Department of Statistics

H222600 Biostatistics (生物統計)

Spring 2023 (111 學年度第 2 學期)

1. ***The mission of the College*** *is to serve business and society in the global economy through developing professionally qualified and socially responsible business leaders as well as through advancing the frontiers of knowledge in business management.*
2. ***The strategic objective of*** [*Department of Statistics*](#) *is to cultivate quality professionals with enthusiasm and global perspectives.*

Undergraduate Program Learning Goals (goals covered by this course are indicated with checks):

✓	1	Undergraduate students should be able to communicate effectively in speaking and in writing.
✓	2	Undergraduate students should be able to solve strategic problems with creative and innovative approaches.
	3	Undergraduate students should develop leadership skills required of a person in a leading position.
		Undergraduate students should demonstrate ethical awareness in learning and in social networking.
	4	Undergraduate students should possess a global perspective and an awareness of the effects of globalization.
	5	Undergraduate students should acquire the skills and values required of a true professional.

➢ **Instructor/開課教師:**
Wan-Lun Wang/王婉倫
Email: wangwl@gs.ncku.edu.tw
Phone: (06)2757575#53632

Pei-Fang Su/蘇佩芳
Email: pfsu@ncku.edu.tw
Phone: (06)2757575#53623

➢ **Prerequisite/先修科目:**
Statistics (I) (II) / 統計學(一)、(二)

➢ **Course Description/課程描述:**

This is a Coursera online course. Biostatistics is intended as a course in the application of statistical thinking to biological problems. Some of the fundamental probability, random variables and their properties along with basic statistical concepts are reviewed. Then binomial proportions, hypothesis testing, discrete data, and so on, which are important in statistics in particular for biostatistics, are introduced. Finally, students will learn how these statistical ideas and techniques can be applied to bioinformatics, including genomic data, non-continuous outcomes, DNA sequence alignment, BLAST algorithm and Markov models.

本課程為 Coursera 線上課程。生物統計學旨在作為將統計思維應用於生物學問題的一門課程。一些基本的機率、隨機變數及其性質與基本統計概念將被回顧。接著,在統計學尤其是生物統計學中很重要的二項式比例、假設檢定和離散資料等將被介紹。

➢ **Course Objectives/課程目標:**

1. To understand basic concepts of statistics and probability/ 理解統計與機率基本概念
2. To recognize analytical techniques for binary, categorical, count and sequence data/ 認識二元、類別、計數及序列資料之分析技術

➤ **Content Summary/課程內容:**

Week /週次	Topic/授課內容	Course URL/課程網址
1	Introduction to clinical research, observational and experimental studies	https://www.coursera.org/learn/clinical-research
2	Introduction to case-control、cross-sectional、cohort studies	
3	Introduction to experimental studies, meta-analysis	
4	Data types : nominal categorical data、ordinal、numerical	
5	How to tell the difference : discrete and continuous variables	
6	Introduction to hypothesis testing	
7	Type I and II errors	
8	Introduction to parametric tests : t test, ANOVA	
9	Introduction linear regression	
10	Introduction to nonparametric tests : sign test, rank sums test, Mann-Whitney-U test	
11	Comparing categorical data : contingency tables Chi-square test Fisher's exact test	
12	Introduction to sensitivity and specificity	
13	Introduction to risk and odds ratios	
14	Introduction to Probability, Expectations, and Random Vectors	
15	Conditional Probability and Bayes' Rule	https://www.coursera.org/learn/biostatistics#syllabus Receive a Coursera certificate after completing all courses in weeks 1 to 5.
16	Distributions, Likelihood Functions and Asymptotic Properties	
17	Confidence Intervals, Bootstrapping, and Plotting	
18	Binomial Proportions and Logs	

Understanding Clinical Research: Behind the Statistics
https://www.coursera.org/learn/clinical-research

Introduction to mathematical biostatistics 1
Introduction to Mathematical Biostatistics 1 | Coursera

➤ **Teaching Approach(es)/教學方法 (如講授、討論、實作、報告、參訪、影音欣賞、個案研討、其他等)**

序號	教學方法	分配(%)
1	Coursera Online Video 線上教學影片	80%

2	Coursera Homework and Online Quiz 作業及線上測驗	20%
總計		100%

➢ **Textbook/教科書:**

The course materials are provided by Coursera. There is no assigned textbook.

➢ **Reference/參考書目:**

➢ **Grading Policy/評量方式:**

1. Learning Portfolio Record/ 學習歷程記錄 30%
2. Coursera Homework/線上課程作業 30%
3. Coursera Online Quiz/線上測驗 40%

(*Grading Policy for AACSB Multiple Assessment:)

COMMU	☐ Oral Communication/ Speaking			
	☐ Written Communication/Writing			
CPSI	■ Creativity and Innovation			
	■ Problem Solving			
	■ Analytical & Computational Skills			
LEAD	☐ Leadership			
	☐ Ethic & Social Responsibility			
GLOB	☐ Global Awareness			
VSP	☐ Values, Skills & Professionalism			
	☐ Technical Skills			
	☐ Management Skills			