UCUG 1000 Cognitive Foundations of University Education:

Critical Thinking and Data Literacy (CTDL)

Fall, 2025/26

No. of Credits: 3

Any pre-/co-requisites: NO

Course Description

This course is taught by a teaching team of a group of faculties from CES and four Hubs to introduce the basics of critical thinking and data literacy. The course will be delivered using the problem-solving approach with interdisciplinary applications. The contents include barriers to critical thinking, characteristics of a critical thinker, argument, cognitive bias, logical fallacies, inductive reasoning, and simple probability and statistical models. Students will be equipped with critical thinking and data analyzing skills to analyze problems of reasoning, evaluate the truthfulness of evidence, examine the fallacies of thinking, construct valid arguments, and make better decisions in personal and professional life.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems
2. Identify, analyze, and evaluate arguments
3. Apply analytical skills to construct valid arguments using data and evidence
4. Evaluate implications and consequences of the solutions
5. Make and communicate decisions critically using data and evidence

Course Modularization and Enrollment

CTDL is the very first pilot of undergraduate modularized course at HKUST(GZ). This course introduces the basics of critical thinking and data literacy and its applications in five aspects, including social science, entrepreneurship, science, engineering, and business. It aims to help students to improve their critical thinking and data analysis abilities. This is a three-credit course and is divided into six modules. Module 01 is mandatory, and each module is worth one credit. **To fulfill the credit requirements for this course, students must complete Module 1 and a minimum of two modules from Modules 02-06**, e.g., if a student has a keen interest in entrepreneurship and business, he/she may study Module 01, Module 03, and Module 06.

Course Information

Module	Class Section	Date	Time		Location	Instructor
Module 01 Basics of critical thinking and data literacy	L01	2025.09.01-2025.10.12	Mon.	15:00-16:20	E1-134	LI Ran
			Wed.	15:00-16:20	E1-134	
	L02		Mon.	12:00-13:20	E1-134	LI Ran
			Wed.	12:00-13:20	E1-134	
	L03		Tue.	13:30-14:50	E1-134	ZHANG Xuning
			Thu.	13:30-14:50	E1-134	
	L04		Tue.	15:00-16:20	E1-134	ZHANG Xuning
			Thu.	15:00-16:20	E1-134	
	L05		Tue.	12:00-13:20	E1-134	Yi-Lung KUO
			Thu.	12:00-13:20	E1-134	
	L06		Mon.	16:30-17:50	E1-134	Yi-Lung KUO
			Wed.	16:30-17:50	E1-134	
Module 02 Critical thinking and data literacy in Social Science	L01	2025.10.13-2025.11.09	Mon.	16:30-17:50	E1-134	XIONG Wanru
			Wed.	16:30-17:50	E1-134	
	L02		Mon.	12:00-13:20	E1-134	XIONG Wanru
			Wed.	12:00-13:20	E1-134	
Module 03 Critical thinking and data literacy in Entrepreneurship	L01	2025.11.10-2025.12.05	Wed.	15:00-17:50	E1-134	HOU Yun
	L02		Fri.	18:00-20:50	W1-101	HOU Yun
Module 04 Critical thinking and data literacy in Science	L01	2025.10.13-2025.11.09	Mon.	19:30-20:50	C3-LHC	YU Liuqian
			Wed.	19:30-20:50	C3-LHC	
	L02		Tue.	19:30-20:50	E4-102	YU Liuqian
			Thu.	19:30-20:50	E4-102	
Module 05 Critical thinking and data literacy in Engineering	L01	2025.11.10-2025.12.05	Mon.	10:30-11:50	E1-134	ZHANG Xuning
			Wed.	10:30-11:50	E1-134	
	L02		Wed.	13:30-14:50	E1-134	ZHANG Xuning
			Fri.	13:30-14:50	E1-134	
Module 06 Critical thinking and data literacy in Business	L01	2025.11.10-2025.12.05	Fri.	15:00-17:50	E1-134	ZUO Ruiting
	L02		Tue.	18:00-20:50	E4-102	ZUO Ruiting

Office Hours: by each instructor's arrangement

Module Introduction and Contents (To be Updated)

Module	Brief Introduction	Contents/Topics
M01 Basics of CTDL	This module equips you with essential skills to critically analyze information and make informed decisions. We start by exploring the foundations of critical thinking, including identifying and evaluating arguments, recognizing logical fallacies, and understanding cognitive biases. As we progress, you'll apply these skills to problem-solving and decision-making scenarios. We'll also introduce data literacy, focusing on understanding and evaluating data. By the end of this module, you'll be empowered to better approach both information and data critically, making well-reasoned decisions in both academic and everyday contexts.	• Introduction to critical thinking • Analyzing Arguments • Logical fallacies and cognitive biases • Advanced critical thinking skills (synthesis, evaluation, problem solving and decision-making) • Introduction to data literacy
M02 CTDL in Social Science	This module introduces essential skills to interpret and make sense of the world through data. We begin with the basics, such as understanding the meaning of a single number, and gradually progress to more complex concepts like establishing relationships between multiple variables. Our ultimate goal is to empower you to use data effectively in making informed decisions in both professional and everyday life. You'll learn how to make sound causal inferences, differentiate between correlation and causation, and recognize and avoid common fallacies that can lead to misleading conclusions in data analysis. By the end of this module, you'll have the tools to approach data critically and confidently.	• Understanding numbers • Making inference I • Making inference II • Avoiding fallacies
M03 CTDL in Entrepreneurship	This module provides an introduction to entrepreneurship with an emphasis on data-driven decision-making. We will start by exploring the fundamentals of entrepreneurship, dispelling common myths, and understanding the realities of starting and growing a business. Next, we will focus on evaluating the growth potential of entrepreneurial opportunities by examining the critical data required for effective opportunity assessment. Additionally, we will address common behavioral biases that can affect these assessments. The module will also cover the operations of the venture capital (VC) industry, including an analysis of term sheets offered by VCs. In the final section, we will delve into the role of experimentation and A/B testing in crafting entrepreneurial strategies. We will also engage in an "equity splitting game," a crucial exercise for founders to navigate one of the most significant stages in their entrepreneurial journey.	• Entrepreneurs and entrepreneurship • Assessing entrepreneurial opportunities • Entrepreneurial financing • Entrepreneurial strategy

