The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2022
Course Outline

SAYT1016 Data Science: Inference, Prediction and Learning
數據科學：推理、預測和學習

Introduction:
Uncertainty exists in many real-life problems, ranging from stock returns to sport results to medication effects to election outcomes. Statistics offers methods to handle uncertainty with a higher precision. This course introduces ways to define, model and forecast uncertainty through real-life examples and counterintuitive phenomena. Topics include exchange paradox, Simpson's paradox, linear regression model, non-parametric regression model, historical simulation, and k-mean clustering.

不確定性存在於許多現實生活中的問題，例子涵蓋股票回報、運動結果、藥物效果、選舉結果等。統計科學提供了具更高準定性的方法，以處理不確定性的問題。本課程以實際示例和違反直覺的現象引導，來定義、模型和預測不確定性。主題包括替換悖論，辛普森悖論，線性迴歸模型，非參數迴歸模型，歷史模擬法，k 平均演算法。

Medium of Instruction: Cantonese supplemented with English

Organising Unit:
Department of Statistics, CUHK

Teacher:
Prof. CHAN Kin Wai
Department of Statistics, CUHK
Room 115, Lady Shaw Building, CUHK
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Course Content:

17 August 2022 (Wednesday) 09:30am - 12:30pm 02:30pm - 05:30pm	AM: (Topic 1.1) Exchange paradox: the roles of random variables (Topic 1.2) Simpson paradox: the power of conditional statements PM: Laboratory section: Introduction of statistical programming language
18 August 2022 (Thursday) 09:30am - 12:30pm 02:30pm - 05:30pm	AM: (Topic 2.1) Linear regression model: borrowing knowledge from covariates PM: Laboratory section and discussion
19 August 2022 (Friday) 09:30am - 12:30pm 02:30pm - 05:30pm	AM: (Topic 2.2) Nonparametric regression model: learning complex structure PM: Laboratory section and presentation
22 August 2022 (Monday) 09:30am - 12:30pm 02:30pm - 05:30pm	AM: (Topic 3.1) Historical simulation: fully utilizing data by resampling PM: Laboratory section and discussion
23 August 2020 (Tuesday) 09:30am - 12:30pm 02:30pm - 05:30pm	AM: (Topic 3.2) k-mean clustering: unsupervised learning PM: Laboratory section and presentation
24 August 2022* (Wednesday) 09:30am - 12:30pm 02:30pm - 05:30pm	Make-up class

Duration	5 whole day sessions (total 30 contact hours)
Date	17,18,19,22,23 August 2022 24 August 2022* (make-up class)
Time	9:30am-12:30pm & 2:30pm-5:30pm
Teaching Mode#	Face to Face (The Chinese University of Hong Kong)
Enrollment	50
Expected applicants	Students who are promoting to S4-S5 with good knowledge in mathematics and with strong interest in solving real problems
Tuition Fee	HKD 3,900.00 (Students who have attended all sessions will be granted a HKD 1,000 scholarship)
Credit	1 University Unit Certificates or letters of completion will be awarded to students who attain at least 75% attendance.

This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.

 # This course will be offered on CUHK campus in face-to-face mode. It may switch to online teaching in accordance with the pandemic development and the policy of the university.