國立東華大學

課　　綱　Course Outline

資訊工程學系國際組

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	CSIEB0060	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

1.Understand the basic concepts and principles of linear algebra, including vectors, matrices, and systems of linear equations.
2.To master the methods and techniques of matrix operations, including matrix addition, matrix multiplication, and matrix inversion, etc.
3.To understand the concept of eigenvalues and eigenvectors of a matrix and their applications in linear algebra.
4.Understand the concepts and properties of linear transformations and be able to apply linear transformations to solve problems.
5.Learn how to use linear algebra tools to solve real-world problems, such as image processing, machine learning, etc.
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.

系教育目標
Dept.’s Education Objectives

1	具備學科知識，養成專業技能 Acquire academic knowledge, develop professional skills
2	學習創新思考，分析解決問題 Inspire innovative thinking, increase analytical problem solving ability
3	培養團隊精神，學習溝通合作 Promote teamwork spirit, encourage coordination and cooperation
4	提昇專業倫理，承擔社會責任 Sublimate professional ethics, engage social responsibility
5	涵育人文素養，開拓國際視野 Cultivate humanities, broaden global perspectives

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	資訊專業終身學習能力 Ability of lifetime learning in information profession	●
B	實驗驗證資訊科學能力 Ability of validate experimental result validation in information science field	○
C	資訊工具整合運用能力 Ability of integrated applications of information technology	○
D	資訊系統應用設計開發能力 Ability of information application system design and development	○
E	團隊合作溝通協調能力 Ability of teamwork, communication, and coordination	
F	資通訊科技問題解決能力 Ability of problem solving regarding information and communication technology	
G	瞭解資訊科技多元影響能力 Ability to understand information technology’s multiple influences	○
H	肩負資訊人社會責任能力 Ability of bearing the social responsibilities being among information professionals	

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.)

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
Textbook: Ward Cheney, David Kincaid, Linear Algebra: Theory and Applications, Second Edition, International Version, Jones & Bartlett Learning, 2012, ISBN 978-1-4496-2731-7