M04 CTDL in Science	This module introduces the scientific process, including identifying questions, formulating hypotheses, gathering data, analyzing data, and drawing conclusions. The process is illustrated using real-world problems like climate warming and other global challenges. Students will learn the scientific fundamentals underlying these global threats, practice the scientific process using hands-on programming examples and real-world data, and explore potential solutions to these global challenges by applying skills of critical thinking and data literacy.	• Data collection • Data visualization • Mathematical modeling • Statistical inference • Applications to climate change
M05 CTDL in Engineering	This module introduces statistical and programming tools that are essential to solve engineering problems. Students will go through the critical thinking model, UWISES, which includes problem understanding and identification, information investigation and evaluation, to solve real-world problems. Through a combination of lectures, case studies, and hands-on activities, students will practice critical thinking and data literacy skills, make informed decisions, and effectively communicate data in engineering contexts.	• Mathematical modeling: Probability distributions, Chebyshev inequality, Central Limit Theorem • Applications: Overbooking problem, Sample size estimation
M06 CTDL in Business	This module equips students with critical thinking and data literacy skills tailored for business decision-making. It covers data management, visualization, probability distributions, and simulation modeling. Students will engage in case studies to apply these concepts in real-world business scenarios, focusing on optimizing decisions and addressing information distortion.	• Introduction to critical thinking and data literacy in business • Data management and visualization • Probability distributions • Simulation modelling and its application in business • Optimization modeling • Managerial decision analysis • Experiment and case study: decision making and information distortion in business

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments

Your grade will be determined as follows:

Assessment Task	Contribution to Overall Course grade (%)
In-class test	20%
Written assignment	60%
Course participation	20%

Each module's assessment will follow the same framework above while the specific tasks and requirements will be provided by instructor.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class test	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understandings on argument, cognitive bias, logical concepts and fallacies, analyzing and evaluating argument, finding, evaluating and using sources, and probability and statistical models.
Written assignment	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' abilities to identify and analyze relevant information, data, and sources, make assumptions, and to construct valid arguments.
Course participation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understanding on concepts of critical thinking and data literacy, abilities to identify and analyze relevant information, data, and sources.

Grading Rubrics

Detailed rubrics for each assignment will be provided by the instructor of each module.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Consistently and accurately identifies and analyzes relevant information, data, and sources, demonstrating a deep understanding of the material. Excels in identifying, analyzing, and evaluating complex arguments, often recognizing subtleties and nuances that others may overlook. Applies advanced analytical skills to construct well-structured, logical arguments that are strongly supported by data and evidence. Thoroughly evaluates the implications and consequences of various solutions, showing a sophisticated understanding of potential outcomes. Communicates decisions clearly and critically, using data and evidence to effectively justify their reasoning. Demonstrates a high level of creativity and critical insight in applying course concepts.
B	Good Performance	Effectively identifies and analyzes relevant information, data, and sources, with only minor gaps or errors. Competently identifies, analyzes, and evaluates arguments, showing a good understanding of the key issues. Constructs logical and coherent arguments using appropriate data and evidence, with some minor weaknesses in structure or support. Adequately evaluates the implications and consequences of solutions, recognizing most key outcomes. Communicates decisions in a clear and logical manner, generally using data and evidence effectively, though with occasional lapses in clarity or depth.
C	Satisfactory Performance	Adequately identifies and analyzes relevant information, data, and sources, but may miss some important details or show

		inconsistency. Identifies, analyzes, and evaluates arguments at a basic level, with some understanding but also significant gaps. Constructs arguments that are generally logical but may lack strong evidence or have weaknesses in reasoning. Provides a basic evaluation of the implications and consequences of solutions, though some important aspects may be overlooked. Communicates decisions with reasonable clarity, using data and evidence, but with frequent errors or superficial analysis.
D	Marginal Pass	Shows minimal ability to identify and analyze relevant information, data, and sources, often missing key elements. Struggles to identify, analyze, and evaluate arguments, with significant misunderstanding or oversimplification. Constructs weak arguments that are often unsupported by sufficient evidence or contain serious logical flaws. Provides limited evaluation of the implications and consequences of solutions, with many important factors ignored. Communicates decisions poorly, often failing to use data and evidence effectively, and demonstrating limited critical thinking.
F	Fail	Fails to identify and analyze relevant information, data, and sources, with little to no understanding demonstrated. Does not effectively identify, analyze, or evaluate arguments, often misunderstanding key concepts. Constructs arguments that are fundamentally flawed, illogical, or entirely unsupported by evidence. Neglects to evaluate the implications and consequences of solutions, or does so in a way that shows no real understanding. Fails to communicate decisions effectively, showing no meaningful use of data or evidence, and demonstrating an absence of critical thinking.

Course AI Policy

Specific instruction on AI will be provided by the instructor of each module.

Communication and Feedback

Assessment marks for individual assessed tasks usually will be communicated within two weeks of submission. Feedback on assignments will include specific details such as strengths and areas for improvement. Students with further questions about the feedback including marks should consult the instructor within five working days after receiving the feedback.

Suggested Texts and Materials

Bassham, G., Irwin, W., Nardone, H., & Wallace, J. M. (2010). Critical thinking: A student's introduction. McGraw-Hill. (5th Edition).

Chatfield, T. (2022). Critical thinking: Your guide to effective argument, successful analysis and independent study. (1st Edition).

Ruggiero, V. R. (2014). Becoming a Critical Thinker. Cengage Learning. (8th Edition).

