

Module Details	
Module Title:	Reaction Engineering
Module Code:	CPE5005-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Chemical Engineering
Subject Area:	Chemical and Process Engineering
FHEQ Level:	FHEQ Level 5
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	42
Tutorials	21
Laboratory	9
Directed Study	128

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year (Sept - May)

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 isothermally and non-isothermally 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

1	Apply knowledge of reaction engineering and reactor types.
2	Apply the principles of reaction engineering and mass and energy balances to the design and analysis of simple reactor system.
3	Measure and critically evaluate reactor design and systems; predict the conversion, temperature dependency, behaviour of reactors in simple engineering applications.
4	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 three separate laboratory coursework. The laboratory reports will be moderated by peer review.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Laboratory Report	Three separate group laboratory report, 1 report in Semester 1 and 2 reports in Semester 2, each 10%	-2000 words	30%
Referral	Laboratory Report	If student fails in any lab section, s/he must repeat the one that failed. 2,000 words are excluding appendices and references and data in Tables.	-2000 words	30%
Formative	Examination - MCQ	Minimum 4 quizzes (online) or paper based (formative)	15 minutes	%
Summative	Examination -	Students required to	2 hours	70%

	closed book	answer questions by showing detailed calculations. Programmable calculators are not permitted. Questions cover contents of both semesters 1 and 2.		
Referral	Examination - closed book	Students required to answer 3 questions by showing detail calculations. Programmable calculator not permitted. Questions cover contents of both semesters 1 and 2.	2 hours	70%

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.