

# **Cambridge Engineering Thinking + PBL**

## **2024 Course Syllabus**



**PBL Track: Empowering the Future: Designing a Green Energy System to Combat Climate Change**


## I. Course Information

Course Dates	22nd January - 4th February 2023
Course Duration	2 Weeks
Course Hours	40 hours in total It includes a total of 24 hours of Lectures and Supervisions delivered by Cambridge professors and experts in both Foundation Module and PBL modules, 16 hours of Group workshops and practical sessions.
Pre-requisites	A background in basic statistics is required for the course. Programming experience is helpful but not necessary.
Assessment	Assessed individually and in groups through group projects
Skills Trained	Problem solving, design thinking, project planning, teamwork, presentation, communication
Materials Required	Internet connection and devices for writing, interacting with online templates such as Google Docs, researching a project and preparing for a final group presentation

## II. Course Description

‘Systems that work do not just happen – they have to be planned, designed and built.’ So said the Royal Academy of Engineering in 2007. To maximise success in an increasingly complex world, employing design thinking and systems thinking is even more important now than it was then. We often hear calls for ‘systems thinking’ and a ‘systems approach’, but how can this be done? This course will teach students to follow a method for systems thinking that has been employed successfully in many domains, including in the world of healthcare systems design and at government and policy level.

Embark on an enthralling exploration of system design, presented through a nuanced, application-driven lens. Delve into the foundational tenets that govern this vast domain, setting the stage for deeper engagement. As we transition from elemental constructs to sophisticated methodologies, participants will be invited to immerse themselves in carefully curated Project-Based Learning (PBL) scenarios. These hands-on experiences aim to cultivate and crystallize the design ideologies inherent to the field.



To culminate this transformative learning experience, students will channel their newfound knowledge and insights into a capstone project— an opportunity to showcase, reflect, and innovate on the principles imbibed throughout this enlightening journey.

### III. Goals & Objectives

The course will introduce the concept of design thinking and a systems approach through four perspectives: systems, design, risk and people. It is anticipated that many principles learned will be useful for the rest of the students’ lives as it will help students to learn a method for design that can be used to help create future systems in a wide range of domains.

**Fourfold Insight:** Dive deep into the realms of:


 **Systems:** Understanding the intricate web of interconnectivity.

 **Design:** Crafting solutions with elegance and functionality.


 **Risk:** Foreseeing and mitigating potential pitfalls.

 **People:** Centering the human element in all endeavors.

**Timeless Takeaways:**

 Equip yourself with principles that transcend time, and remain pertinent throughout your life's journey.

**Universal Application:**

 Master a design methodology, not just for the present, but to mold and shape the systems of the future across diverse domains.

### IV. PBL in Empowering the Future: Designing a Green Energy System to Combat Climate Change

**Objective:**

Design and propose a sustainable green energy system capable of substantially reducing carbon footprints and mitigating the effects of climate change in a chosen region or community.

  
**Description:**

As the urgency to combat climate change grows, the search for viable green energy solutions becomes paramount. In this PBL module, participants will embark on a journey to conceptualize, plan, and prototype a sustainable green energy system tailored for a specific geographical area. They will address local challenges, harness available resources, and navigate the sociopolitical landscape to deliver a holistic energy solution that aligns with the global agenda of reducing carbon emissions.

**Key Components & Milestones:**

1. Research & Needs Assessment
2. Exploration of Green Energy Sources
3. System Design & Integration
4. Stakeholder Engagement & Policy Framework
5. Economic & Environmental Impact Analysis
6. Prototype & Pilot Testing
7. Refinement & Scalability Plan

**Outcome:**

By the end of this PBL module, participants will have a comprehensive understanding of the intricacies involved in green energy system design and implementation. Armed with a prototype and a wealth of data, they will be poised to make impactful contributions to the global fight against climate change and pave the way for a more sustainable future.

**V. More information****Assessment**

Learning will be assessed through small group presentations at the end of the course. Each individual will be expected to present within their group presentation time. The quality of the presentation will be assessed by the instructor. Teams will need to demonstrate how they have used a systems approach to plan or design an improvement. The emphasis will be on the process they have followed rather than the quality of the finished product.

**Format**

The course will take place in a face-to-face format, interspersed by self-directed group work, to prepare for the assessed presentation.

**Reading List**

Readings will be provided to students prior to the course.