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

UCUG 1000 Cognitive Foundations of University Education:

Critical Thinking and Data Literacy (CTDL)

Module 01 Basics of Critical Thinking and Data Literacy (L01, L02)

Fall, 2025/26

No. of Credits: 1 credit in Module 01 (3 credits in UCUG 1000)

Any pre-/co-requisites: No

Instructor: Dr. LI, Ran (ranli@hkust-gz.edu.cn)

Office: E1-316

Office Hours: 10:00 AM – Noon, Fridays

Off-hour Appointment should be made through the Instructor-Student Appointment Making System (https://klms.hkust-gz.edu.cn/)

Module Description

Module 01 (M01) equips you with essential skills to critically analyze information and make informed decisions. We start by exploring the foundations of critical thinking, including identifying and evaluating arguments, recognizing logical fallacies, and understanding cognitive biases. As we progress, you'll apply these skills to problem-solving and decision-making scenarios. We'll also introduce data literacy, focusing on understanding and evaluating data. By the end of this module, you'll be empowered to better approach both information and data critically, making well-reasoned decisions in both academic and everyday contexts.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems

2. Identify, analyze, and evaluate arguments

3. Apply analytical skills to construct valid arguments using data and evidence

4. Evaluate implications and consequences of the solutions

5. Make and communicate decisions critically using data and evidence

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments

Your grade will be determined as follows:

Assessment Task	Contribution to Overall Course grade (%)
In-class test	20% (4*5%)
Written assignment	60% (20%+40%)
Course participation	20%

Grading Rubrics for Written Assignment

Understand (3 pts)	Did the student(s) identify the main fact(s)/idea(s)/conclusion(s)/solution(s) of the issue/problem? (Yes 1 pt or No 0 pt)
	Did the student(s) identify the premises that support the conclusion(s)/solution(s)? (Yes 1 pt or No 0 pt)
	Did the student(s) indicate how the premises support the conclusion(s)/solutions(s)? (Yes 1 pt or No 0 pt)
Wonder (2 pts)	Did the student(s) indicate the challenges that deserve attention? (Yes 2 pts, partially 1 pt, No 0 pt)
Investigate (5 pts)	Did the student(s) provide information to the challenges identified in Wonder step? (Yes 2 pts, partially 1 pt, No 0 pt)
	Did the student(s) demonstrate understanding of the information? (Yes 2 pts, partially 1 pt, No 0 pt)
	Were citations and references included properly? (Yes 1 pt or No 0 pt)
Speculate (4 pts)	Did the student(s) summarize the argument on both side of the key issue/identify a range of possible solutions to the key problem? (Yes 2 pts, partially 1 pt, No 0 pt)
	Did the student(s) indicate the implication/consequences of the relevant information? (Yes 2 pts, partially 1 pt, No 0 pt)
Evaluate (4 pts)	Did the student(s) examines various arguments about the issues or test the possible solutions of the problems (Yes 2 pts, partially 1 pt, No 0 pt)
	Did the student(s) identify the most reasonable and/or effective resolutions or solutions? (Yes 2 pts, partially 1 pt, No 0 pt)
Conclude/Solve (2 pts)	Did the student(s) bridge information together to arrive at reasonable resolution(s)/solution(s)? (Yes 2 pts, partially 1 pt, No 0 pt)

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Consistently and accurately identifies and analyzes relevant information, data, and sources, demonstrating a deep understanding of the material. Excels in

		identifying, analyzing, and evaluating complex arguments, often recognizing subtleties and nuances that others may overlook. Applies advanced analytical skills to construct well-structured, logical arguments that are strongly supported by data and evidence. Thoroughly evaluates the implications and consequences of various solutions, showing a sophisticated understanding of potential outcomes. Communicates decisions clearly and critically, using data and evidence to effectively justify their reasoning. Demonstrates a high level of creativity and critical insight in applying course concepts.
B	Good Performance	Effectively identifies and analyzes relevant information, data, and sources, with only minor gaps or errors. Competently identifies, analyzes, and evaluates arguments, showing a good understanding of the key issues. Constructs logical and coherent arguments using appropriate data and evidence, with some minor weaknesses in structure or support. Adequately evaluates the implications and consequences of solutions, recognizing most key outcomes. Communicates decisions in a clear and logical manner, generally using data and evidence effectively, though with occasional lapses in clarity or depth.
C	Satisfactory Performance	Adequately identifies and analyzes relevant information, data, and sources, but may miss some important details or show inconsistency. Identifies, analyzes, and evaluates arguments at a basic level, with some understanding but also significant gaps. Constructs arguments that are generally logical but may lack strong evidence or have weaknesses in reasoning. Provides a basic evaluation of the implications and consequences of solutions, though some important aspects may be overlooked. Communicates decisions with reasonable clarity, using data and evidence, but with frequent errors or superficial analysis.
D	Marginal Pass	Shows minimal ability to identify and analyze relevant information, data, and sources, often missing key elements. Struggles to identify, analyze, and evaluate arguments, with significant misunderstanding or oversimplification. Constructs weak arguments that are often unsupported by sufficient evidence or contain serious logical flaws. Provides limited evaluation of the implications and consequences of solutions, with many important factors ignored. Communicates decisions poorly, often failing to use data and evidence effectively, and demonstrating limited critical thinking.
F	Fail	Fails to identify and analyze relevant information, data, and sources, with little to no understanding demonstrated. Does not effectively identify, analyze, or evaluate arguments, often misunderstanding key concepts. Constructs arguments that are fundamentally flawed, illogical, or entirely unsupported by evidence. Neglects to evaluate the implications and consequences of solutions, or does so in a way that shows no real understanding. Fails to communicate decisions effectively, showing no meaningful use of data or evidence, and demonstrating an absence of critical thinking.

Course AI Policy

In this course, students are allowed to use generative artificial intelligence (genAI) to aid you in any manner. However, you must cite the AI generated contents and provide the prompt you used and corresponding AI generated contents.

Communication and Feedback

Assessment marks for individual assessed tasks will typically be communicated within two weeks of submission. Feedback on assignments will include specific details such as strengths and areas for improvement. Students with further questions about the feedback including marks should consult the instructor within five working days after receiving the feedback.

Late Submission Policy

Late submission is allowed. However, any late submission will receive a 20% deduction per day late.

Communication and Feedback

Assessment marks for individual assessed tasks usually will be communicated within two weeks of submission. Feedback on assignments will include specific details such as strengths and areas for improvement. Students with further questions about the feedback including marks should consult the instructor within five working days after receiving the feedback.

