Unit

Sustainability in Chemical Engineering

Level	***Term***	***Duration***
CET I	LT 2021	12 lectures

Background

Sustainability (or *sustainable development*) is, arguably, the most pressing societal challenge today. It has become a major factor in decision making of many companies employing chemical engineering graduates. This course will examine the foundation principles of sustainability, the concept of life cycle and its adoption in industry, the concept of circular economy and its implications for chemical industry, and the more challenging topic of sustainability as a *complex systems* problem.

Aims

This course provides an overview of sustainability in a chemical engineering context. The aim is to establish the conceptual framework and foundation for quantitative methods to the analysis of (bio)chemical processes with respect to their impact on sustainability.

Learning Outcomes

After completing this course and the associated problem sheets, students should be able to:

- Know the origins of sustainability concept and key international policy documents outlining the directions towards sustainability.
- Understand the concept of life cycle and be able to apply it to basic (bio)chemical processes.
- Understand the concept of sustainability as a system's problem

Assumed Knowledge

Material	*Source*
Algebra; Material balances; Energy balances	IA courses

Connections To Other Units

This course builds on material taught in CET IA.

Self Assessment

Examples of problems within lectures; one exercise; supervisions.

Assessment

The material from this unit is assessed by coursework.

Prepared	***Approved***	***Subject Grouping***
AAL 12/9/2020	GDM	Group A: Compulsory Topics

Unit	***Staff***
Sustainability IB	Prof. A.A. Lapkin

Synopsis

1. Sustainability concept and its place in (Bio)Chemical Engineering
2. Three pillars of sustainability
3. Life cycle thinking
4. Sustainability as system science

Teaching Materials

References to original and review papers for background reading and discussion will be mentioned during lectures and deposited in Moodle.
The following books may be useful:

- B.R. Bakshi, Sustainable Engineering. Principles and Practice, Cambridge University Press, 2019.
- M. Robertson, “Sustainability Principles and Practice”, Routledge, 2014.