DEPARTMENT OF CHEMICAL & PROCESS ENGINEERING

University of Strathclyde Engineering

CLASSES AVAILABLE TO CHEMICAL ENGINEERING INCOMING ERASMUS EXCHANGE STUDENTS (2021/2022)

This document lists classes run by the Department of Chemical and Process Engineering which are suitable to be selected by incoming Chemical Engineering Erasmus exchange students, for year 2020/21 onward. This information is as up to date as possible but late changes may be necessary.

The Chemical Engineering undergraduate curriculum is such that Level 4 and 5 classes run **only** in Semester 1 (September to December). Hence for exchanges in Semester 2, the choice of chemical engineering *taught* classes is limited to Levels 2 and 3. In practice, the relatively elementary level of most Level 2 classes means they may not be suitable for visiting students. Therefore, in this document we include only those classes definitely suitable. Furthermore, some classes extend over both semesters, and thus are **not** suitable for exchange students visiting for only one semester.

For sufficiently advanced students there is the option in **semester 2** of the full-semester team **design project** worth 60 credits, which is a challenging group work task (see below for details). Note that if this is chosen, no other Chemical Engineering classes should be selected for Semester 2: this class is a full-time full-semester group project.

Students cannot select more than 60 credits per semester **from the Chemical Engineering curriculum** (see below for classes' credit values).

Students *may* add some credits from *other* Departments' curricula, **subject to agreement by those Departments and timetabling requirements**. Timetabling information may be found for specific classes at http://www.strath.ac.uk/timetables/, however please note that timetables are often not confirmed until near the beginning of the semester and the Department is not responsible for setting timetables, this is done by the University as a whole.

For information on classes available in other Departments and contact details, see those Departments' web pages. Some information is also available on the University's Class Catalogue (http://ben.mis.strath.ac.uk/classcatalogue/). **However, please note that this catalogue can include classes that are no longer running or that are not suitable for exchange students.** Therefore, it is advisable to contact lecturers of other Departments' classes or teaching coordinators of those Departments, to check arrangements.

On arrival all students should contact the Department office for final confirmation of their curricula and latest timetable information.

PLEASE NOTE: this document pertains only to exchange students coming to the Department of Chemical Engineering. These classes are generally not suitable for students without a substantial chemical engineering or closely related background.

Students exchanging to other Departments at Strathclyde may potentially be able to take some Chemical Engineering classes, but this is decided on an individual student basis and MUST be discussed with the Chemical Engineering Exchange Students coordinator before attempting to register with the class or attend class sessions.

Also please note that classes listed below are accurate and up to date to the best of our ability but remain subject to change from year to year. Further information can be obtained from the Department https://www.strath.ac.uk/engineering/chemicalprocessengineering/

CLASSES AVAILABLE SEMESTER 1 (SEPTEMBER-DECEMBER)
Class coordinators/lecturers are listed below. Students should contact these members of staff in the first instance should further details of the class content and arrangements be required.

CLASSES:

CLASS CODE	CLASS TITLE	Level Strathclyde	Strathclyde CREDIT
YEAR 3			
CP303	MATERIALS PROCESSING & APPLICATIONS	3	20
CP325	CHEMICAL ENGINEERING DESIGN & ADV IT	3	10
CP316	REACTORS	3	10
CP315	BIOCHEMICAL ENGINEERING	3	10
YEAR 4			
CP414	PARTICLE TECHNOLOGY & ADV REACTORS	4	20
CP405	PROCESS CONTROL & ENV TECH	4	20
CP409	ADV SEPARATIONS & PROBLEM SOLVING	4	20
18417	CHEMICAL ENGINEERING PROJECT	4	20
YEAR 5 MEng (Advanced level only):			
CP523	MOLECULAR SIMULATION IN CHEMICAL ENG	5	10
CP527	PETROLEUM ENGINEERING	5	10
CP529	PROGRAMMING & OPTIMISATION	5	10
CP530	SAFETY MANAGEMENT PRACTICES	5	10
CP533	CLEAN COMBUSTION TECHNOLOGIES	5	10
CP535	MOLECULAR & INTERFACIALSCIENCE	5	10
CP537	ELECTROCHEMICAL ENERGY DEVICES	5	10
CP538	ENVIRONMENTAL ENGINEERING FOR SOLVING INDUSTRIAL CHALLENGES	5	10