Suggested Texts and Materials

Bassham, G., Irwin, W., Nardone, H., & Wallace, J. M. (2010). Critical thinking: A student's introduction. McGraw-Hill. (5th Edition).

Chatfield, T. (2022). Critical thinking: Your guide to effective argument, successful analysis and independent study. (1st Edition).

Ruggiero, V. R. (2014). Becoming a Critical Thinker. Cengage Learning. (8th Edition).

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Schedule (subject to adjustment)

Academic Calendar Week	**Topic**	**Related ILOs**	**Note**
Week 1	• Course overview and introduction to UWISES model • Components of critical thinking	ILO 1, ILO 2, ILO 4	
Week 2	• Identifying & evaluating arguments	ILO 2, ILO 3	
Week 3	• Logical fallacies & Cognitive biases	ILO 2, ILO 4	
Week 4	• Synthesis and evaluation • Problem-solving and decision-making	ILO 4, ILO 5	
Week 5	• Introduction to data literacy • Understanding data • Evaluating data sources	ILO 1, ILO 5	No class on National Day Holiday (Oct 1-8), (make-up session for the Wednesday course on Oct 11)

The Hong Kong University of Science and Technology (Guangzhou)

UG Course Syllabus

Critical Thinking and Data Literacy in Social Science

CTDL1000 Module 2

1 credit

No prerequisites

Name: Wanru XIONG

Email: wanruxiong@hkust-gz.edu.cn

Office Hours: Mondays/Wednesdays, 13:30-16:20, E1 610

Course Description

This module introduces essential skills to interpret and make sense of the world through data. We begin with the basics, such as understanding the meaning of a single number, and gradually progress to more complex concepts like establishing relationships between multiple variables. Students will learn how to make sound causal inferences, differentiate between correlation and causation, and recognize and avoid common fallacies that can lead to misleading conclusions in data analysis. The ultimate goal is to empower students to use data effectively in making informed decisions in both professional and everyday life. Methods of instruction include lectures, discussions, in-class experiments and activities.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems

2. Identify, analyze, and evaluate arguments

3. Apply analytical skills to construct valid argument using data and evidence

4. Evaluate implications and consequences of the solutions

5. Make and communicate decisions critically using data and evidence

Weekly Schedule

Week	Time	Topic	ILOs
1	10.13/10.15	Understand a number	ILO1, ILO2, ILO5
2	10.20/10.22	Connect numbers	ILO1, ILO2, ILO5
3	10.27/10.29	Make inference	ILO1, ILO2, ILO3, ILO4, ILO5
4	11.3/11.5	Avoid fallacies	ILO1, ILO2, ILO3, ILO4, ILO5

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
In-class quiz	20%	In-class
Discussion participation	20%	In-class
Analytical writing	60%	Nov 14, 2025

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class quiz	ILO1, ILO2, ILO3, ILO4	In-class quiz assesses students' ability to identify and analyze relevant information, data, and sources for problems, evaluate arguments, apply analytical skills to construct valid argument using data and evidence, and evaluate implications and consequences of the solutions.
Discussion Participation	ILO1, ILO2, ILO3, ILO4, ILO5	In-class discussion assesses students' ability to identify and analyze relevant information, data, and sources for problems, evaluate arguments, apply analytical skills to construct valid argument using data and evidence, evaluate implications and consequences of the solutions, and communicate their decisions.
Analytical writing	ILO1, ILO2, ILO3, ILO4, ILO5	Analytical writing assesses students' ability to identify and analyze relevant information, data, and sources for problems, evaluate arguments, apply analytical skills to construct valid argument using data and evidence, evaluate implications and consequences of the solutions, and communicate their decisions.

Grading Rubrics

Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Course AI Policy

Students are prohibited from using generative AI in in-class quiz and discussion.

Students are allowed to use generative AI for the analytical writing, and it must be properly acknowledged.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Late and resubmission of in-class quizzes are not allowed.

Late and resubmission of essays after the deadline are subject to a 10% penalty applied for each day that the submission is late.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

The Hong Kong University of Science and Technology (Guangzhou)

[Course Title] Critical Thinking and Data Literacy in Entrepreneurship

[Course Code] UCUG1000-M03

[No. of Credits] 1

[Any pre-/co-requisites] No

Name: Yun Hou

Email: yunhou@hkust-gz.edu.cn

Office Hours: E2-306, Monday afternoon 1-3 or by appointment

Course Description

This module provides an introduction to entrepreneurship with an emphasis on data-driven decision-making. We will start by exploring the fundamentals of entrepreneurship, dispelling common myths, and understanding the realities of starting and growing a business. Next, we will focus on evaluating the growth potential of entrepreneurial opportunities by examining the critical data required for effective opportunity assessment. The module will also cover the operations of the venture capital (VC) industry, including an analysis of term sheets offered by VCs. In the final section, we will delve into how entrepreneurs craft entrepreneurial strategies.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems
2. Identify, analyze, and evaluate arguments
3. Apply analytical skills to construct valid arguments using data and evidence
4. Evaluate implications and consequences of the solutions
5. Make and communicate decisions critically using data and evidence

Weekly schedule & Weekly ILOs

[Include a weekly schedule and corresponding ILOs for clear, week-by-week guidance.]

Week	Topics	Weekly ILOs
1	Entrepreneurship and business model canvas	IOL1 and IOL2
2	Entrepreneurial opportunity identification and evaluation	IOL3
3	Formation of entrepreneurial teams	IOL4, IOL5
4	Financing of new ventures	IOL3, IOL4

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Week 1 Quiz	10%	Date of week 1 class
Week 2 Quiz	10%	Date of week 2 class
Week 3 Individual Write-up	10%	Date of week 3 class
Week 4 Individual Write-up	10%	Date of week 4 class
Group project	40%	One week after the last class
Course participation	20%	Date of class every week

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class quiz	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understandings on the course materials and the critical aspects of entrepreneurship.
Individual Write-up	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understandings on the course materials and applications on analyzing real-world data based decision making problems.
Group project	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' abilities to identify and analyze relevant information, data, and sources, make assumptions, and to present valid arguments.
Course participation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' abilities to identify and articulate relevant information, data, and sources.

