new processes to maintain the

competitiveness and quality of the local rubber production techniques.

Samson International PLC has many skillful engineers at their disposal. The department undergraduates provide them talented carefree minds with an ability to look at something in a whole new angle. These are fresh minds unburdened by the strain of continuous work, minds unhindered by the expectations & deadlines that have been set in view of marketing objectives. They are also able to carry out detailed & analytical literature surveys which the company might find too time consuming to conduct, while living up to their global obligations.

The SIL-UOM incubator deals with providing professional expertise on certain projects & designs carried out by Samson International. The department provides the much-valued intellectual input into certain projects carried out by Samson International PLC that requires a strong theoretical background in return for

Samson International to provide their undergraduates access to their facilities & their latest technologies. There are many benefits the university reaped from this program. The main benefit is that it provides the department undergraduates with an invaluable industrial exposure prior to their entrance into it. Also, the company steps in to fund any upgrading or renovation of any facility in the department, if their use is required in a project, which of course will enable students to take use of them. Plans are in motion to upgrade the Polymer Processing Lab of the department, both of which will bring long term benefits to the undergraduates

SPECIAL EVENTS AND PROGRAMS

Annual General Meeting

Annual gathering of Chemical and Process Engineers of University of Moratuwa is organized by the ChESS with the participation of department's undergraduate, graduates, academic staff and the representatives from the industries. Most recently, the 2018 event was held at Sri Lanka Foundation Institute. The night with magnanimous meetings with industrial leading characters passed out from University of Moratuwa was a precious occasion for chemical and Process Undergraduates to meet their role models

Yaye Padura

An evening with glorious musical spills over the "Yaye Padura" which is another foremost event annually functioning at the Chemical and Process Engineering department court yard, organized by the fresh siblings of the department family in order to facilitate the interaction between undergraduate students of the Department as well as to make a stage to proffer instrumental, vocal and dancing talents of department students and staff.

'EXORIOR'

This is the activity day organized by the Level 03 batch of the Department under the theme, 'Awaken the leader within you'. The program is held with the presence of undergraduates of Level 02, 03 and 04, post graduate students, non-academic staff and the academic staff. The agenda consists of various activities, which help each and every participant to improve his/her abilities and skills in areas of team work and personality development. All the participants irrespective of their age or level spend a day full of friendship and life and are able to gain a glimpse of experiences and strengthen their bonds.

CPE Sports Fiesta

Another annual interactive event organizing by the Level 02 students of the department of Chemical and Process Engineering is CPE Sports Fiesta. This is a sports day that brings all the joys, bonds, freedom and an inestimable change from the impassable academic matters for all students, Academic and Non-academic staff family members of DCPE.

"COMPASS 2018"

"COMPASS- 2018", the National Chemical and Process Engineering Conference organized by the Chemical Engineering Students Society of University of Moratuwa successfully concluded on 9th of October 2018 from 1.00pm to 5.30 pm at BMICH, Colombo 07. It was conducted under the theme 'Productivity and Efficiency through process engineering' covering three main topics; 'Process Safety', 'Value Added Waste' and 'Process optimization and energy recovery'. The event was able to bridge the gap between industry and undergraduates by discussing the real problems that prevail in the industry. The conference was enlighten with the presence of Chief Guest Mr. Kulatunga Rajapaksha, Guest of Honour Mr. Dhammika Welhenge and many other distinguished guests including industry, academia and undergraduates along with 300+ participants.

SOCIETIES

Chemical Engineering Society (ChES)

The Chemical Engineering Society was formed in 1993 with the objective of increasing awareness of Chemical Engineering in the country. It is hence dedicated in promoting more collaborative work with local industries. The Society was registered as a specially authorized society under Societies Ordinance on 22nd September 1995 (Reg. S. 4822). Its membership consists of 259 members including present and past chemical engineering students, employed in both local and international institutions and industries.

