



課 綱 Course Outline

理工學院大數據科學國際學士班學士班

中文課程名稱 Course Name in Chinese	線性代數				
英文課程名稱 Course Name in English	Linear Algebra				
科目代碼 Course Code	DS_10040	班 別 Degree	學士班 Bachelor's		
修別 Type	學程 Program	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					
課程目標 Course Objectives					
<p>1. Understand the basic concepts and principles of linear algebra, including vectors, matrices, and systems of linear equations.</p> <p>2. To master the methods and techniques of matrix operations, including matrix addition, matrix multiplication, and matrix inversion, etc.</p> <p>3. To understand the concept of eigenvalues and eigenvectors of a matrix and their applications in linear algebra.</p> <p>4. Understand the concepts and properties of linear transformations and be able to apply linear transformations to solve problems.</p> <p>5. Learn how to use linear algebra tools to solve real-world problems, such as image processing, machine learning, etc.</p> <p>Overall, the goal of the Linear Algebra course is to help students develop a deep understanding of linear algebra and learn to use linear algebra tools to solve problems.</p>					
系教育目標 Dept.'s Education Objectives					
1	訓練嚴謹思考與推理能力。 to provide a solid training in rigorous thinking and reasoning,				
2	奠定資料科學理論與應用數學的基礎知識。 to establish well-founded background knowledge in data science and applied mathematics,				
3	具備跨領域學習能力。 to prepare the students for interdisciplinary study in the future.				
系專業能力 Basic Learning Outcomes				課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.'s Education Objectives	

A	具備基本資料科學知識及邏輯推理能力。 have well-founded background in data science and logical reasoning,	●
B	具備機率、統計、資料科學及相關領域的知識與應用能力。 have the knowledge of probability, statistics, data science and the related fields, and their applications,	●
C	具備資料科學應用技能與團隊合作，解決問題能力。 be able to utilize data scientific skills for problem solving through cooperation and teamworking.	○

圖示說明 Illustration : ● 高度相關 Highly correlated ○ 中度相關 Moderately correlated

課程大綱
Course Outline

1. Linear systems of equations and matrices: column vectors, matrix operations, Gaussian elimination, matrix multiplication, inverse matrix and determinants, etc.
2. Vector spaces and linear transformations: vector spaces, bases, linear combinations, linear independence, subspaces, base transformations, matrix representations, matrix representations of linear transformations, etc.
3. Eigenvalues and eigenvectors: concept of eigenvalues and eigenvectors, eigenvalues equation, eigenvalues solution, diagonalization and Jordan standard form, etc.
4. Inner product space: concept of inner product, basic properties of inner product space, orthogonality, orthogonal basis, Gram-Schmidt orthogonalization, etc.
5. Applications of Linear Algebra: Applications of linear algebra in physics, engineering, computer science, statistics, etc., such as image processing, machine learning, etc.

資源需求評估 (師資專長之聘任、儀器設備的配合 . . . 等)
Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

Professional Instructors

課程要求和教學方式之建議
Course Requirements and Suggested Teaching Methods

The classes are lectured by oral lectures. The evaluation will be done via at least three exams.

其他
Miscellaneous

1130306 訂定