Grading Rubrics

Assessed Task	Rubrics
In-class quiz	Correct answers will be scored.
Individual Write-up	Correct calculations and answers will be scored.
Group project	The lecture and TAs will grade together based on the quality of the submission. Best submission should clearly follow the business model canvas and clearly state the core idea of the business, with clear division among the group members. Checklist for students: • Team: Roles clear? Who owns what? Equity/workload rationale? • Problem: Specific user + validated pain? • Value Prop: One sentence: For [user] who [problem], we [solution] that [benefit]. • Market & Competition: Realistic size; key alternatives; potential competitors; our difference. • Business Model: How we charge + main costs + simple numbers. • Product & Go-To-Market: MVP scope + first channel/test. • Traction & Risks: What have we learned? Biggest risks + mitigation. • Submission: Clear, concise, sources cited.
Course participation	3 for physical presence; 4 for some participation; 5 for active participation; only sick leave or family emergency will be excused and graded as 3, other excuses will not be accepted.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description

A	Excellent Performance	Consistently and accurately identifies and analyzes relevant information, data, and sources, demonstrating a deep understanding of the material. Excels in identifying, analyzing, and evaluating complex arguments, often recognizing subtleties and nuances that others may overlook. Applies advanced analytical skills to construct well-structured, logical arguments that are strongly supported by data and evidence. Thoroughly evaluates the implications and consequences of various solutions, showing a sophisticated understanding of potential outcomes. Communicates decisions clearly and critically, using data and evidence to effectively justify their reasoning. Demonstrates a high level of creativity and critical insight in applying course concepts.
B	Good Performance	Effectively identifies and analyzes relevant information, data, and sources, with only minor gaps or errors. Competently identifies, analyzes, and evaluates arguments, showing a good understanding of the key issues. Constructs logical and coherent arguments using appropriate data and evidence, with some minor weaknesses in structure or support. Adequately evaluates the implications and consequences of solutions, recognizing most key outcomes. Communicates decisions in a clear and logical manner, generally using data and evidence effectively, though with occasional lapses in clarity or depth.
C	Satisfactory Performance	Adequately identifies and analyzes relevant information, data, and sources, but may miss some important details or show inconsistency. Identifies, analyzes, and evaluates arguments at a basic level, with some understanding but also significant gaps. Constructs arguments that are generally logical but may lack strong evidence or have weaknesses in reasoning. Provides a basic evaluation of the implications and consequences of solutions, though some important aspects may be overlooked. Communicates decisions with reasonable clarity, using data and evidence, but with frequent errors or superficial analysis.
D	Marginal Pass	Shows minimal ability to identify and analyze relevant information, data, and sources, often missing key elements.

		Struggles to identify, analyze, and evaluate arguments, with significant misunderstanding or oversimplification. Constructs weak arguments that are often unsupported by sufficient evidence or contain serious logical flaws. Provides limited evaluation of the implications and consequences of solutions, with many important factors ignored. Communicates decisions poorly, often failing to use data and evidence effectively, and demonstrating limited critical thinking.
F	Fail	Fails to identify and analyze relevant information, data, and sources, with little to no understanding demonstrated. Does not effectively identify, analyze, or evaluate arguments, often misunderstanding key concepts. Constructs arguments that are fundamentally flawed, illogical, or entirely unsupported by evidence. Neglects to evaluate the implications and consequences of solutions, or does so in a way that shows no real understanding. Fails to communicate decisions effectively, showing no meaningful use of data or evidence, and demonstrating an absence of critical thinking.

Course AI Policy

You can rely on AI for proofreading and idea generation. You should not use AI to write original arguments.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated within two weeks of submission. Students with further questions about marks should consult the instructor within five working days after receiving the marks.

Resubmission Policy

No resubmission is allowed.

Required Texts and Materials

No textbook is required.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

The Hong Kong University of Science and Technology (Guangzhou)

UCUG 1000 Cognitive Foundations of University Education:

Critical Thinking and Data Literacy (CTDL) in Science

Fall, 2025/26

Course Code: UCUG1000(M04)

No. of Credits: 1

Any pre-/co-requisites: No

Instructor: Liuqian Yu

Email: liuqianyu@hkust-gz.edu.cn

Office Hours: Monday/Tuesday: 1:30 pm~2:30 pm @ W4–509 or make appointment by email

Teaching Assistants: Zhouxiao Liu zliueb@connect.hkust-gz.edu.cn

Siyu Zhang szhang378@connect.hkust-gz.edu.cn

Course Description

This module introduces the scientific process, including identifying questions, formulating hypotheses, gathering data, analyzing data, and drawing conclusions. The process is illustrated using real-world problems like climate warming and other global challenges. Students will learn the scientific fundamentals underlying these global threats through lectures, practice the scientific process using hands-on programming examples and real-world data, and explore potential solutions to these global challenges by applying skills of critical thinking and data literacy.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems
2. Identify, analyze, and evaluate arguments
3. Apply analytical skills to construct valid argument using data and evidence
4. Evaluate implications and consequences of the solutions
5. Make and communicate decisions critically using data and evidence

Weekly Schedule and ILOs

Week	Contents/Topics	Mapped ILOs
1	Introduction of scientific process; group discussion/presentation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5
2	Data analysis, visualization, and interpretation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5
3	Mathematical modeling and statistical inference	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5
4	Applications to climate change; group discussion & presentation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments

The grade will be determined as follows:

Assessment Task	Contribution to Overall Course grade (%)
In-class test	20%
Written assignment	60%
Course participation	20%

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class test	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understandings of argument, cognitive bias, logical concepts and fallacies, analyzing and evaluating argument, finding, evaluating and using sources, and probability and statistical models.
Written assignment	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' abilities to identify and analyze relevant information, data, and sources, make assumptions, and construct valid arguments.
Course participation	ILO-1, ILO-2, ILO-3, ILO-4, ILO-5	This task assesses students' understanding of concepts of critical thinking and data literacy, abilities to identify and analyze relevant information, data, and sources.

