



## 教學計劃表 Syllabus

課程名稱(中文) Course Name in Chinese	統計專論(三)			學年/學期 Academic Year/Semester	114/2			
課程名稱(英文) Course Name in English	Topics in Statistics (III)							
科目代碼 Course Code	AM_74700	系級 Department & Year	博士 Doctor	開課單位 Course-Offering Department	應用數學系 Department of Mathematics			
修別 Type	選修 Elective	學分數/時間 Credit(s)/Hour(s)	3.0/3.0					
授課教師 Instructor	/楊宏基							
先修課程 Prerequisite								

## 課程描述 Course Description

本課程以統計製程管制 (Statistical Process Control, SPC) 為核心，系統性介紹現代製程監控與品質改善之理論與實務方法。課程內容涵蓋管制圖理論、Phase I 與 Phase II 製程監控、變異來源分析、非獨立資料與多變量製程監控等進階議題，並配合實際案例與電腦軟體實作，培養學生將統計理論應用於實際製程與資料分析問題之能力。

## 課程目標 Course Objectives

由任課教師專長區分，設定個別目標。

Course objectives are subject to the expertise of the instructor.

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	具備專業知識及邏輯推理能力。Have well-founded expertise and be capable of logical reasoning.	●
B	具備學習其它學科的能力，以期能邁向跨領域研究。 Be able to study other fields of science so as to conduct interdisciplinary research in the future.	●
C	具備獨立思考與解決問題的能力。 Be capable of independent thinking and have the problem-solving skills.	●

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

## 授課進度表 Teaching Schedule &amp; Content

週次 Week	內容 Subject/Topics	備註 Remarks
1	Quality concepts, quality management, and the role of SPC	
2	Overview and organization of Statistical Process Control	
3	Population concepts and important continuous distributions	
4	Discrete distributions, data description, and graphical methods	
5	Parametric statistical inference: estimation and hypothesis testing	
6	Nonparametric statistical inference for SPC	
7	Univariate Shewhart control charts for variables	

8	Shewhart charts for attributes and process capability analysis	
9	Midterm Examination	
10	CUSUM charts for monitoring the process mean	
11	CUSUM charts for variance and exponential family distributions	
12	Self-starting and adaptive CUSUM charts; ARL theory	
13	EWMA charts for monitoring mean and variance	
14	Self-starting and adaptive EWMA charts	
15	Control charts based on change-point detection	
16	Multivariate statistical process control under normality	
17	Univariate and multivariate nonparametric SPC	
18	Final Examination	

#### 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:

#### 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:

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## 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
平時成績(含出缺席) General Performance (Attendance Record)	10%		✓	✓				
期中考成績 Midterm Exam	30%		✓	✓	✓			
期末考成績 Final Exam	30%		✓	✓	✓			
作業成績 Homework and/or Assignments	30%		✓					
其他 Miscellaneous (_____)								

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

General Performance (10%) is based on attendance and active participation in class discussions and in-class activities.

Midterm Exam (30%) evaluates understanding of core SPC concepts and methods, with emphasis on analytical reasoning and interpretation.

Final Exam (30%) assesses comprehensive knowledge of advanced SPC topics and the ability to integrate theory with practice.

Homework and Assignments (30%) focus on practical exercises and data analysis, emphasizing correct implementation and clear explanation of results.

### 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.)

Qiu, P. (2014). Introduction to Statistical Process Control. Chapman & Hall/CRC Press. Used as the primary textbook for this course.

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.)

其他補充說明 (Supplemental instructions)