HONG KONG BAPTIST UNIVERSITY
Faculty of Science

1. **Course Code and Course Title**
GFQR1057 How to Survive in the World of Misinformation (3,3,0)

2. **No. of Units**
3

3. **Offering Department**
Department of Mathematics

4. **Pre-Requisite**
Nil

5. **Co-Requisite / Anti-Requisite (if any)**
Nil

6. **Aims & Objectives**

Misinformation is false information, whether or not it is intended to mislead or deceive people. We live in a world full of information and misinformation. Through the study of this subject, students will be better at interpreting information correctly and identifying misinformation.

While not everyone is trained to become an academic, it can be very beneficial for students to have some general understanding of how to construct valid arguments and how to use data to help us understand the misinformation around us. These skills can help us cast doubt on the credibility of various claims.

This course uses real-life examples to aid students make strong connections between the material presented with the real-world scenarios. The basic verification of arguments will improves students' logical reasoning skills so that they can identify false arguments in everyday life. The students should also understand the difference between misinformation and counterintuitive facts.

The students should be able to determine the reliability of the received data and understand the difference between correlation and causation. Finally, they can make analyzing predictions in probability terms. This knowledge will enable students to determine which information they should dismiss.

7. **Course Intended Learning Outcomes (CILOs)**

CILO	By the end of the course, students should be able to:	PILOs
1	Identify misinformation in everyday life.	1,5
2	Explain how misinformation misleads by exposing its logical fallacies.	2,3
3	Interpret quantitative data in daily life from the appropriate statistical point of views.	3,5

4	Evaluate claims in commercial advertisements or other everyday situations for their truthfulness.	3,4,5

8. **Teaching & Learning Activities (TLAs)**

CILO No.	TLAs
1,2,3,4	**Lectures** The instructor will present real-life cases to motivate students' interests and introduce the topics of the course's materials. Basic concepts will be introduced to consolidate students' background knowledge. Examples of misinformation will be given to illustrate finer details.
1,2,3,4	**In-class exercises** Exercises will be given so that students will have immediate practice after learning each topic.
1,2,3	**In-class group discussion** Students work in small groups to discuss the examples retrieved from real-life data from the Internet, newspaper, and magazine. This allows students to develop their collaboration and communication skills. The instructor/tutor would facilitate the students to examine the misinformation occurring in various aspects of society. Students should present their conclusion after group discussion.
2,3,4	**Reflection** Written form reflection allows students to express their understanding of the whole course from their perspectives. Students can apply a good level of critical analysis in this learning activity.

9 **Assessment Methods (AMs)**

Type of Assessment Methods ABC	Weighting	CILOs to be Address	Description of Assessment Tasks
Exercises	24%	1,2,3,4	Exercises are designed to help students understand the topics. There are six in-class exercises in total, where the weighting is evenly distributed. Each exercise will allow students to apply the tools learned. Also, the instructor can monitor the learning progress of the students.
Quizzes	12%	1,2,3,4	Three quizzes will be given to assess how well the students have learned the concepts and knowledge of a completed component of the course. Questions in this part will come with several integrated topics introduced in lectures. It is designed to be a comprehensive test, covering all topics of the entire course, to assess how far students have achieved the course intended learning outcomes.
Group Discussion Participation	12%	1,2,3	Students will be divided into groups consisting of five to seven people. The instructor will give every group several daily life examples. The students should discuss within the group and

			identify which daily life examples are misinformed. Throughout the process, students should actively engage in and contribute constructively to the study of a particular person through cooperation and respect for their classmates. The assessment of participation is according to the following aspects: • Preparation (5%) • Analysis and evaluation (4%) • Cooperation & Respect (3%)
Group Project Presentation	28%	2,3,4	Students should gather more information about the tools they learn and the ways they can be applied to identify misinformation. Individual groups present the results in the last two weeks of the semester. The assessment of presentations is according to the following aspects: • Accuracy of information (10%) • Subject knowledge (9%) • Organization (6%) • Language & communication (3%) Members of a group obtain the same marks from the presentation. Their contributions to the project are assessed in group discussion participation and reflective reports.
Reflective Report	24%	2,3,4	Students submit individual reflective reports (800-1000 words) after the group presentations. Reflective reports also document the individual contributions to the course project. The reflective reports are assessed according to the following elements: • Contributions to project (8%) • Language & communication (2%) • Accuracy (8%) • Depth & Breadth (6%)

10. **Assessment Rubrics**

To be determined by the instructor

11. **Course Intended Learning Outcomes and Weighting**

Content	**CILO No.**	**Teaching (in hours)**
1. How to evaluate an argument	1,2	6
2. Counterintuitive can be true	1,2	3

3. Interpretation of data with justifiable arguments	1,3,4	30

12. **Textbooks / Recommended Readings**

General Reading List and References:

1	P.K. Sun. *Mathematics Around Us. HKMS Texts in General Education, Vol. 6*. Pearson Education, 2014.
2.	K.I. Liu, K. M. To. *Speaking of Statistics. HKMS Texts in General Education, Vol. 5.* Pearson Education, 2013.
3.	S.K. Campbell. *Flaws and Fallacies in Statistical Thinking.* New York: Dover Publication, 2004.
4.	Charles Wheelan, *Naked Statistics: Stripping the Dread from the Data,* W. W. Norton & Company, 2013.
5.	Steven Pinker, *Rationality: What It Is, Why It Seems Scarce, Why It Matters,* Viking, 2021.