Specific objectives other than this primary objective of the society includes,

- To provide opportunities for the dissemination and exchange of knowledge and experience primarily among professionals of Chemical and Process Engineering and also, among the industrialists, the public and society at large
- To promote the rational and economic development of Chemical Engineering science and technology in the country so as to ensure the best interests of the community as a whole
- To encourage research, development and training in Chemical and Process Engineering
- To promote among its members high standards of technical proficiency, professional expertise and professional ethics so as to enhance in turn the profession of Chemical and Process Engineering
- To collaborate with other organizations: national and international, in activities relating to furtherance of the ChES objectives

Chemical Engineering Student Society (ChESS)

The Chemical Engineering Student Society was formed in year 2004. It is dedicated to building a responsibility among undergraduates to integrate social concerns into their academic lives. Through a variety of interdisciplinary activities, focusing on leadership development and interactive learning, ChESS at UoM strives to work together with industrial, social and student communities.

Specific objectives of the ChESS include,

- Enhancing the involvement of the Chemical and Process Engineering students in industry related activities and projects
- Improving the interaction with the society through socially beneficial activities

- Sharing knowledge with school children through interactive activities and projects

Activities

- Organizing the Annual General Meeting, of DCPE, providing a great opportunity for the members of the CPE family to interact with each other. At the AGM undergraduates and postgraduates have the opportunity to meet each other as well as their dearest academic staff.
- Annually publication of the magazine "Chemunique" which has a wide circulation.

Alumni Association

The Alumni Association of the DCPE is the hub that reconnects all passed out graduates of the department, young and old. Its prime objective is to enhance a continuing relationship between the department and its older generations. Alumni membership is open to all graduates from the department.

LABORATORY FACILITIES AND RESOURCES

Laboratory Facilities

The Department of Chemical and Process Engineering is proud to have a well-equipped and well-functioning set of laboratories which facilitate both undergraduates and postgraduate students with their experimental work and research. At present, the department is in the process of establishing new laboratory facilities for petrochemical engineering with modern state of art technologies. The assistance of the competent and the well-qualified technical officers and the technical assistance staff members for the experimental work and research activities is also significant.

Unit Operations/ Pilot Plant Laboratory

Lecturer in Charge: Prof. (Mrs.) B. M. W. P. K. Amarasinghe
Technical Officer: Mr. B. H. P. Mahendra
Boiler Operator: Mr B. A. R. D. Abeywardena
Lab Attendant: Mr. A.G. V. K. Somarathna

Unit operations are the basic physical operations of Chemical Engineering. The Unit Operations Laboratory of the department is well-equipped to conduct both laboratory scale and pilot scale experiments, allowing students to gain hands-on experience with the fundamental principles and practical applications of chemical engineering. The apparatus for distillation, evaporation, crystallisation, heat transfer, retort processing, filter press, fluidized bed, mixing and centrifugation and are few of the outstanding equipment in the laboratory.

Latex Technology Laboratory

Lecturer in Charge: Dr. S. Walpalage
Technical Officer: Mrs. W. S. M. De Silva
Lab Attendant: Mr. D. S. Dayananda

The Latex Technology Laboratory of the department is equipped with latex characterization instruments for latex product manufacture while it is also equipped with several instruments to measure chemical properties of polymer. Also, instrumentation to analyse various properties of rubber and plastic such as physical, mechanical and thermal properties namely; specific gravity, rebound resilience, tensile and compression, abrasion resistance, melt flow index and other are available in this laboratory

Process Control Laboratory

Lecturer in Charge: Dr. M. Narayana
Technical Officer: Mrs. H. B. R. Sajeewani
Lab Attendant: Mr. D. S. Dayananda

Designing and operation of processes that are safe, meet the production requirements with high quality with profit are the premier objectives of a Chemical and Process Engineer. Therefore, the process instrumentation and control are vital aspects to be mastered by the students. The Process Instrumentation and Control Laboratory of the department is equipped with various process modelling and simulation facilities such as process simulator, numerical control, process feedback control study unit to enhance the student competencies.

Industrial Chemistry Laboratory

Lecturer in Charge: Prof. B. A. J. K. Premachandra
Technical Officer: Mrs. I. K. Athukorala
Lab Attendant: Mr. H. L. G. S. Peiris

The Industrial Chemistry Laboratory supports many course modules for both undergraduate and postgraduate studies through several experimental setups and by facilitating research activities. Furthermore, it is equipped with two major pilot scale reactors which are important in reactor engineering namely; Continuously Stirred Tank Reactor (CSTR) and Batch Reactor.

