UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Reaction Engineering
Module Code	CPE5005-B
Academic Year	2020/1
Credits	20
School	Department of Chemical Engineering
Subject Area	Chemical and Process Engineering
FHEQ Level	FHEQ Level 5
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	36
Online Tutorials (Synchronous)	18
Laboratories	6 (original and 2 (in case of the lockdown)
Practical Classes or Workshops	2 (computer workshop)
Directed Study	136

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

Module Aims
To deliver a comprehensive understanding of the methodology of linking chemical kinetics with material and energy conservation in the design of idealised homogeneous and heterogeneous chemical reactors operating both in batch and continuous modes and under both isothermal and non-isothermalt conditions.

Outline Syllabus

Chemical Kinetics: rate equations and reaction rate constant; activation energy, its determination and interpretation; Arrhenius law; reaction kinetics of complex heterogeneous reactions; consecutive and competing reactions and rate determining steps; catalysis.
Reactors: Modelling of basic reactor types; derivation of mass and energy equations for batch, tubular and continuous flow stirred tank reactors under isothermal and non-isothermal conditions; heterogeneous reactors including basic principles of packed bed and fluidised bed catalytic reactors, reactors in series; transient operations of continuous stirred tank reactors; non-ideal flow behaviour; resident time distributions and their interactions with reaction kinetics.

Learning Outcomes

Outcome Number	Description
01	Apply knowledge of reaction engineering and reactor types.
02	Apply the principles of reaction engineering and mass and energy balances to the design and analysis of simple reactor system.
03	Measure and critically evaluate reactor design and systems; predict the conversion, temperature dependency, behaviour of reactors in simple engineering applications.
04	Develop analytical skills, problems solving skills and design skills related to reaction engineering.

Learning, Teaching and Assessment Strategy

Theory, implementation, application, critical analysis is gained through lectures, tutorials, Aspen Hysys computer workshop, e-learning, peer feedback (lab session), case studies and directed study. Engineering application and evaluation is gained from three separate lab sessions.
Both formative and summative assessment. Formative assessment using online quizzes mainly on of understanding and application. Summative assessment on critical analysis by examination; assessment of engineering application assessed by two separate laboratory coursework. The laboratory reports will be moderated by peer review.
Note that due to current COVID19 pandemic, the module uses a blended approach to support learning and achievement. These will include attending lab activity in a shorter time, i.e. 1 hour, short video records that address key concepts, supplementary learning materials. Online tutorials will also be used to support learning and monitor progress as student move through the curriculum. Several online quizzes through the year and one formative assessment at the end of sem1.
Supplementary assessment as original.

Mode of Assessment				
Type	Method	Description	Length	Weighting
Summative	Laboratory Report	Two separate group laboratory report of 2000 words excluding tables, figures, appendices and references.	N/A	30%
Summative	Examination - Open Book	Students required to answer questions by showing detailed calculations.	N/A	70%
Formative	Examination - MCQ	Minimum 4 quizzes (online) or paper based (formative)	15 minutes	N/A
Formative	Examination - MCQ	Minimum 4 quizzes (online) or paper based (formative)	15 minutes	N/A

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.

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