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	資料庫系統				
英文課程名稱 Course Name in English	Database Systems				
科目代碼 Course Code	CSIEB0290	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

資料庫系統技術經過多年的發展，已經廣泛應用在絕大多數現代資訊系統中。隨著各種類型大數據資料(Big Data)不斷的產生與累積，資料庫系統和資料分析技術已經成為現代企業或機關組織維繫競爭力所不可或缺的重要能力。本課程介紹資料庫系統的理論基礎與實務應用，同時討論在大數據時代的最新資料庫技術趨勢。內容可以分為基礎部分和進階議題討論(依時間允許)。我們將選擇廣受歡迎的開放軟體資料庫管理系統和工具來進行實驗和學期計畫，讓同學具備透過網路提供資料庫相關應用服務的設計和實作能力。

Database systems are at the heart of almost all modern information systems. Any area with a need to process large volume of data can’t survive without database technologies. It is now one of the essential capabilities for computer science students to learn and practice. At the age of big data, data processing and analysis technologies are considered key indicators of competitiveness for any organization or enterprise. The main purposes of this course are to introduce the core concepts and key technologies of database systems, as well as current trends in data science. Students will learn how to construct effective database systems for intended domains. Students will also learn how to build online services with database systems for effective data management in the background.

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

Fundamentals(基礎部分):
・Database system concepts and history(資料庫系統基本概念與發展歷史回顧)
・Conceptual data modeling(概念資料模型)、Entity Relationship(ER)/Enhanced Entity Relationship(EER) data model(ER/EER資料模型)and database design(資料庫設計)
・Relational data model(關聯式資料模型)、Structured Query Language SQL(結構查詢語言SQL)、relational algebra/calculus(關聯式代數與計算) and relational database design(關聯式資料庫設計)
・Open source DBMS and application design: PHP/MySQL, Python/PostgreSQL(開源資料庫管理系統與應用設計: PHP/MySQL, Python/PostgreSQL)
・Database design theory(資料庫設計理論)、functional dependencies(函數相依) and normalization(正規劃)
・Database management system DBMS design(資料庫管理系統設計)、storage structure(儲存架構)、indexing methods(索引方法)
・Query processing(查詢處理)、query optimization(查詢最佳化)
・Transaction processing(交易處理)、concurrency control(並行控制) and recovery(回復)
・Big data processing(大數據處理)、NoSQL/NewSQL databases(NoSQL/NewSQL資料庫) and cloud data management(雲端資料管理)
Advanced topics(進階部分)：will be covered if time permits(依時間允許)
・Object-oriented databases(物件導向資料庫)、XML and semi-structure data processing (XML與半結構資料處理)

・Parallel and distributed databases(平行與分散式資料庫)
・Active databases(主動式資料庫)
・Temporal databases(時間資料庫)
・Spatial databases(空間資料庫)
・Multimedia databases(多媒體資料庫)
・Logic and deductive databases(邏輯與推導式資料庫)
・Data mining(資料探勘) and data warehousing(資料倉儲)
・Mobile data management(行動資料管理)
・Streaming data management(串流資料管理)

We will use open source DBMS such as MySQL, PostgreSQL as examples to practice database application design. If time permits, we will also cover NoSQL and NewSQL databases such as HBase and MongoDB for big data processing.（在實務練習方面，我們將採用開放式資料庫管理系統像是MySQL、PostgreSQL等，同時討論如何設計建構資料庫應用程式。如果時間允許，我們將介紹大數據處理之NoSQL與NewSQL資料庫如HBase與MongoDB等。）

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.)

需搭配一般教室和電腦教室
Need to use both traditional classroom and computer lab.

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

Class lectures, case study and term project

其他
Miscellaneous