CAPD /CAM Centre

Lecturer in Charge: Dr. M. Narayana
System Analyst : Mr. N. A. C. Narangoda
Technical Officer: Mrs. H. B. R. Sajeewani
Lab Attendant: Mr. M. P. A. J. Kumara

The centre facilitates the studies with experience on many process simulation applications. It is being used to offer many useful software packages such as AutoCAD, SolidWorks, LabVIEW, MATLAB and Simulink, Scilab, Aspen Plus etc. that are particularly useful in the industry of Chemical and Process Engineering. The centre supports the academic activities also providing the internet access to gather necessary resources for their studies.

Environmental Engineering Laboratory

Lecturer in Charge: Prof. P. G. Ratnasiri
Technical Officer: Ms. P. D. M. Rodrigo
Lab Attendant: Mr. G. G. C. Kumara

The Environmental Engineering Laboratory facilitates necessary experience and knowledge in environmental engineering. It is equipped with lab scale and pilot scale equipment facilities related in wastewater and solid waste treatment. Facilities are available to determine key parameters related in water/wastewater analysis. Pilot scale experimental setups are available to conduct experiments under aerobic and anaerobic waste treatment processes. Furthermore, online data acquisition and monitoring of anaerobic waste treatment processes are conducted using newly automated reactor systems.

Transport Phenomena Laboratory

Lecturer in Charge: Prof. A. D. U. S. Amarasinghe
Technical Officer: Mr. B. H. P. Mahendra
Lab Attendant: Mr. A. G. V. K. Somarathna

Transport Phenomena Laboratory has been developed as an undergraduate teaching laboratory. Main focus is to demonstrate the fundamental concepts in heat, mass and momentum transport. Students are encouraged to learn through hands-on experiences. Rankine Cycler is the latest arrival to the lab. Students are able to understand the fundamentals of steam power generation and to become familiar with the associated thermodynamic principles and efficiencies of the Rankine power cycle. The laboratory is further equipped with the following teaching units,

- Flow measurement unit
- Centrifugal pump demonstration unit
- Equipment Test Bench to Study Analogy between fluid friction and heat transfer
- Apparatus for determining heat loss from bare and lagged pipes
- Computer controlled gaseous mass transfer and diffusion coefficient unit
- Computer controlled liquid mass transfer and diffusion coefficient unit

Polymer Processing Laboratory

Lecturer in Charge: Prof. B. A. J. K. Premachandra
Technical Officer: Mrs. W. S. M. De Silva
Lab Attendant: Mr. U. K. D. D. N. Gunasekara

The Polymer Processing Laboratory provides the students with the opportunity to gain experience in polymer processing techniques. This laboratory offers a wide range of pilot plant scale machinery for mixing and subsequent processing of both plastic and rubber, including an injection moulding machine (plastic), blow moulding machine (plastic), extruders with single and double screws (plastic), hot feed extruder (rubber), internal mixer, two-roll mill, plasticorder, presses and processability testing equipment.

Food Engineering Laboratory

Lecturer in Charge: Dr. (Mrs.) S. H. P. Gunawardena
Technical Officer: Mrs. W. K. I. Gayani
Lab Attendant: Mr. M. P. A. J. Kumara

Food Engineering Laboratory facilitates the students with experimental and research work on food-bio chemistry, and food process engineering. The laboratory is equipped with a freeze dryer, fruit juice extractor, dough mixer and other ancillary units required in food processing.

Microbiology Laboratory

Lecturer in Charge: Dr. (Mrs.) H. L. T. U. Ariyadasa
Technical Officer: Mrs. I. K. Athukorala
Lab Attendant: Mr. B. Karunathilake

Microbiology Laboratory of DCPE is focused on understanding the diverse cellular and metabolic processes of microbes for the production of pharmaceuticals, chemicals and energy. The laboratory is equipped with Autoclave, Incubators, Incubator shakers, Centrifuges, Colony counter, Class II biosafety cabinet, -20^{o}C Freezer and also state of the art equipment including PCR, horizontal Gel electrophoresis system, Gel documentation system and microscopy core facilities essential for the advance research in the area of Metabolic Engineering.

