

**Entrepreneurship and Innovation Minor Programme  
Course Outline**

**I. Course Identity**

Course code	EPIN1020
Course title (English)	<b>Design Thinking and Practice</b>
Course title (Chinese)	設計思考與實踐
Units	3
Description (English)	<p>The course aims to develop "T-shaped" characters who can develop the depth of expertise in a single field (one's major as represented by the vertical bar of the T shape) while acquiring the ability to communicate and collaborate with people and computational systems from different disciplines (the horizontal bar of the T) to address challenges.</p> <p>This ability to connect horizontally is "Design Thinking", which is the bridge between creativity and innovation, combining divergent and convergent modes of problem discovery and problem solving that leverages human insights and data analytics to create values. Throughout the process, user-experience, technology tools/platforms, and business models will be integrated for fostering innovation.</p> <p>By acquiring a designer's perspective in looking at the world, students can learn to appreciate what it means to "think out of a box" --- the thinking style that transcends traditional management control and disciplinary mindset. They can create more alternatives beyond one's own discipline to foster more systemic and holistic implementation.</p> <p>The implementation will be further augmented with Computational Thinking, the ability to specify problem and solution that allows a computer to carry it out.</p> <p>This course is for students who want to explore how human insights and computational power can work together to tackle some of the most difficult challenges we are facing in the world.</p>

Description (Chinese)	<p>本課程旨在培養一種深廣兼重, “T型” 之思維模式, 既能在某單一專項中深入了解, 同時能有效溝通, 與不同領域的人才和運算系統協作, 融滙貫通。如此縱向及橫向串連的能力, 乃為設計思維。課程內容鼓勵大家活用創意, 結合不同類型的探索與解決問題的方法, 藉以創新用戶經驗, 科技工具/平台及商業模式。</p> <p>設計思維若能在實踐中結合運算思維, 則有利把人類的洞察力和運算系統的数据分析力整合, 發揮更大效用。</p> <p>學生將透過設計者的視野, 尋找突破常規的新意念, 打破傳統管理及各自界別的舊有觀念, 更學會善用運算系統來實踐方案。課程鼓勵學生走出自身專業領域以外, 嘗試創造多個不同的方案, 從中領略如何解決問題, 同時能判斷處理問題的優先次序。</p>
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## **II. Prerequisites / co-requisites**

Please state prerequisites and co-requisites, in terms of courses in CUHK\* or any other requirements (e.g., having taken certain subjects in high school).

(\* Because course codes may not yet be stable, please provide both course code and course title.)

### **A. Prerequisites**

No prerequisite.

### **B. Co-requisites**

No co-requisite.

## **III. Learning Outcomes**

1. Identify research questions (i.e. 3W and 2H --- who, what, why, how, and how much) used in design thinking to define value proposition.
2. Form interdisciplinary team to collaborate and to build maker work habits.
3. Conduct empathetic inquiries in real life context to collect artifacts, stories, and data to discover insightful behavioral patterns.
4. Specify problem through the lens of data and process, input and output, online and off-line, humans and artifacts.
5. Practice ideation through brainstorming, digitization, abstraction, automation, visualization, and story telling.
6. Understand various prototyping methods (e.g. paper/cardboard, digital/interactive, audio-visual narrative, role playing, and 3D models) to be used in realizing design ideas for iterative development.
7. Analyze and synthesize user research, market analytics, prototype testing, and business model validation to generate solutions.
8. Evaluate alternative solutions to define a minimum viable product.
9. Present a minimum viable product proposal (including a 3 min. video) to acquire resources for further development.
10. Acquire the mindset, basic knowledge and skills to combine UX, technology tools/platforms, and business model to innovate.

#### **IV. Course syllabus**

##### **I. What is Design Thinking? (3 hrs)**

- (a) What do 21st century talents need to survive and excel?
- (b) What is “Design Thinking” and why do we need it?
- (c) How Design Thinking works in real life (Examples from 2 Case Studies)
- (d) Explanation of class format, lab time, online participation, and course assessment criteria.

##### **2. Computational Thinking and Coding (3 hrs)**

- (a) Understand what “computational thinking” is all about and how it is related to design thinking and coding.
- (b) Apply computational thinking to analyze and decompose the problem
- (c) Generate alternatives through ideation
- (d) Programming in Scratch, a visual programming language for exploring computational thinking and coding.

