Annex A

3. TEMPLATE FOR NEW/CURRENT/REVISED COURSE CONTENT

PROPOSED COURSE OUTLINE FOR ET5217

Academic Year	AY22-23	**Semester**	1
Course Coordinator			
Course Code	ET5217		
Course Title	Design and Systems Thinking for Entrepreneurs		
Pre-requisites	Nil		
No of AUs	4		
Contact Hours	Lectures: 11 x 2hr Tutorials 11 x 2hr Student presentations 2 x 4hr External speakers		
Proposal Date	22 September 2021		

Course Aims

In this course you will explore how Design and Systems Thinking contribute to entrepreneurship. The Design Thinking methods will improve your understanding and interaction with potential customers and allow you to respond rapidly with flexibility to their needs. With Systems Thinking you will be aware of and explore the inter-dependent connections between the multiple components of any venture. A comprehensive appreciation of Design and Systems Thinking will enable you as an entrepreneur to navigate confidently through the development of your venture or business.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Describe the principles and processes of Design Thinking as it applies to entrepreneurship.
2. Describe the principles and processes of Systems Thinking as it applies to entrepreneurship.
3. Develop Design and Systems Thinking responses to a range of entrepreneurial situations.
4. Demonstrate initiative and flexibility when applying Design and Systems Thinking processes in response to a specific situation.
5. Confidently present, discuss and critique strategies, processes and solutions of own work and work of peers in a constructive and participatory manner.

Course Content

In this course you will explore how Design and Systems Thinking contribute to entrepreneurship. You will begin by examining the concept of Design Thinking, with its innovative approach to understanding a potential client's needs. You will explore the process of how Design Thinking can introduce attitudes into a business that create an active and innovative relationship with potential clients. You will learn Design Thinking techniques and apply them in your own team-based project. The second half of the course introduces Systems Thinking, which in many ways absorbs Design Thinking into a larger context. You will study the concepts and principles of Systems Thinking, and then apply these in the second team-based project.

Lectures
Lectures will outline the background and theory of Design 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 Thinking have infused into a wide range of sectors, including business, technology, education, commerce and engineering. The lectures will highlight the practical application of these methods with real-world examples.

Tutorials
Tutorials will provide a place to address the week's lecture topics and add further discussion. In the tutorials you will also form project teams, working towards the project presentations. Over time, the tutorials will evolve to operate more like workshops, where the projects are developed, discussed amongst peers, and feedback received from the lecturer.

Teamwork and Project Presentations
This course includes two team-based project presentations. You will also provide an individual project report. The team aspect is important in this course, as both design thinking and systems thinking are very reliant on working with people. The assessment for the team projects will assess the group achievements as well as your own personal contribution and achievements. The team assessment has 4 criteria:

1. **Collaborative achievement:** How well the team meets the project brief in a way that surpasses the capabilities of a single individual.
2. **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.
3. **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.
4. **Inter-personal team relationship:** This includes 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.

Reflection: Each member of the team will reflect on their contribution and team performance in a confidential response document submitted at the conclusion of the project. The Reflection allows the

individual to share with their instructor their personal views of their team experience. Reflections will vary according to the nature of the course, the project, and the team's composition.

Assessment (includes both continuous and summative assessment)

Component	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment Rubrics
Design-Thinking Report	Analysis, Lateral thinking, Research, Written communication	20%	Individual	Appendix 1
Systems-Thinking Report	Analysis, Lateral thinking, Research, Written communication	20%	Individual	Appendix 1
Presentation - Design Thinking Presentation	Presentation, Communication	20%	Team / Individual	Appendix 2 (Team assessment)
Presentation - Systems Thinking Presentation	Presentation, Communication	20%	Team / Individual	Appendix 2 (Team assessment)
Participation – Lectures, Tutorials and Team projects	Competence, Communication	20%	Individual	Appendix 3

Additional Submission Requirement – Declaration Form

Self-appointed team leaders from each team are required to fill-in the NTC Declaration Form. The declaration form is to be included as the front cover page of the assignment. Any submission without the declaration form will be deemed as late and grades will be deducted accordingly.

Formative feedback

You will receive feedback on your projects from your peers and the lecturer during presentations and in tutorials. This feedback can be both individual- or team-based.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lectures	Lectures will outline the background, and theory of design thinking and

	systems thinking, and how it has emerged as a central problem-solving process in society and for entrepreneurs today. You will learn about how design thinking and systems thinking has infused into a wide range of sectors, including business, technology, education, commerce and engineering.
Tutorials	Tutorials provide the place to discuss and reflect on the content of the lectures. Relevant issues arising from the topic will be discussed. The tutorial times may also include out-of-class activities.
Team-based project learning	At times you will be encouraged to work in project teams. Collaborating with peers in small groups allows you to develop communication skills, group responsibility, leadership skills, and positive interdependence. Team-based project learning provides the platform to learn how to create human-centred solutions to human-created challenges. Projects also afford natural social organisations through which you can co-construct your understanding of real-world challenges and co- develop solutions to these challenges with one another.
Student Presentations	The student presentations provide the opportunity for your team to demonstrate your innovative design and systems thinking solutions to specific challenges. You will need to pitch your solution with confidence and convince your audience of its effectiveness.