Process Instrument Centre

Lecturer in Charge: Prof. B. A. J. K. Premachandra
Technical Officer: Mr. J. D. Wijegunarathne
Lab Attendant: Mr. Mr. H. L. G. S. Peiris

Instrumentation is vital for proper measurement and controlling of processes. The Process Instrument Centre of the Department consists of advanced modern analytical measurements. The Gas Chromatograph, High Performance Liquid Chromatograph, Differential Scanning calorimeter, Particle Size Analyser and UV Spectrophotometer are among these instruments. This centre provides a combination of testing facilities for academia and industrial purposes.

Petroleum Testing Laboratory

Lecturer in Charge: Dr. S.A.D.T. Subasinghe
Technical Officer: Mr. J. Wijesinghe
Lab Attendant: Mr. S. M. R. N. Dhammika

The Petroleum Testing Laboratory is equipped with newest laboratory instruments to facilitate students with experimental work on petroleum engineering. The automated vacuum distillation unit, Sulphur analyzer, Octane analyser, Bomb calorimeter and Viscometer bath are only few experimental setups in the laboratory. As well, it is equipped with necessary apparatus to provide the student with knowledge and experience in Energy Engineering and Fuel Technology. The laboratory includes many apparatuses such as the soxhlet apparatus, Reigdens specific surface apparatus, the Mohr westphal balance, the Pensky Martens closed cup and Cleveland open cup, Engler viscometer and Saybolt universal viscometer, Penetrometer, Universal torsion viscometer, Pilot plant leaching unit etc.

24-hour-Research Laboratory

Lecturer in Charge: Prof. A. D. U. S. Amarasinghe
Technical Officer: Mrs. W. K. I. Gayani
Lab Attendant: Mr. B. Karunathilake

24 hours laboratory is a research laboratory providing facilities for research students to work around the clock. Department of Chemical and Process Engineering offers research programs leading to PhD, MPhil and MSc. Two separate laboratory units are currently available with basic facilities for the research students to set up their test rigs and other equipment required for their experimental work. Computer facilities are also provided with unlimited access. Undergraduate students with research projects involving longer time durations for their experimental work are also encouraged to use 24 hours laboratory.

Resources

Prof Hubert D J Silva Memorial Resource Centre

The Department of Chemical and Process Engineering offers the students with access to a valuable collection of literature, specialising in the Chemical and Process Engineering field. The Resource Centre is full of worthy reference material relevant to many branching of Chemical and Process Engineering, facilitating both the undergraduates and postgraduates with their academic and research activities.

Student Common Room

The Student Common Room is established to provide the undergraduates with an opportunity to socialize themselves.

Wi-Fi Access Facility

The students are provided with Wi-Fi facilities to acquire necessary knowledge and reference materials that are required for their academic studies and activities.

Study Zones

Spaces have been provided for the students with seating arrangements and Wi-Fi facilities to engage in academic activities and studies such as group activities and discussions.

Operational Hours and Access to Laboratory Facilities and Resources

Department of Chemical and Process Engineering is usually open for academic work from 8.00 a.m. to 4.15 p.m.

All laboratory Facilities in Department of Chemical Engineering are available for students strictly during the scheduled practical sessions, and students should not use and interfere with any equipment without the permission of the Lecturer in Charge or under the guidance of a Laboratory Instructor.

The CAPD/ CAM Centre is open from 8.00 a.m. to 8.00 p.m. on week days and from 8.00 a.m. to 4.00 p.m. on Saturdays.

At present all other facilities are available during working hours only.

OTHER INFORMATION

Getting Help and Advice

A professional full-time counsellor is employed by the University to provide professional counselling to the students who require special attention.

Career guidance unit of the UOM plays an important role in developing University Industry links and provide necessary guidance for the students to select their future career.

In order to address common student problems, the faculty of engineering has further appointed a Staff-Student Liaison Committee at faculty level which has representatives comprising senior academic staff members of the faculty and nominees from respective student groups. The department Staff-student liaison committee helps to solve issues related to academic work, facilities etc.

The office of the Director of Undergraduate Studies provides guidelines, performance criteria and registration procedures to students. The student performance records are also available at this office for their perusal, giving the opportunity for the students to plan the academic activities accordingly.

The DCPE staff was reported as one of the friendliest in the faculty (SWOT analysis report, IRQUE reviewers report). This encourages the students to approach the staff members about their problems to discuss at personal level.

The DCPE has appointed level coordinators for each level to guide the students on subject selection and other academic issues related to each level. The Department has also appointed Advisors for each student to provide guidance and necessary counseling on academic and personal problems during their stay at the University.