BRIEF CLASS DESCRIPTION (SEMESTER 1 CLASSES)
CP303 MATERIALS PROCESSING & APPLICATIONS
Lecturers: Dr Mark Haw / Dr Todd Green
Level 3 Semester 1 - CREDITS 20 / ECTS 10

SYLLABUS:

- Basic material properties, use of material property charts in design and other material selection criteria. Basic solid mechanics (stress, strain relationships) and application to design of thin-walled pressure vessels and fuel cell stacks. Pressure vessel codes and standards. Thermal properties of materials and their relationship to the design of thermal insulation and heat exchanger design.
  Introduction to corrosion, basic definitions, cost and types of corrosion. Electrochemical reactions, potentials and the Nernst equation. Thermodynamics of electrochemical reactions. Construction and analysis of Pourbaix diagrams and their use to rationalise corrosion behaviour. Uniform, galvanic and stress corrosion and concentration cells. Aspects of corrosion protection and control. Measurement of corrosion rates and selection of materials for corrosion resistance.

- Multiphase systems: suspensions, particulates and emulsions. Basics of flow and transport in multiphase systems, including single particles moving in a fluid and application to sedimentation. Extension to multiple particles/concentrated systems. Packed beds, flow of fluid through packed beds, fluidisation. Introduction to non-Newtonian rheology and rheometry. Non-Newtonian flow in multiphase systems, including shear-thinning, thickening, viscoelasticity, extensional effects and jamming. Links to powder flow, geophysical flows, traffic flow.

LEARNING OUTCOME:

LO1: Understand basic material properties, mechanics and their importance in chemical engineering design. Selection of appropriate materials based on their mechanical, electrical and thermal properties. Understand some basic concepts related to material degradation and failure.

LO2: Understand the thermodynamic and kinetics basis for the corrosion of metals in aqueous solution and to use this information to select appropriate materials for chemical processing. Understand the various types of corrosion and some basic methods by which they can be mitigated or prevented.

LO3: Demonstrate an appreciation of the nature of multiphase systems and major examples in industrial applications including consequences for processing and use

LO4: Understand the key physical concepts underlying flow and transport in multiphase systems including non-Newtonian flow behaviour and its consequences in multiphase systems

CP325 CHEMICAL ENGINEERING DESIGN & ADV IT
Lecturers: Dr Esther Ventura-Medina
Level 3 Semester 1 - CREDITS 10 / ECTS 5

SYLLABUS:

- Understanding the nature of process design, the information, documentation and tasks required.
- Extracting information about a process from design documentation (e.g. flow diagrams and stream tables).
- Researching and obtaining appropriate physical property data from literature.
- Carrying out process calculations based on design information (e.g. mass and energy balances) to assess the viability of a process.
- Evaluating general process characteristics from the safety and environmental perspective.
- Raising awareness of the environmental impact of a process.
- Developing process flowsheets from block flow diagrams and subsequently developing process flow diagrams.
- Identifying adequate unit operations and types of process equipment required for some common duties.
- Preparing design documentation for a preliminary conceptual design of a process or a process unit according to design standards.
- Synthesising and communicating information about a process.
- Skills to discuss technical ideas fluently with different audiences.

- Using modelling and simulation packages (e.g. Aspen) to carry out different process calculations in a format that can be understood and used or modified by other engineers.

LEARNING OUTCOME:

LO1: Extract and use information about a process presented in process diagrams.

LO2: Implement process calculations based on process diagram information (e.g. mass, heat and energy balances) to check whether a design is feasible.

LO3: Develop a preliminary process design and to size the main pieces of equipment, using computer packages where appropriate.

LO4: Present process design documentation in a concise and coherent manner and work collaboratively in teams.