Reading and References

References

1. Brown, T. Katz, B. *Change by design : how design thinking transforms organizations and inspires innovation.* Harper Business. 2009.
2. Buchanan, R. Wicked problems in design thinking. *Design Issues,* 8(2), 5-21. 1992.
3. IDEO's The Field Guide to Human-Centred Design (http://www.designkit.org//resources/1)
4. IDEO www.ideo.com
5. Stanford d.school's Bootcamp Bootleg (https://dschool.stanford.edu/resources/design-thinking-bootleg)
6. Kelly, T. Littman, J. *The art of innovation : lessons in creativity from IDEO, America's leading design firm.* Harper Collins Business. 2001
7. Jolly, R., & Can, I. (2015). Systems Thinking for Business. Portland, Oregon: Systems Solutions Press.
8. Meadows, Donella H, Thinking in systems, Earthscan. 2009.
9. Richmond, Barry, and Steve Peterson. An introduction to systems thinking. Lebanon, NH: High Performance Systems., Incorporated, 2001.

Course Policies and Student Responsibilities

(1) General

Students are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled assignments and tests by due dates. Students are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions they have missed. Students are expected to participate in all seminar discussions and activities.

(2) Absenteeism

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

(3) Absence Due to Medical or Other Reasons

If you are sick and not able to attend a quiz or midterm, you must submit the original Medical Certificate (or another relevant document) to the administration to obtain official leave. In this case, the missed assessment component will not be counted towards the final grade. There are no make-up quizzes or make-up midterm.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, and collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructor

Instructor	Office Location	Phone	Email
Prof Gray Hodgkinson			ghodgkinson@ntu.edu.sg

Planned Schedule

Week	Course ILO	Description
1	1	**1. Introduction to Design Thinking**

		• What is Design Thinking? • Value to business • History of Design Thinking, development and application. Key moments. • What is the goal? What is the new way of seeing, understanding, and making change? • When to use Design Thinking? **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities.
2	1,3	**2. Empathy** • Understanding the challenge and defining the task • Ethnographic surveys and principles of observation • Empathy and engagement • Interviews, discussion, listening, stories • Interpreting behaviours **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
3	1,3,4	**3. Definition** • Reframing the issues to human-centric statements • Identifying meaningful moments • Identifying significant insights • Defining scale and point of view **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
4	1,3,4	**4. Ideation** • Organising data and recognising patterns • Recognising solutions in response • Ideation methods • Generating a diversity of ideas • Revisiting original surveys and preconceptions **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
5	1,3,4	**5. Prototyping** • Introduction to a range of prototype methods • Rapid prototyping and Iteration • Concept of Fast Fail • Sprints and Scrums • Refinement **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
6	1,3,4	**6. Test and Assess** • Prototype testing and Iteration • How to provide and receive feedback

		• Feedback loops • Validation, critique and reflection **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
7	4,5	**7. Student Presentations**
8	2	**8. Introduction to Systems Thinking** • What is Systems Thinking? • Value to business • History of Systems Thinking, background, development and application. Key moments. • How does System Thinking relate to Design Thinking? • What is the goal? What is the new way of seeing, understanding, and changing? • How to examine and identify a system? • Systems shapes and frameworks • Understanding agents • Definitions of systems **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
9	2,3	**9. System Dynamics** • Thinking in systems • Feedback loops • Boundaries and variables • System behaviours • System dynamics and archetypes • Dynamic simulations • Stacks, flows, critical paths • Influence of time, schedules and timings **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities
10	2,3,4	**10. Systems Mapping** • System mapping techniques • Interconnectivity • Casual loops • Feedback loops • Digital mapping tools • Sorting, recruitment, assimilation • Interactions • Diversity, randomness, aggregation **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities

11	2,3,4	**11. Strategy, ecosystems and evolution** • Agent interactions • Emergent phenomenon • Game theory and behaviour • Gamification • Business ecosystems **Tutorial**: Discussion of topics from lecture. Issues and variations. Group activities.
12	2,3,4	**12. Disruption** • Sudden change, revolution, evolution • The drift to low performance • Tragedy of the commons • Managing networks • Network perspectives – TOP (Technical, Organizational, Personal) • Forecasting and managing unpredictability. • Skills that support applied systems thinking **Tutorial**: Discussion of topics from lecture. Issues and variations. Preparation for presentations.
13	3,4,5	**13. Student Presentations**