Grading Rubrics

Marking schemes of the in-class discussion and writing can be referred to the Canvas file: Rubrics_CTDL_in-class_Disucssion_Writing.pdf. More detailed guidance and requirements for the other assessments will be provided in due course.

Final Grade Descriptors

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Consistently and accurately identifies and analyzes relevant information, data, and sources, demonstrating a deep understanding of the material. Excels in identifying, analyzing, and evaluating complex arguments, often recognizing subtleties and nuances that others may overlook. Applies advanced analytical skills to construct well-structured, logical arguments that are strongly supported by data and evidence. Thoroughly evaluates the implications and consequences of various solutions, showing a sophisticated understanding of potential outcomes. Communicates

		decisions clearly and critically, using data and evidence to effectively justify their reasoning. Demonstrates a high level of creativity and critical insight in applying course concepts.
B	Good Performance	Effectively identifies and analyzes relevant information, data, and sources, with only minor gaps or errors. Competently identifies, analyzes, and evaluates arguments, showing a good understanding of the key issues. Constructs logical and coherent arguments using appropriate data and evidence, with some minor weaknesses in structure or support. Adequately evaluates the implications and consequences of solutions, recognizing most key outcomes. Communicates decisions in a clear and logical manner, generally using data and evidence effectively, though with occasional lapses in clarity or depth.
C	Satisfactory Performance	Adequately identifies and analyzes relevant information, data, and sources, but may miss some important details or show inconsistency. Identifies, analyzes, and evaluates arguments at a basic level, with some understanding but also significant gaps. Constructs arguments that are generally logical but may lack strong evidence or have weaknesses in reasoning. Provides a basic evaluation of the implications and consequences of solutions, though some important aspects may be overlooked. Communicates decisions with reasonable clarity, using data and evidence, but with frequent errors or superficial analysis.
D	Marginal Pass	Shows minimal ability to identify and analyze relevant information, data, and sources, often missing key elements. Struggles to identify, analyze, and evaluate arguments, with significant misunderstanding or oversimplification. Constructs weak arguments that are often unsupported by sufficient evidence or contain serious logical flaws. Provides limited evaluation of the implications and consequences of solutions, with many important factors ignored. Communicates decisions poorly, often failing to use data and evidence effectively, and demonstrating limited critical thinking.
F	Fail	Fails to identify and analyze relevant information, data, and sources, with little to no understanding demonstrated. Does not effectively identify, analyze, or evaluate arguments, often misunderstanding key concepts. Constructs arguments that are fundamentally flawed, illogical, or entirely unsupported by evidence. Neglects to evaluate the implications and consequences of solutions, or does so in a way that shows no real understanding. Fails to communicate decisions effectively, showing no meaningful use of data or evidence, and demonstrating an absence of critical thinking.

Course AI Policy

Students are allowed to use artificial intelligence (AI) tools (e.g., ChatGPT) to enhance their learning experience and course performance. However, if AI tools are adopted for the written report, students must provide a statement briefly describing how the AI tool(s) was used, including the exact prompts used and the rationale for the choices made. Screenshots of the prompts and outputs should also be attached. An example of the statement can be found on Canvas: Statement_of_GenAI_use_example.pdf

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include specific details. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Suggested Texts and Materials

Bassham, G., Irwin, W., Nardone, H., & Wallace, J. M. (2010). Critical thinking: A student's introduction. McGraw-Hill. (5th Edition).

Chatfield, T. (2022). Critical thinking: Your guide to effective argument, successful analysis and independent study. (1st Edition).

Ruggiero, V. R. (2014). Becoming a Critical Thinker. Cengage Learning. (8th Edition).

McGuffie, K. and Henderson-Sellers, A. (2014). The climate modelling primer. John Wiley & Sons, Ltd. (4th Edition).

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to the Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

Course Information

Course title: Critical Thinking and Data Literacy Module 5

Course code: UCUG1000

Credit: In total: 3 credits. Module 5: 1 credit

No pre-/co-requisites

Instructor

Name: Xuning ZHANG

Email: eexuning@hkust-gz.edu.cn

Office Hours: Wednesday 15:00-16:30 and Friday 15:00-16:30, or make appointment through appointment system https://klms.hkust-gz.edu.cn/

Teaching Assistant

Name: Junhao YANG

email: jyang721@connect.hkust-gz.edu.cn

Name: Shihui ZHANG

email: szhang423@connect.hkust-gz.edu.cn

Course Description

This course is taught by a teaching team of a group of faculties from four Hubs to introduce the basics of critical thinking and data literacy. The course will be delivered using the problem-solving approach with interdisciplinary applications.

Module 5 introduces statistical and programming tools that are essential to solve engineering problems. Students will go through the critical thinking model, UWISES, which includes problem understanding and identification, information investigation and evaluation, to solve real-world problems. Through a combination of lectures, case studies, and hands-on activities, students will practice critical thinking and data literacy skills, make informed decisions, and effectively communicate data in engineering contexts. In module 5, the flipped classroom approach will be adopted. The instructor will release the course materials and send the link through emails before each lecture. Students need to learn the materials and complete the simple quiz before attending the lecture. During the lecture, students will go through the critical thinking process, UWISES, to practice critical thinking and data literacy skills. Students will do in-class activities individually or in a team.

Upon the completion of the course, students will be equipped with critical thinking and data analyzing skills to analyze problems of reasoning, evaluate the truthfulness of evidence, examine the fallacies of thinking, construct valid arguments, and make better decisions in personal and professional life.