The students are given a course outline at the beginning of each semester for each subject. This gives the course objective, learning outcomes, subject coordinator, lecturers, module content, evaluation criteria and a list of references

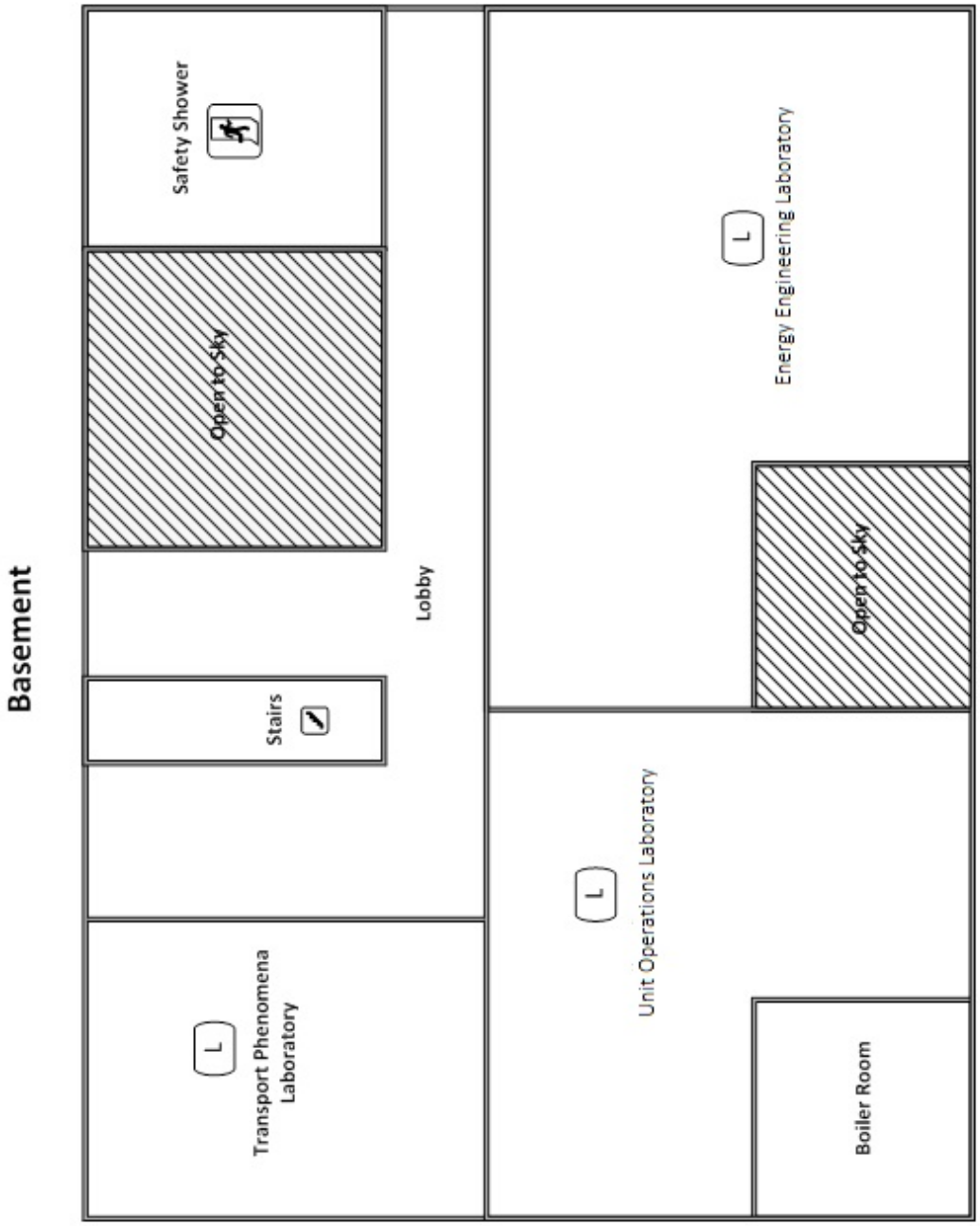
The students are strongly encouraged to discuss the subject matter with respective subject coordinator or the lecturers.