CP316 REACTORS
Lecturers: Prof Sudipta Roy
Level 3 Semester 1 - CREDITS 10 / ECTS 5

SYLLABUS:

- Chemical equilibria and the role of equilibria in designing reactors (and controlling reactions)
- reaction kinetics and complex reactions such as reversible, series and parallel reactions, rate limiting step
- stoichiometry and its role in understanding limiting reactant and conversion
- Ideal reactors - batch, plug flow and continuous stirred tank reactors
- (Design considerations for single reactors/reactions, operating points and considerations for optimisation
- Design of multiple reactors, continuous reactors with recycle, and reactors in series,
- Design consideration for multiple reactions – series and parallel reactions, selectivity and yield as performance indicators

LEARNING OUTCOME:

LO1: Understand the basis of chemical reactor design in terms of mass balances, kinetics, energy balances and stoichiometry.

LO2: Performance equations for different types of reactors – batch, flow – continuous stirred tank and plug flow reactors

LO3: Know how to take into account multiple reactions (parallel and series reactions) operating series in the design and analysis of reactors.

LO4: Know how to take into account multiple reactors operating series in the design and analysis of reactors.

CP315 BIOCHEMICAL ENGINEERING
Lecturer: Dr Vitor Magueijo
Level 3 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:

- Microbiology;
- Biochemistry;
- Enzyme kinetics;
- Enzymatic reactions in batch and continuous reactors;
- Growth kinetics;
- Batch, fed-batch and continuous fermentation.

LEARNING OUTCOME:

LO1: In the context of biochemical engineering, understand: a) the basics of bioprocess engineering; and b) the relevant microorganisms, biological processes, and groups of biochemical substances (microbiology and biochemistry).

LO2: Produce simple models for enzyme kinetics and their use in reactor design and analysis.

LO3: Perform simple analysis of batch, fed-batch and continuous fermenters.

CP414 PARTICLE TECHNOLOGY AND ADVANCED REACTORS
Lecturers: Dr Iain Burns/ Prof Sudipta Roy/ Prof Jan Sefcik
Level 4 Semester 1 - CREDIT 20 / ECTS 10

SYLLABUS:

- Particle Technology: Industrial relevance and commercial applications of particulate systems. Classification and characterisation of particulate systems. Particle formation processes. Precipitation and crystallization. Design of batch and continuous crystallization processes. Product formulation.
- Advanced Reactors: Multiphase reactors. Flow and mixing in reactors. Residence time distributions. Heterogeneous reaction kinetics. Enzymatic reaction kinetics. Heat and mass transport limitations in chemical reactors. Reaction and diffusion.

LEARNING OUTCOME:

LO1: Demonstrate an appreciation of the main applications of, and the market for, products based on particulate systems and a basic understanding of key physical and chemical processes and relevant equipment involved in industrial particle formation operations.

LO2: Understand the characteristics of particles relevant for their industrial processing and the corresponding characterisation methods, and be able to carry out calculations relating to design of particle formation processes.

LO3: Demonstrate an appreciation of the nature of non-ideal and multiphase chemical reactors and major examples in industrial applications including consequences for their design and operations.

LO4: Understand the key physical concepts underlying flow and mixing, transport limitations in chemical reactors as well as enzymatic, heterogeneous and multiphase reacting systems

CP405 PROCESS CONTROL AND ENVIRONMENTAL TECHNOLOGY
Lecturers: Dr Iain Burns / Dr Vitor Magueijo
Level 4 Semester 1 - CREDIT 20 / ECTS 10

SYLLABUS:

- Process Control: Instruments used in basic measurements, control system structures and communications; Basics of process dynamics, including the representation of systems with transfer functions; Analysis of control systems and the design of control systems for complete plants.

- Environmental Technology: Basic concepts and their specific application in an environmental context; Legislation, pollution prevention and source reduction; Wastewater treatment (general overview, wastewater characteristics, preliminary and primary treatment, principles of biological treatment, final solids removal); Waste gas treatment (general overview, waste gas characteristics, removal of particulate matter, removal of VOCs, SOx and NOx).

