

Module Details	
Module Title	Food and Pharmaceutical Process Engineering
Module Code	CPE7004-B
Academic Year	2023/4
Credits	20
School	Department of Chemical Engineering
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Independent Study	160
Tutorials	12
Lectures	24
Practical Classes or Workshops	4

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2
BDB	University of Bradford / Semester 2

Module Aims
<p>Food and Pharmaceutical Process Engineering is a multidisciplinary module that provides students with advanced knowledge of mixing, crystallisation, drying, extrusion, separation in process industry, the design of equipment for food and pharmaceutical processing such as mixing, hot melt extrusion, distillation, extraction, membrane separation and heat treatment units. Economic, legal, social and environmental issues are explained in relation to the use of these unit operations.</p>

Outline Syllabus

1. Mixing in the Process Industry: Introduction
2. Mixing in Agitated Vessels: Circulation & Intensity of Circulation, Power Consumption, Mixing Time
3. Mixing in Agitated Vessels: Extension to real non Newtonian fluids.
4. Crystallisation and Crystallisers
5. Drying of pharmaceuticals
6. Size reduction and size enlargement in pharmaceutical industry
7. Size enlargement (dry, wet & melt granulation), extrusion spheronisation
8. Polymeric solid dispersions & hot melt extrusion
9. Powder technology and tableting
10. Processing Techniques in the Food Industry (e.g. Freezing, Drying, Moisture Control, Thermal, Membrane Separation).
11. Food Processing Units and Process Modelling using gPROMS (process modelling tools).
12. Design and operation optimisation of unit operations applied in food processes
13. Economic, legal, social and environmental issues in design and operation of many of the above unit operations.

Learning Outcomes

Outcome Number	Description
01	Specify quantitatively the characteristics of mixing, fluid flow, drying, filtration, crystallisation;
02	Develop critical understanding of different unit operations applied to food and pharmaceutical processes and develop problem solving skills.
03	Develop skills in the use of software in food process modelling, simulation and optimisation.
04	Appreciate the impact of design and operation of food and pharmaceutical processes on the economic, legal, social and environmental issues.

Learning, Teaching and Assessment Strategy

The topics are delivered through interactive lectures; group discussions; tutorials involving hand calculations; computer labs developing process models for unit operation used in food processing. Interactive sessions and group discussions are activated via directed learning on the topics. The computer lab sessions are interactive and are supported by the tutor and the students.

Two pieces of Coursework each accounting 50%.

Coursework 1: Work individually or in a group (a) to develop food process model and simulate using a modelling software gPROMS (b) to research and write a critical report on the design and operation optimisation of given food processing unit operation reflecting on economic (cost), social and environmental (food waste, energy conservation, volatile organic compounds, health) aspects.

Coursework 2: Work individually to write a report comparing two routes to manufacture pharmaceutical amorphous solid dispersions. Practical laboratory experiments will be performed to produce ASDs, and their resultant properties will be measured. The report should provide a comparison of the two processes and their respective advantages and disadvantages, making reference to published research studies within this field. Consideration should be made of the environmental, economic and social considerations.

It is a requirement of the Institution of Engineering and Technology (IET) that students MUST achieve a mark of at least 30% in assessment components weighted above 30% IN ADDITION to achieving a mark of at least 40% in the module overall. This requirement applies ONLY to students on IET accredited programmes, which is the BDA occurrence/version of the module.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Written	Group/Individual report (2000 words per student)	50%
Summative	Coursework - Written	Individual Report (2000 words)	50%

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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