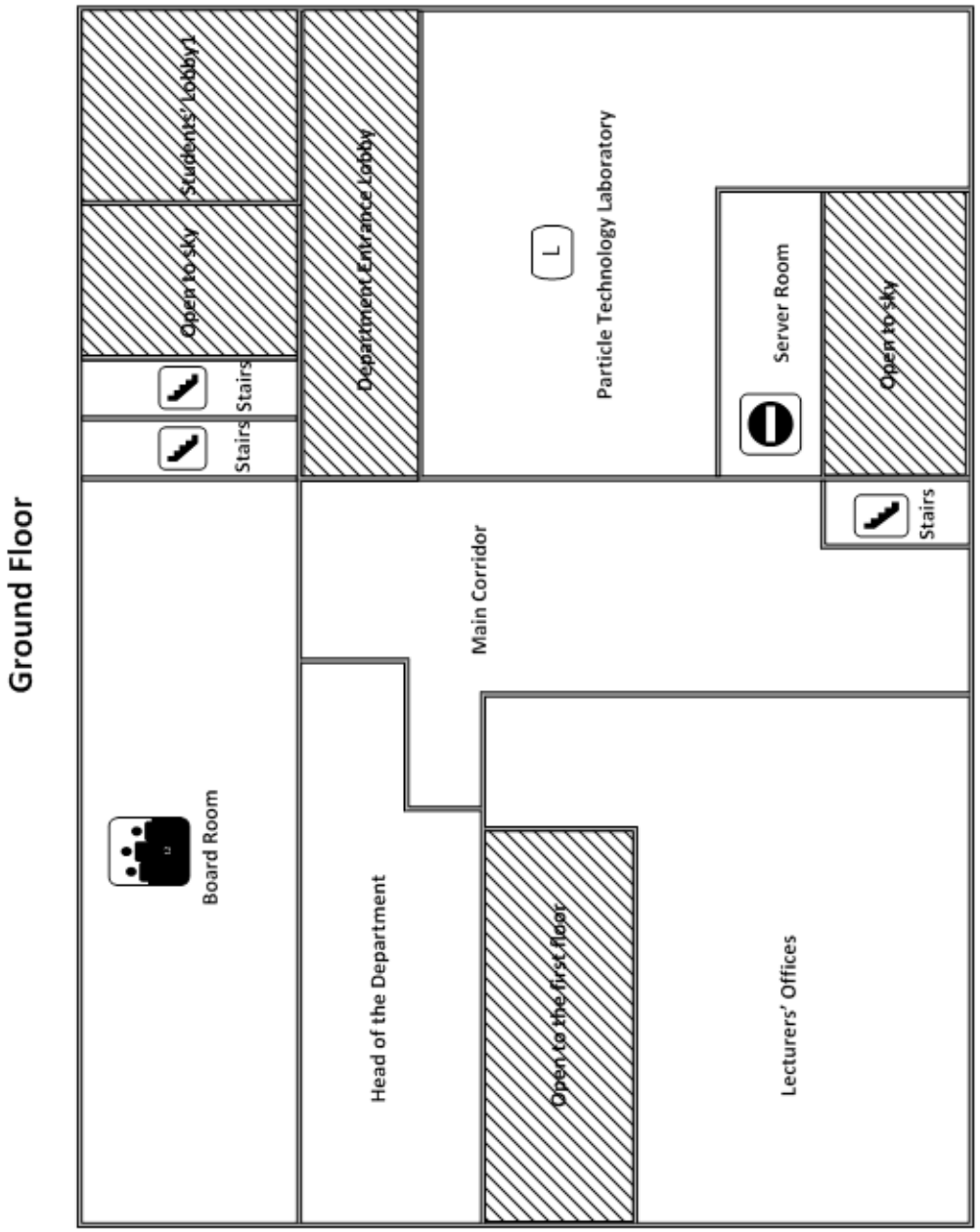
IESL Membership

The Institute of Engineers' is the premier engineering body of Sri Lanka. Members benefit by the development of individual's professional career and building network of technical and social contacts.

