

Fluid and Particle Mechanics

Module Code:	CPE5006-A
Academic Year:	2018-19
Credit Rating:	10
School:	Department of Chemical Engineering
Subject Area:	Chemical and Process Engineering
FHEQ Level:	FHEQ Level 5
Module Leader:	Dr Rajnikant Patel

Additional Tutors:

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	13
Tutorials	14
Laboratory	9
Directed Study	62.5
Examinations DO NOT USE	1.5

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

The aim of this module is to give the student an understanding of the concepts and theory involved in fluid and particle mechanics.

Outline Syllabus

- 1) Free settling of solid particles: Drag force on spherical particles, Terminal settling velocities, Unsteady state free settling - (Stokes Law Region), Cyclone separation (solid-gas).
- 2) Hindered settling of solid particles: Modifications of Stokes Law, Empirical models (Richardson & Zaki), Packed bed model, Application to design of continuous thickeners.
- 3) Flow through porous media granular beds, packed columns and fluidised beds: Characteristics of packed beds, Capillary model for flow through packed beds (Carman-Kozeny and Ergun Equations), Flow through expanded beds (minimum fluidisation velocity, design of fluidised beds, hindered settling).
- 4) Filtration: Flow through filter cakes (incompressible cake), Flow through filter media, flow through compressible cake, Constant rate/pressure filtration, Washing of cake.
- 5) Gas Cyclone design and operation
- 6) Design of mixing vessels.
- 7) Dimensional analysis.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1 1.1 Analyse the physical phenomena, theoretical concepts and design aspects of processes involving particulate systems.
 1.2 Develop laboratory skills of some unit operations and practical awareness of health and safety issues in chemical processes
- 2 2.1 Apply calculation procedures for preliminary design work
 2.2 Use laboratory skills to achieve desired outcomes
- 3 3.1 Engage with problem solving techniques having wider applications in the chemical industry.

Learning, Teaching and Assessment Strategy

Theoretical understanding and problem solving are achieved through lectures and tutorials/example classes. Practical skills are developed in the laboratory sessions. The syllabus content involves various teaching and assessment methods suited to achieving the learning outcomes.

The 'Directed Study' is the number of hours students need to spend on average, in their own time, researching deeper into the subject matter. This would also include reading about the unit operations used in the laboratory and preparing the lab reports.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Laboratory Report	Group report on Sedimentation Fluidised Bed. Moderated by peer review		30%	Yes
Summative	Examination - closed book	Examination - closed book	1.5 hours	70%	No

Legacy Code (if applicable)

ENG2314M

Reading List

To view Reading List, please go to [rebus:list](#).