

Module Details	
Module Title	Mass Transfer Operations (At Distance)
Module Code	CPE5010-B
Academic Year	2021/2
Credits	20
School	Department of Chemical Engineering
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Seminars	2
Practical Classes or Workshops	6
Lectures	12
Directed Study	180

Availability	
Occurrence	Location / Period
DLA	University of Bradford / Academic Year

Module Aims
To introduce the basic principles of chemical engineering separation processes and mass transfer and then proceed to study the design and operation of separation processes units operation such as distillation, gas-liquid absorption and stripping, liquid-liquid extraction, adsorption and crystallisation.

Outline Syllabus
Distillation (binary and multi-component). Calculation of number of plates, column height and diameter, heat transfer in condenser and reboiler. Crystallisation; application, theory, basic principles, super-saturation effects. Gas absorption including application, different types of equipment in industry, process design of a column to find the height and diameter of the column, required solvent flow rate. The concepts and procedure for their calculation of the number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are immiscible, including application, different types of equipment in industry, solvent selection, process design of a column to find the height and the diameter of the column and the required solvent flow rate. The concepts and procedure for their calculation of number of theoretical stages, height of theoretical stages, number of theoretical and height of theoretical units will be explained. Liquid-solvent extraction when the phases are miscible, including application, different types of equipment in industry, solvent selection, process design of counter-current and cross flow stage wise operations to find the number of stages to meet operation constraints.

Learning Outcomes	
Outcome Number	Description
01	Explain the physical phenomena, theoretical concepts and design aspects of mass transfer in separation processes, including distillation, gas-liquid absorption, gas-solid adsorption, liquid-liquid extraction and crystallisation.
02	Analyse the important separation processes of distillation, gas absorption, adsorption, liquid-liquid extraction and crystallisation and carry out design calculations appropriately of the above processes.
03	Apply simplifying assumptions to complex problems in order to gain useful design information individually and in a team.
04	Communicate (written and verbal) outcome of practical work.

Learning, Teaching and Assessment Strategy
The assessment will be by formal examination (70%) and course work (30%). The formal exam, worth 70%, is of 2.0 hr duration and taken at the end of semester 2. Formative assessment will take the form of frequent class tests on the unit operations of Distillation, Gas Absorption and Solvent Extraction. The coursework consists of a critical report of the group laboratory experiments on Distillation and Gas Absorption. It will include in it design and operation elements as well critical evaluation of the data collected. The coursework is worth 30% and students will have two weeks to complete it. Summative peer evaluation will be taken into account when calculating the individual mark for the coursework.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - MCQ	Online MCQ examination: closed book (1 Hr)	70%
Summative	Coursework	1 written report (1200 Words)	30%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.