##### **3. From User Journey to Data Cycle (3 hrs)**

- (a) Form interdisciplinary team to get started with the class project
- (b) Data driven product and service design
- (c) User journey and touch point data audit and system testing
- (d) The data cycle and its tools

##### **4. Hands-on Workshop on Design Thinking (3 hrs)**

- (a) Participate in an empathy exercise
- (b) User experience mapping and problem definition
- (c) Conduct system analysis and design to generate alternative solutions
- (d) Role-playing presentation

##### **5&6 Big Three of Web Development (6 hrs)**

- (a) HTML - the noun in web publishing
- (b) CSS - the adjective in web publishing
- (c) JavaScript - the verb in web publishing
- (d) Using Git, front-end software library and visual user interface (UI) builder for static web development and publishing

**7&8 Navigating the Data Cycle (6 hrs)**

- (a) Data extraction and transformation with latest digital tools
- (b) Loading data into SQL database for filtering and processing
- (c) Installing, configuring, and customizing a content management system (CMS) for rapid web development
- (d) Application integration with CMS and SQL database

**9. Lean Startup and Platform Economics (3 hrs)**

- (a) From Design Thinking to Lean Startup and agile development
- (b) Identifying early adopters for go-to market strategy development
- (c) Conversion metrics for funnel design and product-market fit validation
- (d) The 3Cs of platform development (Content, Community, Commerce) in an API economy

**10. Develop Prototype for Rapid Market Validation (3 hrs)**

- (a) From paper prototype to interactive mock-up
- (b) From interactive mock-up to CMS prototype
- (c) Using Google and Facebook tools for market validation and conversion tracking
- (d) Building your content marketing pipeline and conversion metrics

**11. Product-Market Fit Validation (3 hrs)**

- (a) Conduct usability study for qualitative validation
- (b) Perform data analytic study for quantitative validation
- (c) Frameworks (e.g. business model navigator and community canvas) and metrics for business model validation and presentation
- (d) Metrics tracking and cash-flow projection

**12. Visual Story Telling (3 hrs)**

- (a) The Kickstarter way to pitch: story telling with visuals and videos.
- (b) The 3 stages of video production (pre-production, production, and post-production).
- (c) Use shots, angles, camera movement, dialogue, sound, music, and effects to develop your narrative for a compelling pitch.
- (d) Data visualisation for communicating your business model and metrics

**13. Final Class Presentation (3 hrs)**

Student teams are given 15 minutes each to present prototype, video narrative, and business model in front of the class.

**V. Assessment method**

Component/ method	% weight
Individual class participation	25%
Individual online participation	25%
Project	40%
Peer assessment	10%
Total	100%

**VI. Feedback for evaluation**

1.	Course and Teaching Evaluation Survey
2.	Internal Course Review
3.	Other feedbacks opportunities (for reference): <ul style="list-style-type: none"><li>• Class participation and interaction with the course teacher, tutor (if applicable) and fellow students</li><li>• Emails and personal consultations with the course teacher and tutor (if applicable)</li><li>• Evaluation and comments on assignments</li></ul>

**VII. Reading**

**A. Required**

- Andreessen, Marc (2011) Why Software is Eating The World. The Wall Street Journal, August 20, 2011.
- Blank, S. (2013) Why the Lean Start-up Changes Everything. Harvard Business Review May 6. 2013.
- Buytaert, Dries (2015) No, Data is Eating the World. Recode.net, Jan 7, 2015.
- Gibbons, Sarah (2016) Design Thinking 101. Nielsen Norman Group. July 31, 2016.
- Kumar, Vivek (2017) Design Thinking vs. Computational Thinking in Education. LinkedIn Pulse August 16, 2017.
- Wing, Jeannette M. (2006) Computational Thinking. COMMUNICATIONS OF THE ACM March 2006/Vol. 49, No. 3

- Wing, Jeannette M. (2014) Computational Thinking Benefits Society. Social Issues in Computing. New York: Academic Press

#### **B. Recommended**

- Edelman, Gil (2015) How to Choose your Technology Stack, SV/SG Blog.
- Gaffney G. (2004) Contextual Inquiry - A Primer
- Nielsen. J. (2010). Mental Models, Alert Box October 18, 2010
- Nielsen. J. (2010) Interviewing Users, Alert Box July 26. 2010
- Nielsen. J. (2000) Why You Only Need to Test with 5 Users. Alert Box March 2000
- Nielsen, J., (2012) Usability 101: Introduction to Usability, Alert Box

#### **VIII. Course components**

Activity	Frequency/Duration
Lecture	3 hours/week
Hackathon-style workshop	two 6 hr workshop
Problem set	5/3 hrs