LEARNING OUTCOME:

LO1: (Control): Formulate and describe strategies for control of relatively simple chemical process plants.

LO2: (Control): Analyse simple dynamic systems and the effects of applying control systems to them.

LO3: (Environmental technology (ET)): recognise the effect of pollution on the environment and have a basic knowledge of ways of measuring pollutant levels, of pollution control strategies, of environmental legislation and of relevant technical documents.

LO4. (ET): have an in-depth knowledge of pollution treatment methods, including the design wastewater treatment plants and the sizing of waste gas treatment units.

CP409 ADVANCED SEPARATIONS AND PROBLEM SOLVING
Lecturers: Dr Paul Mulheran/ Prof Joop ter Horst/ Dr John McGinty
Level 4 Semester 1 - CREDIT 20 / ECTS 10

SYLLABUS:

- Membrane processes: concentration polarisation, ultrafiltration, reverse osmosis, gas separation, membrane modules and membrane systems/cascades.
- Multi-component distillation: relative volatility, binary systems, multi-component bubble point, dew point and flash distillation, key components, analysis of multi-component distillation column.
- Drying: psychometry, drying rate, analysis of dryers (batch and continuous).
- Problem formulation: Engineering estimation, dimensional analysis, differential balances.
- Numerical methods: iterative methods, finite difference method, software tools.

LEARNING OUTCOME:

LO1: Appreciate the principles of fractional distillation involving more than two components.

LO2: Appreciate basic principles and applications of membrane technology.

LO3: Appreciate basic principles and applications of drying technology.

LO4: Apply physical principles (e.g., mass/energy balances, thermodynamics, chemical kinetics, and transport phenomena) to formulate mathematical models of unit operations.

LO5: Apply numerical methods and software to solve coupled algebraic and differential equations.

YEAR 5 ADVANCED (MEng) LEVEL
Please note Y5 classes are at advanced level and are most suitable for students in the final year of their degree.
CP523 MOLECULAR SIMULATION IN CHEMICAL ENGINEERING
Lecturer: Dr Miguel Jorge
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS

- Introduction to molecular simulations, including typical molecular simulation conventions, such as periodic boundary conditions, pair potentials, potential and kinetic energy, local 'microscopic' density, and equilibration.
- An introduction to molecular dynamics simulation including the 'Velocity Verlet' integration algorithm, simulation thermostats, and how to set-up an MD simulation.
- Molecular modelling, including; when to use classical models of molecules (as opposed to quantum simulations), typical force-fields used for simulating molecules.
- Fundamental concepts in statistical mechanics including; microstates and the fundamental postulate of statistical mechanics, the definition of entropy and free energy, the Boltzmann weight, standard ensembles and ensemble averages, the link and difference between statistical mechanics and thermodynamics, the Maxwell-Boltzmann velocity distribution, partition functions and their relation to free energies.
- How to use Etomica molecular dynamics applets.
- Fundamental aspects relevant to the etomica applet applications, including thermodynamic aspects of adsorption, interfacial tension and surfactant adsorption.
- Data analysis, especially analysis of time-series and statistical error, including; ensemble averages, standard deviation, block averages, correlation in data, standard error, propagation of error, linear regression
- The role of entropy in 'driving' chemical engineering processes

LEARNING OUTCOME:

LO1: Understand the connection between the molecular scale and the process scale and how particular chemical engineering processes operate at a molecular scale

LO2: Understand the importance of entropy in chemical engineering, and its role in statistical mechanics and thermodynamics

LO3: Understand how typical molecular simulations work

LO4: Be able to take measurements from molecular simulations, and analyse and report data and technical ideas in written and oral communications

CP530 SAFETY MANAGEMENT PRACTICES
Lecturer: Mr Deddis
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS: An examination of some major incidents which have occurred over recent years and the breaches of the management systems in each case are explored. Introduction to the role of managers in Safety and the Environment and the meaning of Managing for Safety. Review of the general structure of Safety Management Systems and a general approach to Auditing Safety Management. How to develop a Site Emergency Plan and the skills needed to Investigate Accidents. The role of Human Factors in the process and the concept of Inherently Safety/Less Environmental Harmful Design. A review of the legal structure in Britain and of some of the Major Acts and Regulations.