13. **Course Content**

Topic	Contact Hours
Week 1: Valid arguments ● Stepwise guideline to valid arguments ● Are these two arguments the same? ● How to combine arguments correctly Students will do in-class exercise 1 for the last hour of the lessons in Week 1. TLA: Lectures, In-class exercise Readings: 1. P.K. Sun. *Mathematics Around Us*, chapter 2. 2. Steven Pinker, *Rationality*, chapter 3.	3 Hours
Week 2: What's wrong with my argument? ● Understand the rationale in daily language ● Identify the necessary elements in logical thinking ● Determine the validity of arguments in everyday life ● Identify the logical fallacies Students will do in-class exercise 2 for the last hour of the lessons in Week 2. TLA: Lectures, In-class exercise Readings:	3 Hours

1. P.K. Sun. *Mathematics Around Us*, chapter 2. 2. Steven Pinker, *Rationality,* chapter 3. 3. https://www.cantorsparadise.com/your-first-formal-system-da2fffbf7888	
Week 3: Counter intuitive Examples ● Monty Hall problem ● Simpson's paradox ● Source of the misconception Students will do quiz 1 for the last hour of the lessons in Week 3. TLA: Lectures, Quiz Readings: 1. https://www.cantorsparadise.com/understanding-the-monty-hall-problem-e9aa24cc62ac. 2. https://towardsdatascience.com/benfords-law-a-simple-explanation-341e17abbe75 3. https://www.statisticshowto.com/benfords-law/ 4. https://monolop.com/6-scientific-paradoxes-that-will-blow-your-mind-c79a8f729df6 5. https://towardsdatascience.com/top-3-statistical-paradoxes-in-data-science-e2dc37535d99. 6. Steven Pinker, *Rationality,* chapter 1 and 2.	3 Hours
Week 4-5: Misuse of data ● Misleading graphs and charts in daily life ● False summary from correct data ● Quantitative analysis of data about misconception Students will do in-class exercise 3 and 4 for the last hour of the lessons in Week 4 and 5, respectively. TLA: Lectures, In-class exercise Readings: 1. Charles Wheelan, *Naked Statistics*, chapter 3. 2. S.K. Campbell. *Flaws and Fallacies in Statistical Thinking,* chapter 3 and 5. 3. W. Mendenhall, *Introduction to Probability and Statistics*, chapter 7 and 8.	6 Hours
Weeks 6 – 7: Manipulation of data ● Sufficient data to conclude ● Difference between correlation and causation ● Limitation of extrapolation Students will do quiz 2 and in-class exercises 5 for the last hour of the lessons in Week 6 and 7, respectively.	6 Hours

TLA: Lectures, In-class exercise, Quiz Readings: 1. https://www.oreilly.com/radar/what-is-causal-inference/?utm_medium=email&utm_source=topic+optin&utm_campaign=awareness&utm_content=20220131+data+ai+nl&mkt_tok=MTA3LUZNUy0wNzAAAAGCTXp3QHzY-WvGPwGc9lbj8u7hi7QaVqrFxFKiPwPsUsjfKKFnUn2kDzY_ZclupDFHPt8TpZR8pMcZDtVzHgWBpXh3I2MLTA0nCPdoCAPIM9xhqA. 2. Charles Wheelan, *Naked Statistics*, chapter 7. 3. Steven Pinker, *Rationality,* chapter 7 and 9.	
Week 8: Questionnaire design ● How should you professionally design a survey questionnaire ● How should you carry out a survey ● What should you notice when you see survey results? Students will do in-class exercises 6 for the last hour of the lessons in Week 8. TLA: Lectures, In-class exercise Readings: 1. Charles Wheelan, *Naked Statistics*, chapter 10. 2. Steven Pinker, *Rationality,* chapter 4.	3 Hours
Week 9: Bayes' Theorem ● When new information comes, how should you update your prediction? Students will do quiz 3 for the last hour of the lessons in Week 9. TLA: Lectures, Quiz Readings: 1. Steven Pinker, *Rationality,* chapter 5. 2. S.K. Campbell. *Flaws and Fallacies in Statistical Thinking,* chapter 11.	3 Hours
Weeks 10 – 11: Group discussion The instructor will give every group several daily life examples. The students should discuss within the group and identify which daily life examples are misinformed. ● TLA: In-class group discussion, Reflection	6 Hours
Weeks 12 – 13: Project Presentations TLA: In-class group discussion, Reflection	6 Hours
Total:	**39 Hours**

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Approved by General Education Committee meeting on 29 March 2023.

Approved by Faculty Board meeting on 17 May 2023.