#### **IX. Indicative teaching plan**

Week	Date	Lecture /Topic
1	Sep 5	<p><b><u>What is Design Thinking?</u> (3 hrs)</b></p> <p>(a) What do 21st century talents need to survive and excel?</p> <p>(b) What is “Design Thinking” and why do we need it?</p> <p>(c) How Design Thinking works in real life (Examples from 2 Case Studies)</p> <p>(d) Explanation of class format, lab time, online participation, and course assessment criteria.</p>

2	Sep 12	<p><b><u>Computational Thinking and Coding (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) Understand what “computational thinking” is all about and how it is related to design thinking and coding.</li> <li>(b) Apply computational thinking to analyze and decompose the problem</li> <li>(c) Generate alternatives through ideation</li> <li>(d) Programming in Scratch, a visual programming language for exploring computational thinking and coding.</li> </ul> <p><b>Individual assignment:</b> 1st assignment (Scratch Game)</p>
3	Sep 19	<p><b><u>From User Journey to Data Cycle (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) Form interdisciplinary team to get started with the class project</li> <li>(b) Data driven product and service design</li> <li>(c) User journey and touch point data audit and system testing</li> <li>(d) The data cycle and its tools</li> </ul> <p><b>Individual assignment:</b> 2nd assignment (Data Scraping &amp; Cleaning)</p>
4	Sep 28	<p><b><u>Hands-on Workshop on Design Thinking (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) Participate in an empathy exercise</li> <li>(b) User experience mapping and problem definition</li> <li>(c) Conduct system analysis and design to generate alternative solutions</li> <li>(d) Role-playing presentation</li> </ul> <p><b>Group assignment:</b> Group Project proposal</p>
5	Oct 6 (Sat)	<p><b><u>Big Three of Web Development (6 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) HTML - the noun in web publishing</li> <li>(b) CSS - the adjective in web publishing</li> <li>(c) JavaScript - the verb in web publishing</li> <li>(d) Using Git, front-end software library and visual user interface (UI) builder for static web development and publishing</li> </ul>



6	Oct 13 (Sat)	<p><b><u>Navigating the Data Cycle (6 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) Data extraction and transformation with latest digital tools</li> <li>(b) Loading data into SQL database for filtering and processing</li> <li>(c) Installing, configuring, and customizing a content management system (CMS) for rapid web development</li> <li>(d) Application integration with CMS and SQL database</li> </ul> <p><b>Individual assignment:</b> 3rd assignment (Personal Digital CV requirement analysis and system design)</p>
7	Oct 24	<p><b><u>Lean Startup and Platform Economics (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) From Design Thinking to Lean Startup and agile development</li> <li>(b) Identifying early adopters for go-to market strategy development</li> <li>(c) Conversion metrics for funnel design and product-market fit validation</li> <li>(d) The 3Cs of platform development (Content, Community, Commerce) in an API economy</li> </ul>
8	Oct 31	<p><b><u>Develop Prototype for Rapid Market Validation (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) From paper prototype to interactive mock-up</li> <li>(b) From interactive mock-up to CMS prototype</li> <li>(c) Using Google and Facebook tools for market validation and conversion tracking</li> <li>(d) Building your content marketing pipeline and conversion metrics</li> </ul>
9	Nov 7	<p><b><u>Product-Market Fit Validation (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) Conduct usability study for qualitative validation</li> <li>(b) Perform data analytic study for quantitative validation</li> <li>(c) Frameworks (e.g. business model navigator and community canvas) and metrics for business model validation and presentation</li> <li>(d) Metrics tracking and cash-flow projection</li> </ul> <p><b>Individual assignment:</b> 4th assignment (Personal Digital CV development, testing and tracking)</p>

10	Nov 14	<p><b><u>Visual Story Telling (3 hrs)</u></b></p> <ul style="list-style-type: none"> <li>(a) The Kickstarter way to pitch: story telling with visuals and videos.</li> <li>(b) The 3 stages of video production (pre-production, production, and post-production).</li> <li>(c) Use shots, angles, camera movement, dialogue, sound, music, and effects to develop your narrative for a compelling pitch.</li> <li>(d) Data visualisation for communicating your business model and metrics</li> </ul>
11	Nov 21	<p><b>No class</b></p>
12	Nov 28	<p><b><u>Final Class Presentation (3 hrs)</u></b></p> <p>Student teams are given 15 minutes each to present prototype, video narrative, and business model in front of the class.</p>