

Module Details	
Module Title	Reaction Engineering
Module Code	CPE5005-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Directed Study	138
Lectures	36
Tutorials	18
Laboratories	6
Practical Classes or Workshops	2

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-isothermal conditions.

Outline Syllabus
<p>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.</p> <p>REACTORS (Fundamentals, Design and Operations): 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 the 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, simple biochemical reactions and reactors.</p>

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
<p>Theory, implementation, application, and critical analysis are gained through lectures, tutorials, Aspen Hysys computer workshops, e-learning, peer feedback (lab session), case studies and directed study. Operation, Design, Engineering application and evaluation are gained from three separate lab sessions. Both formative and summative assessment. Formative assessment using online quizzes mainly on understanding and application. Summative assessment on critical analysis by examination; assessment of engineering application assessed by two separate laboratory/design coursework. The laboratory reports will be moderated by peer review.</p> <p>The module uses a face-to-face approach (as much as possible) to support learning and achievement. These will include attending lab activities, lectures and all tutorials. Under additional resources in Canvas, several videos and supporting materials are made available to enhance learning. Several online quizzes through the year and one formative assessment at the end of sem1. Supplementary assessment as original, with individual report(s) required in place of group report(s).</p>

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - Closed Book	Students required to answer questions by showing detailed calculations (2 Hrs) This will be at the end of Sem1	35%
Summative	Laboratory Report	2 separate group lab report of 1500 words excluding tables, figures, appendices and references. Pre-lab is 10%	30%
Summative	Examination - Closed Book	Students required to answer questions by showing detailed calculations (2 Hrs). his will be at the end of Sem2.	35%
Formative	Examination - MCQ	Minimum 4 quizzes (online or paper based) (formative mid-term)	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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