Appendix 1
Assessment Criteria
Design Thinking Report: ILOs 1,3,4,5 20%
System Thinking Report: ILOs 2,3,4,5 20%

	Research 5% *Describe the principles and processes of design thinking as it applies to entrepreneurship.* Collection, collation, and analysis of background material. Clear recognition of links and relationships pertinent to the topic. Writing demonstrates a proficient comprehension of how processes apply to a situation.	**Development 5%** *Describe the principles and processes of system thinking as it applies to entrepreneurship.* Expansion of design and system thinking principles demonstrated. Clear recognition of how systems operate, and how they are related to and absorb design thinking principles. Writing demonstrates a proficient comprehension of how processes apply to a situation.	**Application 5%** *Develop design and system thinking responses to a range of entrepreneurial situations.* Application of design and system thinking principles to a specific topic. Solution demonstrates empathetic issue recognition, insightful problem definition, creative solutions, and effective prototyping. Identification of system implications. Proposition for disruptive change.	**Presentation 5%** *Demonstrate initiative and flexibility when applying design and system thinking processes in response to a specific situation.* Articulate and engaging communication of proposed topic solution. Skilful reference to design and system principles while pitching an innovative solution. Well spoken. Articulate response to questions and discussion.
A+ **85-100**	Outstanding	Outstanding	Outstanding	Outstanding
A **80-84**	Excellent	Excellent	Excellent	Excellent
A- **75-79**	Very good	Very good	Very good	Very good
B+ **70-74**	Good	Good	Good	Good
B **65-69**	Competent	Competent	Competent	Competent
B- **60-64**	Adequate	Adequate	Adequate	Adequate
C+ **55-59**	Mediocre	Mediocre	Mediocre	Mediocre
C **50-54**	Minimal	Minimal	Minimal	Minimal
D+ **45-49**	Insufficient	Insufficient	Insufficient	Insufficient

D **40-44**	Deficient	Deficient	Deficient	Deficient
F **0-39**	No evidence	No evidence	No evidence	No presentation

Appendix 2
Team Assessment – Project Presentation 20%

	Collaborative achievement 5% The team meets the project brief in a way that clearly surpasses the capabilities of a single individual.	**Collaborative creativity: 5%** The team demonstrates initiative, exploration and creativity, combining the separate skills and abilities of the individuals to expand and generate new creative outcomes.	**Individual contribution 5%** The individual's contribution to the team is significant. Role is performed above expectations in assigned roles. Active contribution to team coordination, time management, presentations, screenings, discussions and submissions.	**Individual team relationship 5%** The individual has a positive professional team relationship, demonstrating positive engagement, readiness to contribute, high value of communication, sharing of ideas, fairness and peer support.
A+ 85-100	Outstanding	Outstanding	Outstanding	Outstanding
A 80-84	Excellent	Excellent	Excellent	Excellent
A- 75-79	Very good	Very good	Very good	Very good
B+ 70-74	Good	Good	Good	Good
B 65-69	Competent	Competent	Competent	Competent
B- 60-64	Adequate	Adequate	Adequate	Adequate
C+ 55-59	Mediocre	Mediocre	Mediocre	Mediocre
C 50-54	Minimal	Minimal	Minimal	Minimal
D+ 45-49	Insufficient	Insufficient	Insufficient	Insufficient
D 40-44	Deficient	Deficient	Deficient	Deficient
F	No evidence	No evidence	No evidence	No presentation

0-39				

Appendix 3

Assessment Criteria
Participation 20%

	Participates actively in lectures and tutorials by asking insightful questions and engaging in critical discussions that reflect high comprehension of topics. Is proactive in tutorials, constructively engaging with topics, and contributing to discussion with peers. Takes an active part in team project development and presentations. Excellent attendance of all lectures and tutorials.
A+ **85-100**	Outstanding
A **80-84**	Excellent
A- **75-79**	Very good
B+ **70-74**	Good
B **65-69**	Competent
B- **60-64**	Adequate
C+ **55-59**	Mediocre
C **50-54**	Minimal
D+ **45-49**	Insufficient
D **40-44**	Deficient
F **0-39**	No participation

Appendix 4

Individual Reflection Feedback Report

Name ________________________

Other Team members ____

In this course you are graded as an individual, which includes when you work in a team.
To assist in this grading, you are asked to provide a reflection report about your role in the team.
The comments in this form are confidential to the student and the instructor.

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

Do you feel that the team achieved an outcome that surpassed that achievable by any of the individuals?

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2. 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.*

What feelings do you have about the collaboration within the team?

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3. 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.*

How effective do you believe your contribution was?

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4. Inter-personal team relationship: *This includes 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.*

What can you say about your working relationship with your team members?

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