LEARNING OUTCOME:

This module aims to provide an advanced level exposure to the role of management and management systems in Safety and Loss Prevention.

LO1: Understand the concept of audit of systems/process/operations;

LO2: Be able to carry out advanced hazard identification exercises;

LO3: Be able to produce a simple safety case for a process plant

CP527 PETROCHEMICAL ENGINEERING
Lecturer: Mr Deddis
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:

- Reservoir characterisation
- Reservoir fluid properties
- Porous media flow
- Well performance
- Single and multi-phase pipe flow fundamentals
- Artificial lift technologies

LEARNING OUTCOME:

LO1: Understand reservoir fluid Pressure Volume Temperature (PVT) diagrams and classify the different reservoirs.

LO2: Perform basic reservoir fluid property calculations.

LO3: Understand fundamentals of fluid flow through porous media and pipe flow, and derive but also solve basic governing equations to determine the pressure/velocity fields.

LO4: Understand the operation of different types of artificial lift methods for extracting hydrocarbon fluids.

CP529 PROGRAMMING AND OPTIMISATION
Lecturer: Dr Paul Mulheran
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:

- Getting started with Excel 2007 and the Visual Basic Editor
- Fundamentals of programming: if, do loops, arrays etc
- Algorithm development
- House-keeping: communicating with spreadsheets
- Stochastic searches in one dimension
- Local versus global maxima
- Constraints
- Optimisation in higher dimensions
- Engineering applications

LEARNING OUTCOME:

LO1: Develop algorithms to solve optimisation tasks

LO2: Present working Excel spreadsheets tackling optimisation tasks in a form suitable for other engineers to use

LO3: Understand and apply stochastic optimisation methods to more challenging process engineering

CP535 MOLECULAR AND INTERFACIAL SCIENCE
Lecturer: Dr Leo Lue
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:

- Surfaces and interfaces (surface tension, wetting, mathematical description of surfaces, bridging)
- Properties of interfaces (surfactants, films, emulsions, membranes)
- Experimental techniques for studying and engineering interfaces and processes at interfaces
- Introduction to statistical mechanics (microstates, ensembles, partition function)
- Applications of statistical mechanics (ideal gas, equations of state, adsorption, blackbody radiation)
- Electronic properties of materials (band theory, metals, semiconductors)
- Applications in electronics (diodes and photovoltaic cells)
- Catalysis (photocatalysis, electrocatalysis, and quantum dots)

LEARNING OUTCOME:

LO1: Demonstrate knowledge and quantitative understanding of the processes that take place at interfaces and their applications.

LO2: Demonstrate knowledge of experimental techniques used to study and engineer interfaces.

LO3: Demonstrate a quantitative understanding of the link between molecular-scale structure and interactions and the macroscopic properties of a material.

LO4: Demonstrate knowledge of how the microscopic properties of a material are exploited in applications.

CP533 CLEAN COMBUSTION TECHNOLOGIES
Lecturer: Dr Jun Li
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:
Combustion chemistry; Gaseous fuel combustion & flames; Solid fuel combustion; Gasification & Syngas upgrading; Pollutant Emissions; Combustion in boilers; Advanced combustion technologies.

LEARNING OUTCOME:

LO1: Calculate key parameters of gaseous flames and analyse solid fuel combustion processes

LO2: Analyse the mechanism of pollutants formation along with combustion process control methods

LO3: Evaluate the advantages and disadvantages of combustion technologies

CP537 ELECTROCHEMICAL DEVICES
Lecturer: Dr Ed Brightman
Level 5 Semester 1 - CREDIT 10 / ECTS 5

SYLLABUS:

- Thermodynamics - equilibrium electrochemistry, galvanic cells and the Nernst equation
- Kinetics - Faraday’s Law and current-voltage relationship
- Energy devices - overview of different battery, fuel cell and electrolysis technologies, including commercial/industrial applications and their place in the energy landscape
- Device design, diagnostic methods and modelling
- Technoeconomic aspects of the hydrogen economy and grid scale energy storage

LEARNING OUTCOME:

LO1: Describe the main devices for electrochemical energy conversion and their uses in industries, transport and energy systems.