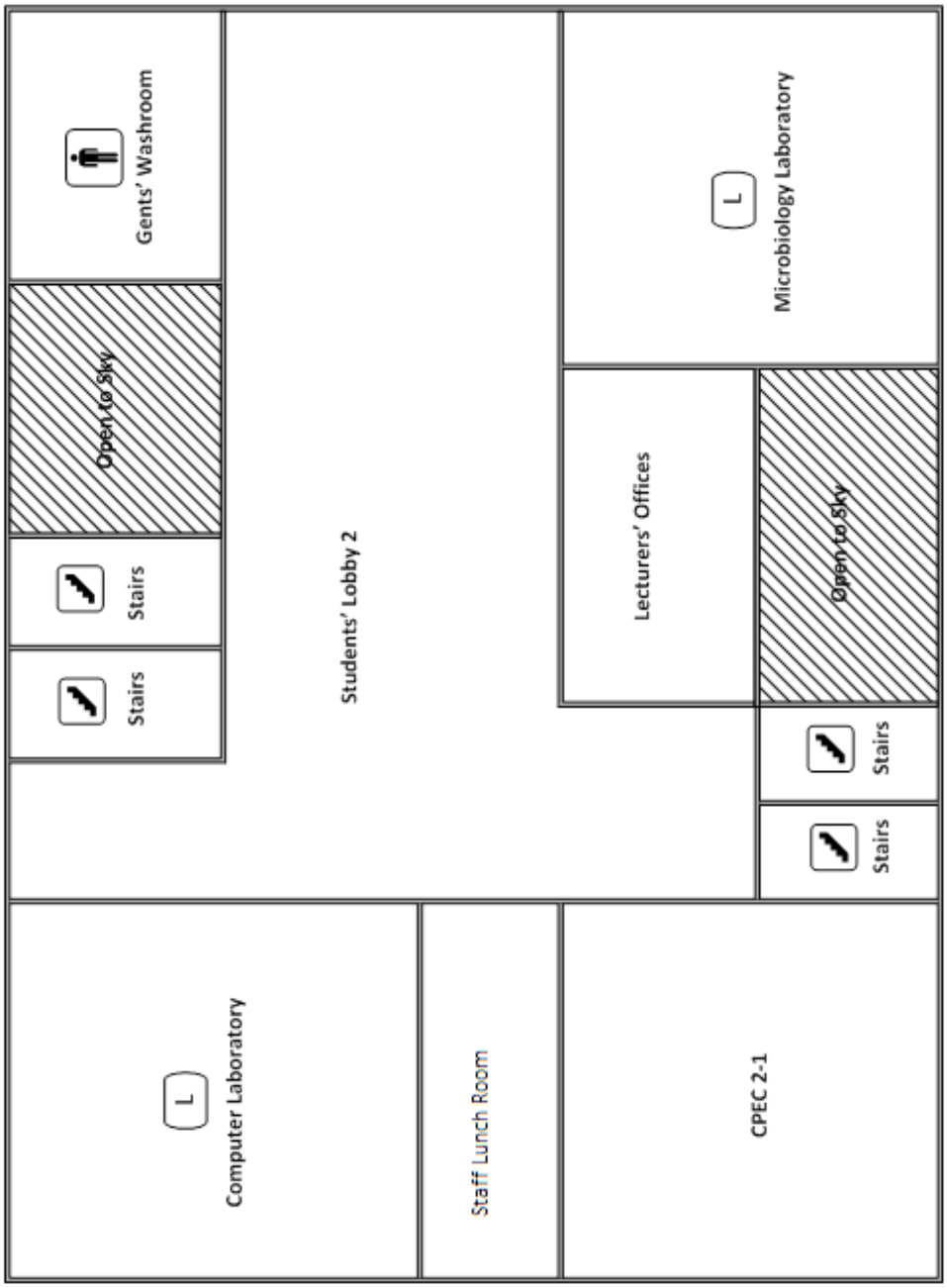
We encourage all CPE students to apply for the student membership category. For further information contact the Industrial Training Division, University of Moratuwa.