Course Intended Learning Outcomes (CILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems
2. Identify, analyze, and evaluate arguments
3. Apply analytical skills to construct valid argument using data and evidence
4. Evaluate implications and consequences of the solutions
5. Make and communicate decisions critically using data and evidence

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	**Contribution to Overall Course grade (%)**	**Due date**
In-class test (quiz + in-class test)	20%	The beginning or the end of each corresponding lecture
Course participation (in-class team activity + peer evaluation)	20%	The end of each corresponding lecture
Analytical writing (in-class writing activity + analytical report)	60%	The end of each corresponding lecture and Dec 8, 11:59pm

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of CILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class test	CILO-1, CILO-2, CILO-3, CILO-4, CILO-5	The quizzes and tests examine students' understanding of the critical thinking model UWISES, and basic probability concepts (CILO-1). They also test students' ability to analyze and evaluate information (CILO-1, CILO-2, CILO-4) and present in written formation (CILO-3, CILO-5).
Course participation	CILO-1, CILO-2, CILO-3, CILO-4, CILO-5	This task is a set of in-class activities, including team discussion, writing, presentation, debate, and peer evaluation. It tests students' ability to identify problems (CILO-1, CILO-2), search for information (CILO-1), analyze and evaluate arguments and evidence (CILO-2, CILO-4), and present their thoughts orally (CILO-3, CILO-5).
writing (in-class team activity + analytical report)	CILO-1, CILO-2, CILO-3, CILO-4, CILO-5	This task is a set of in-class activities and an analytical essay. It tests students' ability to identify problems (CILO-1, CILO-2), search for information (CILO-1), analyze and evaluate arguments and evidence (CILO-2, CILO-4), and present their thoughts in writing (CILO-3, CILO-5).

Weekly Topics & CILOs

Lecture	Topics	CILOs

Lecture 1	Module Introduction & UWISES Review	CILO1, CILO2, CILO3, CILO4,
Lecture 2	Overselling UWISES (Understand+Wonder) & Analytical Report (Introduction) + Overselling UWISES (Investigate)	CILO1, CILO2, CILO3
Lecture 3	Discrete Random Variables (Online pre-lecture learning) & Presentation of the pre-lecture learning +Overselling UWISES (Speculate)	CILO1, CILO2, CILO3, CILO5
Lecture 4	Overselling UWISES (Evaluate & Solve) & Analytical Report (Main body+Conclusion)	CILO1, CILO2, CILO4, CILO5
Lecture 5	Medical Testing UWISES (Understand & Wonder)	CILO1, CILO2,
Lecture 6	Medical Testing UWISES (Investigate) & Bayes' rule	CILO1, CILO2, CILO3
Lecture 7	Medical Testing UWISES (Speculate & Evaluate & Solve)	CILO1, CILO2, CILO3, CILO4, CILO5
Lecture 8	TA Instructional Delivery	

Grading Rubrics

Report rubrics: Analytical Report Rubrics_M5.xlsx

Peer evaluation rubrics: Discussion Rubrics.xlsx

Final Grade Descriptors:

Grades	**Short Description**	**Elaboration on subject grading description**
A	Excellent Performance	Consistently and accurately identifies and analyzes relevant information, data, and sources, demonstrating a deep understanding of the material. Excels in identifying, analyzing, and evaluating complex arguments, often recognizing subtleties and nuances that others may overlook. Applies advanced analytical skills to construct well-structured, logical arguments that are strongly supported by data and evidence. Thoroughly evaluates the implications and consequences of various solutions, showing a sophisticated understanding of potential outcomes. Communicates decisions clearly and critically,

		using data and evidence to effectively justify their reasoning. Demonstrates a high level of creativity and critical insight in applying course concepts.
B	Good Performance	Effectively identifies and analyzes relevant information, data, and sources, with only minor gaps or errors. Competently identifies, analyzes, and evaluates arguments, showing a good understanding of the key issues. Constructs logical and coherent arguments using appropriate data and evidence, with some minor weaknesses in structure or support. Adequately evaluates the implications and consequences of solutions, recognizing most key outcomes. Communicates decisions in a clear and logical manner, generally using data and evidence effectively, though with occasional lapses in clarity or depth.
C	Satisfactory Performance	Adequately identifies and analyzes relevant information, data, and sources, but may miss some important details or show inconsistency. Identifies, analyzes, and evaluates arguments at a basic level, with some understanding but also significant gaps. Constructs arguments that are generally logical but may lack strong evidence or have weaknesses in reasoning. Provides a basic evaluation of the implications and consequences of solutions, though some important aspects may be overlooked. Communicates decisions with reasonable clarity, using data and evidence, but with frequent errors or superficial analysis.
D	Marginal Pass	Shows minimal ability to identify and analyze relevant information, data, and sources, often missing key elements. Struggles to identify, analyze, and evaluate arguments, with significant misunderstanding or oversimplification. Constructs weak arguments that are often unsupported by sufficient evidence or contain serious logical flaws. Provides limited evaluation of the implications and consequences of solutions, with many important factors ignored. Communicates decisions

		poorly, often failing to use data and evidence effectively, and demonstrating limited critical thinking.
F	Fail	Fails to identify and analyze relevant information, data, and sources, with little to no understanding demonstrated. Does not effectively identify, analyze, or evaluate arguments, often misunderstanding key concepts. Constructs arguments that are fundamentally flawed, illogical, or entirely unsupported by evidence. Neglects to evaluate the implications and consequences of solutions or does so in a way that shows no real understanding. Fails to communicate decisions effectively, showing no meaningful use of data or evidence, and demonstrating an absence of critical thinking.

Course AI Policy

In this module, students are allowed to use generative artificial intelligence (AI) to aid you in any manner. However, you must cite the AI generated contents with APA or IEEE citation.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include [specific details, e.g., strengths, areas for improvement]. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

Late submission is allowed. However, any late submission will receive a 50% deduction per day late.

Required Texts and Materials

Ruggiero, V. R. (2014). Becoming a Critical Thinker. Cengage Learning. (8th Edition).

Alberto Leon-Garcia, Probability, *Statistics and Random Processes for Electrical Engineering*, Addison Wesley, 3rd ed., 2009

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students

are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

The Hong Kong University of Science and Technology (Guangzhou)

UG Course Syllabus

Course Name: Cognitive Foundations of University Education: Critical Thinking and Data Literacy in Business

Course Code: UCUG 1000-M06

No. of Credits: 1

Instructor Name: Ruiting Zuo

Email: ruitingzuo@hkust-gz.edu.cn

Teaching Assistant: Yushu He (yhe529@connect.hkust-gz.edu.cn)

Zichun Wang (zwang890@connect.hkust-gz.edu.cn)

Contact:
For any course-related matters, please email me or the teaching assistants, and **kindly CC all of us.**

Office Hours: Wednesday, 9:00-11:30 am, or by appointment.

