國立東華大學

教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	初等分析			學年/學期 Academic Year/Semester	114/1
課程名稱(英文) Course Name in English	Elements of Analysis				
科目代碼 Course Code	DS__10070	系級 Department & Year	學二	開課單位 Course-Offering Department	大數據科學國際學士班
修別 Type	學程 Program	學分數/時間 Credit(s)/Hour(s)	4.0/4.0		
授課教師 Instructor	/周君彥				
先修課程 Prerequisite	/#微積分(一)/#微積分(二)				

課程描述 Course Description

This course is an introduction to analysis focus on building a solid basis for students in data science.
There are two parts of this course.

Part I One-Dimensional Theory (basically it is a review of Calculus but much more solid)
We start with the real number system, and then discuss sequences in the real number system, and functions on the real number system.
We then discuss differentiability and integrability on the real number system.
We further go on to the discussion of infinite series of real numbers and infinite series of function.

Part II Multidimensional Theory
We start with n-dimensional Euclidean space R^n and discuss convergence in R^n.
Then the extremely important concepts of metric space and related topics is introduced.
We then discuss differentiability and integrability on R^n.
We will discuss some topics in vector calculus if everything goes well and as time allowed, so is the topic of Fourier series.

課程目標 Course Objectives

為微積分的進一步討論，訓練學生分析的能力和計算的技巧，培養學生抽象思考的能力
This is an advanced yet introductory course to analysis. It aims to train students to have both ability in analysis and technique in computation and to nurture ample mathematical/abstract understanding for articulation. Brief introduction to modern approach to the differential and integral calculus of functions and transformations in several variables.

	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

授 課 進 度 表 Teaching Schedule & Content		
週次Week	內容 Subject/Topics	備註Remarks
1	Part I One-Dimensional Theory (1/6) (the real number system)	
2	Part I One-Dimensional Theory (2/6) (sequences in the real number system, and functions on the real number system)	
3	Part I One-Dimensional Theory (3/6) (differentiability on the real number system)	
4	Part I One-Dimensional Theory (4/6) (integrability on the real number system)	
5	Part I One-Dimensional Theory (5/6) (infinite series of real numbers)	
6	Part I One-Dimensional Theory (6/6) (infinite series of function)	
7	Review and Midterm Exam	
8	Part II Multidimensional Theory (1/10) (Euclidean space R^n and discuss convergence in R^n)	
9	Part II Multidimensional Theory (2/10) (continuing the discussion of convergence in R^n)	
10	Part II Multidimensional Theory (3/10) (metric space 1/3)	
11	Part II Multidimensional Theory (4/10) (metric space 2/3)	
12	Part II Multidimensional Theory (5/10) (metric space 3/3)	
13	Part II Multidimensional Theory (6/10) (differentiability on R^n)	
14	Part II Multidimensional Theory (7/10) (integrability on R^n)	
15	Part II Multidimensional Theory (8/10) (fundamental theorems of vector calculus 1/2)	
16	Part II Multidimensional Theory (9/10) (fundamental theorems of vector calculus 2/2)	
17	Part II Multidimensional Theory (10/10) (Fourier series)	
18	Review and Final Exam	

教 學 策 略 Teaching Strategies

☑ 課堂講授 Lecture ☐ 分組討論Group Discussion ☐ 參觀實習 Field Trip

☐ 其他Miscellaneous: study the textbook and the slides before the class to get the most from

教 學 創 新 自 評 Teaching Self-Evaluation

創新教學(Innovative Teaching)

☐ 問題導向學習(PBL) ☐ 團體合作學習(TBL) ☐ 解決導向學習(SBL)

☐ 翻轉教室 Flipped Classroom ☐ 磨課師 Moocs

社會責任(Social Responsibility)

☐ 在地實踐Community Practice ☐ 產學合作 Industy-Academia Cooperation

跨域合作(Transdisciplinary Projects)

☐ 跨界教學Transdisciplinary Teaching ☐ 跨院系教學Inter-collegiate Teaching

☐ 業師合授 Courses Co-taught with Industry Practitioners

其它 other:

學期成績計算及多元評量方式 Grading & Assessments									
配分項目 Items	配分比例 Percentage	多元評量方式 Assessments							
		測驗 會考	實作 觀察	口頭 發表	專題 研究	創作 展演	卷宗 評量	證照 檢定	其他
平時成績(含出缺席) General Performance (Attendance Record)									see supplemental instructions
期中考成績 Midterm Exam	40%								see supplemental instructions
期末考成績 Final Exam	40%								see supplemental instructions
作業成績 Homework and/or Assignments	20%								see supplemental instructions
其他 Miscellaneous (_____)									see supplemental instructions

評量方式補充說明
Grading & Assessments Supplemental instructions

The semester score is the maximum of the following A,B,C. (Only C is involved with bonus points described below.)
A will be simply be 20% on homework, 40% on midterm, 40% on final exam, without bonus points.
B will be simply be 40% on midterm and 60% on final exam, without bonus points.
C will be the square root of 60 times the number N (where N = A + bonus points).
Student are encouraged to earn bonus points (only counted in N when computing C) such as quizzes, showing eagerness in discussion, and other good behaviors.

教科書與參考書目（書名、作者、書局、代理商、說明）
Textbook & Other References (Title, Author, Publisher, Agents, Remarks, etc.)

An Introduction to Analysis 4th edition, William R. Wade

課程教材網址(含線上教學資訊,教師個人網址請列位於本校內之網址)
Teaching Aids & Teacher's Website(Including online teaching information. Personal website can be listed here.)

We will set up a line group on the first day of the class.
Everyone of this class is required to be in the line group since all materials of this class will and only be in the line group, including homeworks.

其他補充說明 (Supplemental instructions)

Homeworks are required to be hand-written on A4 size papers with black or blue pen or pencils.
Every question should start with a complete description of the question itself, and followed by proposed solution by the student.
Every homework should be stapled at the upper-left corner.
Name and student ID no must be written clearly on near the upper-left corner of the first page on each homework.
Handwriting must be easily recognizable, otherwise points will be deducted or even no points will be given.