LO2: Describe the half cell reactions involved in fuel cells, electrolysers and redox flow batteries

LO3: Understand basic diagnostic tools used in electrochemical device development

CP538 ENVIRONMENTAL ENGINEERING FOR SOLVING INDUSTRIAL CHALLENGES
Lecturer: Dr McNab/Dr Somorin
Level 5 Semester 1 - CREDIT 10 / ECTS 5

Syllabus
The module will teach the following:

- An Introduction to Environmental Engineering for Solving Industrial Challenges
- Environmental Legislation
- Circular Economy
- Resource Efficiency
- Pollution Control Technologies

Learning Outcomes

- Understand and describe the main environmental and legislative issues for chemical engineers working in the industrial sector.
- Understand the role of resource efficiency and the circular economy in making the industrial sector more sustainable.
- Understand and describe the main environmental technologies used for pollution control (and the scientific and engineering principles used) to reduce the environmental impact from contaminants arising from industrial activity in the air, land and water.

CLASSES AVAILABLE SEMESTER 2 (JANUARY-APRIL)
Class coordinators/lecturers are listed below. Students should contact these members of staff in the first instance should further details of the class content be required.

CLASSES

CLASS CODE	CLASS TITLE	Level Strathclyde	CREDIT
YEAR 3			
CP302	MASS TRANSFER & SEPARATION PROCESSES	3	20
CP305	ETHICS, SUSTAINABILITY & ECONOMICS	3	20
CP325	CHEMICAL ENGINEERING DESIGN & ADV IT	3	10
YEAR 4			
CP407	CHEMICAL ENGINEERING DESIGN	4	60
YEAR 5			
18530	CHEMICAL ENGINEERING PROJECT	5	60

BRIEF CLASS DESCRIPTIONS (SEMESTER 2 CLASSES)

CP302 MASS TRANSFER & SEPARATION PROCESSES
Lecturer: Dr Iain Burns / Dr Paul Grassia
Level 3 Semester 2 CREDIT 20 / ECTS 10

SYLLABUS:

- Mass transfer: Students are expected to learn to calculate rates of mass transfer related to separation processes, including: diffusion in various simple geometries, diffusion with changing path-length, diffusion in solids and diffusion across a vapour-liquid interface.

- Vapour-liquid separation processes: Students are expected to learn how to apply the principles of mass and energy balances, vapour-liquid equilibrium and mass transfer to understand the operation of separation processes including: distillation, adsorption and stripping in staged and continuous-contact columns as well as multi-stage evaporation.

- Adsorption: Students are expected to learn about the thermodynamics of adsorbed phases, including binary mixtures, and ideal adsorbed solution theory. This will be used as the framework to learn about industrial adsorption processes under cyclic operation.

LEARNING OUTCOME:

LO1: To employ the principles of mass transfer to solving quantitative problems in a chemical engineering context.

LO2: To solve quantitative problems concerning phase equilibrium and mass transfer in chemical engineering separation processes.

LO3: To apply mass and energy balances in the design of separation processes.

LO4: To solve quantitative problems concerning the role of adsorption in chemical engineering separation processes.

CP305 ETHICS, SUSTAINABILITY & ECONOMICS
Lecturers: Dr Mark Haw / Dr Kaska Sypek
Level 3 Semester 2 CREDIT 20 / ECTS 10

SYLLABUS:

History and global context of sustainable development; basic concepts in sustainable development; introduction to life cycle assessment.
Ethical dimensions to engineering problem solving; professionalism, codes of conduct; and obligations to the public; ethical frameworks; introduction to applied ethics; psychological aspects of decision making; case studies engineering ethics.
Economics and Decision-making at project scale: Fundamental economics, market understanding, price and cost estimation, discounted cash flow project evaluation, risk.
Industrial development and larger scale strategic decisions: the major global challenges, 'free market' models and failures, modern innovation-driven practice and case-studies, sustainable commercialisation from early-stage innovations.