Perquisite:

This course is essentially self-contained. However, a foundation in algebra (including solving equations, graphing functions, understanding slopes, etc.) and basic knowledge of probability will be helpful.

Course Description

This module provides students with a comprehensive foundation in data-driven decision-making, equipping them with the necessary skills to analyze and utilize data effectively in various business scenarios. Students will explore fundamental concepts about data collection, visualization, analysis, forecasting, and optimization in a business context. The module will start with an exploration of fundamental probability theory and spreadsheet analysis. Subsequently, students will apply these theoretical and programming skills to analyze real-world business data, learning how to link data and decisions through probabilities and optimization models. By combining theoretical knowledge with practical applications, students will develop a deep understanding of how data can drive informed decision-making processes. Finally, students will participate in an experimental exercise where they will gain valuable business insights, collect data firsthand, analyze the collected data using the techniques learned, and utilize the findings to drive business planning effectively. Through hands-on experimentation and role-playing exercises, students will not only gain valuable insights but also enhance their ability to apply data analysis techniques in real-world business settings.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Identify and analyze relevant information, data, and sources for problems in business
2. Identify, analyze, and evaluate arguments in business
3. Apply mathematical and programming analytical skills to construct valid argument using data and evidence in business
4. Evaluate implications and consequences of the managerial solutions.
5. Make and communicate decisions critically using data and optimization techniques.

Weekly Schedule & Weekly ILOs

Module	Coverage	Weekly ILOs
1 (Week 10)	• Introduction to Critical Thinking and Data Literacy in Business • Case study • Preliminary knowledge about probability	• Gain an understanding of fundamental ideas and concepts related to data analytics in business • Develop basic math skills that will be essential for data analysis later in this course
2 (Week 11)	• Conduct Business experiment • Data collection and in-class discussion **Notice: Please ensure that you attend the scheduled experiment, as no make-up sessions will be available. Participation in the experiment and data collection during the session are closely related to a written assignment accounting for 30 marks in this course.**	Gaining practical experience in business decision-making: By simulating real-world scenarios, students can apply theoretical knowledge to practical situations and understand the implications of their decisions on business performance.
3 (Week 12)	• Business analysis with spreadsheet • Case study using data	Apply mathematical and programming analytical skills to construct valid argument using data and evidence in business context
4 (Week 13)	• From data to model including how to fit data with probability model • Data-driven decision making	Make and communicate decisions critically using data and optimization techniques

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

Assessment Task	Contribution to Overall Course grade (%)	Due date
In-class assignment	20%	05/12/2025
Written assignment	60%	30/11/2025, 16/12/2025
Participation (attendance + discussion)	20%	05/12/2025

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

Assessed Task	Mapped ILOs	Explanation
In-class assignment	ILO1, ILO2, ILO3, ILO4	This task assesses students' ability to explain and understand basic business and data analysis concepts (ILO 1, ILO 2), critically analyze the business context using mathematical and programming techniques (ILO 3), and provide potential managerial insights or solutions supported by data and evidence (ILO 4).
Written assignment	ILO1, ILO2, ILO3, ILO4, ILO5	This task assesses students' ability to explain and understand fundamental business and data analysis concepts (ILO 1, ILO 2), critically analyzing the business context using mathematical and programming techniques (ILO 3). In the written assignment, students are expected to present well-founded arguments and rationale, offer managerial insights or solutions supported by data, evidence, and optimization techniques (ILO 4, ILO 5).
Participation	ILO1, ILO2, ILO3, ILO4, ILO5	The students are required to take all the courses, understand the basic concepts and techniques delivered during the class and have active in-class discussion ((ILO 1, ILO 2, ILO 3, ILO 4, ILO 5).

Grading Rubrics

In-class assignment: This must be taken the day they are administered. The grading will be based on the correctness, clarity, organization, and effectiveness of their analysis and findings using data and evidence.

Written assignments: The depth of analysis, critical thinking, the application of business analytics concepts, and the effectiveness of interpreting data and presenting ideas with data and evidence will be considered. I will also examine the organization, coherence, and clarity of the written assignment, including the logical flow of ideas and the use of proper grammar and punctuation. **Late submissions within 24 hours after the deadline will incur a 10% penalty. Submissions received more than 24 hours after the deadline will not be graded.**

Participation accounts for 20% of your total grade and includes **both attendance and in-class discussion. Attending all four weeks will earn you 16 marks. You will receive 1 point for each comment, discussion, or answer to a question with a maximum of 4 points for in-class discussion.** Attendance and in-class discussion

will be recorded by the teaching assistant (TA). If you do not check in with the TA, your attendance and in-class discussion will not be recorded.

Please make sure to have your attendance and participation recorded by the TA during the break or before the end of each class. Your participation score will be based solely on the records. No exceptions will be made for missing records.

If you need to miss an upcoming class, arrive late, or leave early due to unavoidable reasons such as medical issues, please email me at least 12 hours in advance and provide supporting evidence (e.g., a medical report).

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Demonstrates a comprehensive grasp of subject matter, expertise in problem-solving, and significant creativity in thinking. Exhibits a high capacity for scholarship and collaboration, going beyond core requirements to achieve learning goals.
B	Good Performance	Shows good knowledge and understanding of the main subject matter, competence in problem-solving, and the ability to analyze and evaluate issues. Displays high motivation to learn and the ability to work effectively with others.
C	Satisfactory Performance	Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis and critical thinking. Shows persistence and effort to achieve broadly defined learning goals.
D	Marginal Pass	Has threshold knowledge of core subject matter, potential to achieve key professional skills, and the ability to make basic judgments. Benefits from the course and has the potential to develop in the discipline.
F	Fail	Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Shows limited ability to think critically or analytically and exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include specific details, e.g., strengths, areas for improvement. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Required Texts and Materials

The math primer and spreadsheet tools for data analysis will be uploaded to Canvas for reading and reference.

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST(GZ)'s Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Regulations for Academic Integrity and Student Conduct for the University's definition of plagiarism and ways to avoid cheating and plagiarism.