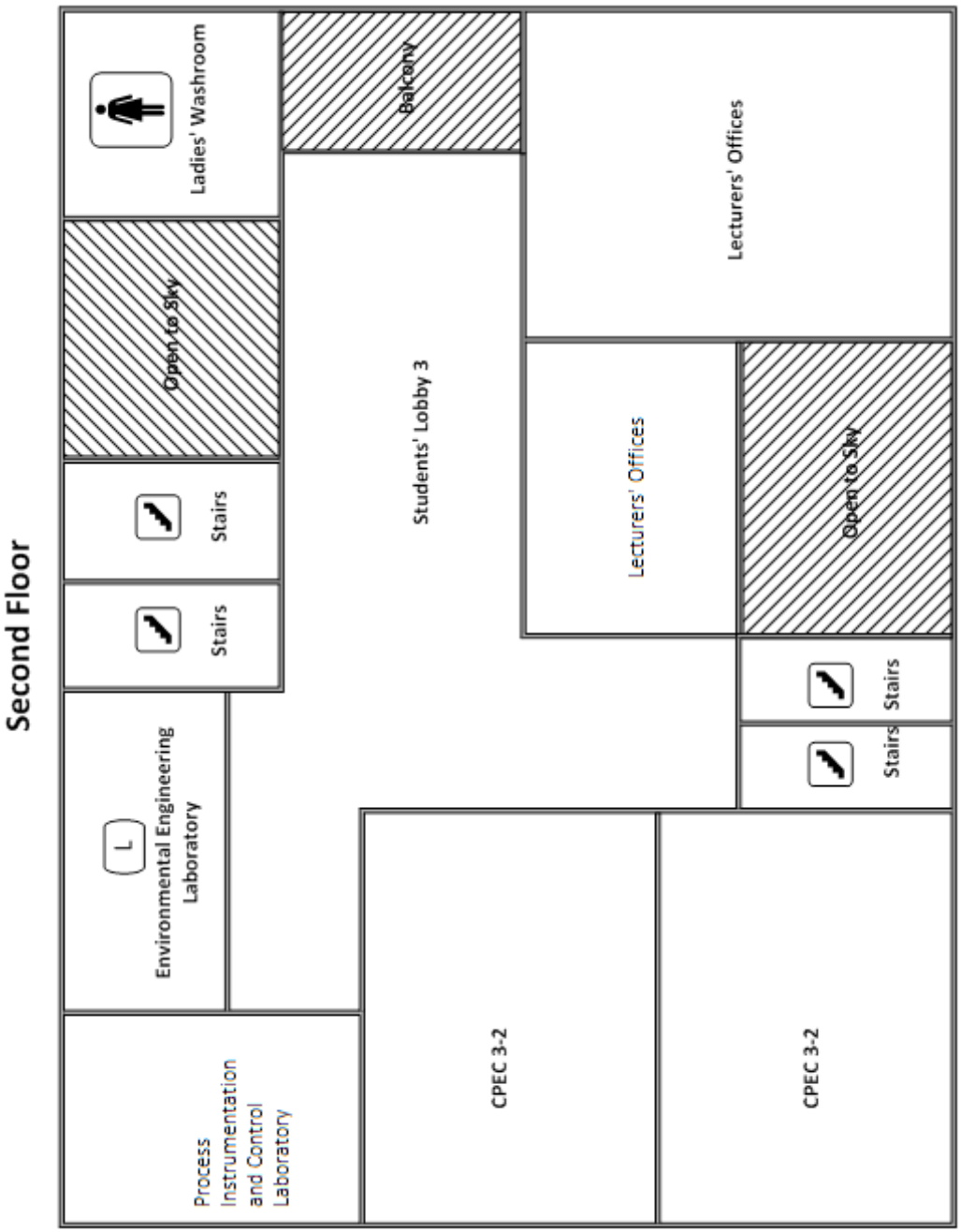
FLOOR PLAN OF DCPE




Ground Floor
Board Room
Stairs
Stairs
Open to sky
Students' Lobby1
Department Entrance Lobby
Particle Technology Laboratory
Server Room
Open to sky
Stairs
Main Corridor
Head of the Department
Open to the first floor
Lecturers' Offices

First Floor


Gents' Washroom
Open to Sky
Stairs
Stairs
Students' Lobby 2
Lecturers' Offices
Microbiology Laboratory
Open to Sky
Stairs
Stairs
Computer Laboratory
Staff Lunch Room
CPEC 2-1


Second Floor
Ladies' Washroom
Balcony
Lecturers' Offices
Open to Sky
Stairs
Students' Lobby 3
Lecturers' Offices
Open to Sky
Stairs
Stairs
Environmental Engineering Laboratory
Process Instrumentation and Control Laboratory
CPEC 3-2
CPEC 3-2