

BS937-10 Bioproduct Plant Design & Economic Analysis

21/22

Department

Life Sciences

Level

Taught Postgraduate Level

Module leader

Guy Barker

Credit value

10

Module duration

2 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The module explains the integration of Unit Operations into functional and commercially viable bioprocesses.

[Module web page](#)

Module aims

Bioprocesses are evaluated with regard to optimising performance in the context of process efficiency, product quality, capital and operating costs and environmental performance.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

This module aims to familiarise the students with the principles and methodologies of modern chemical plant design. The students will be introduced to the multidisciplinary, step-wise approach to the design project, starting from a conceptual phase up to the front end engineering design. As

well as the fundamental process design principles, the module will address operational, safety and environmental aspects of a well-designed and successful manufacturing facility. The role of key financial instruments and methods of economic analysis will be developed and demonstrated in evaluating the plant profitability and investment criteria. The latter part of the module will introduce students to the principles and applications of computer assisted process design. Starting with the process flowsheet development, the students will be also familiarised with the modelling of process units and solution strategies for solving complex process networks.

Learning outcomes

By the end of the module, students should be able to:

- Identify and evaluate the key process steps to convert raw materials into marketable end products.
- Recommend and justify courses of action for bioprocess design and functionality to optimise operations.
- Undertake capital and operating cost analysis.
- Identify knowledge gaps in the design and evaluation of bioprocesses using the key skills of numeracy, communication & ability to use process analysis tools.
- Effectively communicate the design and feasibility of bioprocessing systems by oral, written or visual means.

Indicative reading list

Warren McCabe, Julian Smith and Peter Harriot, Unit Operations of Chemical Engineering ISBN: 0070393664 McGraw-Hill Science/Engineering September 2000

. Perry (2008) Chemical Engineers Handbook Platinum Edition
ISBN 0071355405

Bruce Nauman (2008) Handbook of Chemical Reactor Design, Optimization, and Scaleup. Wiley

MacKenzie Davis and David Cornwell (2008) Introduction to Environmental Engineering. McGraw-Hill.

Peters M S, Timmerhouse K D, (2003) Plant Design and Economics for Chemical Engineers. McGraw-Hill.

W.D. Seider, J.D. Seader, D.R. Lewin (2010) Product & Process design principles: synthesis, analysis, and evaluation. Wiley.

Sustainability in the design, synthesis and analysis of chemical engineering processes / edited by Gerardo Ruiz-Mercado, Heriberto Cabezas
mediaName E-Book | Butterworth-Heinemann is an imprint of Elsevier | 2016

[View reading list on Talis Aspire](#)

Subject specific skills

Undertake capital and operating cost analysis.

Use process analysis tools.

Transferable skills

Communication of the design and feasibility of systems by oral, written or visual means.

Numeracy

Communication

Study

Study time

| Type | Required |
|---------------|-----------------------------|
| Lectures | 20 sessions of 1 hour (20%) |
| Seminars | 8 sessions of 1 hour (8%) |
| Private study | 72 hours (72%) |
| Total | 100 hours |

Private study description

Self teaching/study/seminar preparation time = 72 hours

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A2

| | Weighting | Study time |
|-------------------------------|-----------|------------|
| Assessed Seminar (30 minutes) | 40% | |
| 20-minute assessed seminar | | |
| Essay (1500 words) | 60% | |
| Essay | | |

Feedback on assessment

Oral feedback on seminar presentations. Written individual feedback to each student on essay and group on seminar assessments. Face-to-face feedback on any assessment provided on request from the student.\r\n\r\n

Availability

Courses

This module is Core for:

- Year 1 of TBSS-C5N2 Postgraduate Taught Biotechnology, Bioprocessing and Business Management