LEARNING OUTCOMES:

- LO1 Understand the historical and global context of sustainable development and be able to discuss life cycle assessment

- LO2 Understand the nature of professional responsibility and develop a professional ethical identity to carry forward in working life

- LO3 Have a basic understanding of economic fundamentals, common economic models, business practice and project evaluation, using them alongside other psychological and strategic factors, to demonstrate good decision-making in engineering practice

- LO4 Understand the drivers for larger scale strategic decisions related to chemical engineering, appreciating the role of innovation in chemical engineering industrial development as well as in the sustainable development/commercialisation of individual businesses and projects.

CP407 CHEMICAL ENGINEERING DESIGN
Coordinator: Dr Leo Lue
Supervisors: Academic staff
Level 4 Semester 2 CREDIT 60 / ECTS 30

SYLLABUS:

The module will be run with student assigned to teams, each advised by academic staff, consisting of 5 to 7 members. It will be mainly student driven, with weekly feedback meetings between the teams and their advisors. In addition, it is expected that each student team will also run its own meetings during the semester.

Key delivered elements of the module will include:
- Kick-off presentation: Presentation given to students in week 0 to present the design brief and expectation of the module.

- HAZOP lecture: A lecture will be delivered by expert practitioners on the details of HAZOP analysis.
- Writing skills lecture and workshop: A lecture and workshops will be held to develop the students' writing skills.

Key elements of assessment include:

- Phase 1 report: A report due in week 4 that considers process selection, location, procurement and supply, raw material and energy sourcing, economic, sustainability, environmental, and local regulatory issues. It should include a preliminary design and a plan and assignment of tasks for delivery of the final design report.
- Presentation: An oral presentation will be given at around week 7 by the team to update the advisors on the progress on the project since the submission of the phase 1 report.
- HAZOP interview: A detailed HAZOP performed by the team for a section of their process will be reviewed by an expert.
- Phase 2 report: A report detailing the final design.

LEARNING OUTCOMES:

LO1: Apply and adapt chemical engineering knowledge, design methodologies, and problem solving skills in unfamiliar situations to perform both scoping and detailed studies to generate innovative processes, systems, and products to fulfill industrial or societal needs. This includes identifying the objectives and context of the requirements with respect to business, technical, sustainable development, safety, health & environmental issues, and appreciation of public perception concerns.

LO2: Demonstrate the management and collaboration skills necessary to work within a team, planning, prioritizing and organizing activities, as well as effectively dealing with the challenges of working with peers, to meet deadlines.

LO3: Demonstrate the ability to communicate and present the outcomes and rationale of the design clearly, concisely, and effectively, with the appropriate amount of detail and explain and defend chosen design options and decisions.

LO4: Demonstrate skills to research, critically evaluate, and work with technical information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory to mitigate deficiencies.

18530 CHEMICAL ENGINEERING PROJECT
Coordinator: Dr Yi-Chen Chen
Supervisors: Academic staff
Level 5 Semester 2 CREDIT 60 / ECTS 30

SYLLABUS:

The module project is either an industrial case study or a research project. The Industrial case study will be based at cohort of oil/gas/petrochemical and other companies who have participated in these placements since 2003. The research project may be based internally or at an approved European University.

The scope of the project will provide the student with the opportunity to implement chemical engineering technical skills and knowledge, and identify how and where the value of their work undertaken impacts on an organisation’s activities or research activities.

LEARNING OUTCOME:

LO1: Gained experience of extending themselves with open-ended work, in contrast to the more reactive type of work involved in taught classes, labs, and design classes.

LO2: Gained professional engineering experience and/or research experience

LO3: Gained experience of project management and communication skills, setting targets, time management, monitoring and critically evaluating process, communicating interim and final outcomes both verbally and by written report/thesis.