COURSE CONTENT

Course Code	DR5004
Course Title	Design and Systems Thinking
Pre-requisites	Nil
No of AUs	3
Contact Hours	39

Course Aims
In this course you will engage with two aspects of the human thinking process: 1) the versatile investigation and problem-solving process known as design thinking where you will experience new ways of gaining insights when designing for a situation where the emphasis is on human considerations. By applying the design thinking process, you will respond with solutions that are appropriate to the intended audience. 2) the holistic approach to investigation and analysis of systems thinking focusing on the way that a system's constituent parts interrelate and work over time and within the context of larger systems. You will be exposed to constraints and boundary conditions of systems, their interconnectivity and dynamics that define real-world challenges. You will use methods of systems thinking to break systems down into their separate elements and apply strategic processes to aid in the development of viable solutions. This course complements EE5082 Interdisciplinary Project Work providing the foundational basis based on which you can then apply to EE5082.

Intended Learning Outcomes (ILO)
Upon the successful completion of this course, you will be able to: 1. Describe the ideology and processes of design thinking and how it differs from other design and development methods. 2. Apply creative and inventive techniques to develop a responsive design concept through to prototype supported with rationale that responds to human-centred situation. 3. Define the basic principles and properties that define a system and provide real-life examples highlighting the dynamics of a system. 4. Differentiate between linear and non-linear systems and their differences. 5. Identify leverage points in systems and develop a unique process that is in response to specific situations that require systems. 6. Constructively discuss and critique design thinking and systems thinking approaches, processes and solutions employed by peers.

Course Content

In this course, you will learn and apply the creative process of design thinking and the holistic analysis process of systems thinking. You will work in teams with students from different backgrounds, and together you will employ an innovative investigation process to understand a topic and respond with creative and appropriate solutions.

Seminars

In-class seminars and mini-lectures will outline the background and theory of design thinking and systems thinking, and how both can be employed to real world problems and issues of today. You will learn about how design and systems of thinking has infused into a wide range of sectors, including business, technology, education, commerce and engineering.

Projects and workshops

In a creative environment, you will practice the various process of design thinking and systems through projects and workshops on real world topics that you select, or be given.

Teamwork

In this course you will frequently work in a team. When in a team, you will be additionally assessed on:

Collaborative achievement: How well the team meets the project brief in a way that surpasses the capabilities of a single individual.

Collaborative creativity: How well the team demonstrates initiative, exploration, and creativity, combining the separate skills and abilities of the individuals to expand and generate new creative outcomes.

Individual growth: How much you grow as an individual within the team. This could be creative, technical, or team-related such as team management.

Individual contribution: How effective your contribution is to the team. This includes performing your role as expected or exceeding expectations in areas such as meeting deadlines and contributing to key moments such as presentations, screenings, discussions, and submissions.

Team relationship: This includes inter-personal team relationships, with aspects such as positive engagement, readiness to contribute, value of communication, sharing of ideas, fairness, and peer support. You may also be assessed on team management and leadership.

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1	Introduction to **Design Thinking** • Overview of concepts • Principles of Human centric/user centric approach • Basics of observation, engagement, immersion, empathy, interview	1	**Introductory Lecture**
2	Design Thinking **Project** – group project, topics to be given • What is the nature of the topic? Why use Design Thinking • Selecting target users • Case studies	1-2	**Project Briefing** Understanding the project challenge In-class exercise, group discussions
3	Project – Empathy • Engagement with users • Understanding true requirements • Case studies	1-2	**In-class Lecture** In-class exercise Group Discussions
4	Project – Ideation • How to generate a range of ideas, • Using a variety of techniques to ideate • Selecting ideas to develop • Case studies	1-2	**In-Class Lecture** In-class exercise on ideation for the project
5-6	Project – Prototyping • idea prototyping • Fast prototyping and iteration • Testing prototyping with users/peers • Refining prototyping • Case studies	1-2	**Demonstration** Introduction to prototyping workshop, Exercise in prototyping
7	Design Thinking Project Group Presentations	1-2, 6	**In class presentations** Group presentations
8	Introduction to **Systems** • Definitions of inflow, outflow, stocks • Feedback loops • One-stock and two-stock systems • Systems with delays	3-5	**In-class Lecture** In-class exercise Group Discussions
9	Types of Systems • Resilient systems	3-5	**In-class Lecture** In-class exercise

	• Self-organising systems • Sub-systems and hierarchy • Linear and non-linear systems		Group Discussions
10	Properties of systems • Boundaries • Layers of limits-law of the minimum • Delay in systems • Bounded rationality and systems	3-5	**In-class Lecture** In-class exercise Group Discussions
11	System traps and opportunities • Policy resistance • Tragedy of the commons • Drift to low performance • Escalation • Success to the unsuccessful	3-5	**In-class Lecture** In-class exercise Group Discussions
12	System intervention • Buffers • Stock and flow structure • Delays • Balancing and reinforcing feedback loops • Information flow	3-5	**In-class Lecture** In-class exercise Group Discussions
13	Presentation/ Submission of Systems Thinking Assignments • Reflection of the module	1-6	**In class presentations** Group presentations Discussions