

理學院

108 學年度第一學期模組化課程

代數拓樸與數據分析

Algebraic Topology and Data Analysis

授課教師：

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國立成功大學數學系

課程類別	學分數	選必修	開課人數	注意事項
講義	1	選修	15	Lecture in English 本課程英文授課

先修課程或先備能力：

高中數學

建議修課年級：

不設限

建議修課學生背景：

適合各領域學生修習

教學方法：

講授 70%，討論/報告 15%，實作(電腦模擬.實驗) 15%

評量方式：

問題考試 30%、出席率 20%、其他(Oral presentation) 30%

補充說明：

Each person has to present a recent scientific paper on topological data analysis or explain how to apply topology to a problem of personal interest dealing with data.

學習規範：

Academic integrity is expected of every student.

課程概述：

Introduction to topological data analysis. This course aims to discuss one approach to the analysis of large and complex data sets using techniques from algebraic topology.

課程進度：

Period	Hours	Syllabus
9/2	9:00-12:35	Introduction: Topology and Data
9/3	9:00-12:35	Homology
9/4	9:00-12:35	Persistence
9/5	9:00-12:35	Case Study: natural image statistics, sensor networks, or case of interest
9/6	9:00-12:40	Oral Presentation

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課程學習目標：

1. Be familiar with basics of algebraic topology that are useful for data analysis.
2. Be familiar with basic analysis of data using algebraic topology.
3. Have a taste on applications of topological data analysis.

課程的重要性、跨域性與時代性：

Large and complex data sets of various kinds have been produced at an unprecedented rate and understanding them is a fundamental problem in modern science. Using topology to extract structure from data has been gaining importance in pure mathematics, applied mathematics, and computer science; it has seen many applications in biology, chemistry, material science, medical imaging, to name a few.

其他備註：

參考書目：

Computational topology by Edelsbrunner and Harer.