

113學年度第2學期 課程教學大綱

中文名稱	工程機率與統計	課號	UT532
英文名稱	PROBABILITY AND STATISTICS IN ENGINEERING		
課程類別	講授類	必選修	選修
授課教師	周佑誠	系所	海下科技研究所碩士班
		學分	3

因應嚴重特殊傳染性肺炎等傳染病，倘若後續需實施遠距授課，授課方式調整如下：

- 同步遠距【透過網路直播技術，同時進行線上教學，得採Microsoft Teams、Adobe connect等軟體進行】
- 同步遠距含錄影【透過網路直播技術，同時進行線上教學並同時錄影，課程內容可擇日再重播，得採Microsoft Teams、Adobe connect等軟體進行】
- 非同步遠距【課堂錄影或錄製數位教材放置網路供學生可非同時進行線上學習，得採EverCam、PPT簡報錄影、錄音方式進行】
- ★遠距教學軟體操作說明連結

因應嚴重特殊傳染性肺炎等傳染病，倘若後續需實施遠距授課，評分方式調整如下：

- 1.作業 (Homework)：40%
- 2.期中考 (Midterm)：30%
- 3.專題 (Project)：30%

課程大綱 Course syllabus

- (1) 機率 (Probability)
- (2) 離散隨機變數與機率分佈 (Discrete Random Variables and Probability Distributions)
- (3) 連續隨機變數與機率分佈 (Continuous Random Variables and Probability Distributions)
- (4) 聯合機率分佈 (Joint Probability Distributions)
- (5) 敘述統計 (Descriptive Statistics)
- (6) 抽樣分佈與點估計 (Sampling Distributions and Point Estimation of Parameters)
- (7) 單樣本區間估計 (Statistical Intervals for a Single Sample)
- (8) 單樣本假說檢定 (Tests of Hypotheses for a Single Sample)
- (9) 多因子實驗設計與變異數分析 (Design of Experiments with Several Factors and the Analysis of Variance)

課程目標 Objectives

使學生(1)能概述在工程上機率論與統計學之觀念與意義(2)能利用機率與統計的方法描述工程上之現象(3)能評估資料分析時之現象合理性(4)能應用機率論與統計學的知識解決不同之工程問題。

This course enables students (1) to summarize the concepts and significance of probability and statistics in engineering; (2) to describe engineering phenomena using probabilistic and statistical methods; (3) to detect anomalies when performing data analysis; (4) to solve different engineering problems using probabilistic and statistical methods.

授課方式 Teaching methods

課堂講授、討論與實作 (Lectures, discussions, and hands-on practices)

評分方式〔評分標準及比例〕 Evaluation (Criteria and ratio)

- 1.作業 (Homework)：40%
- 2.期中考 (Midterm)：30%
- 3.專題 (Project)：30%

參考書/教科書/閱讀文獻 Reference book/ textbook/ documents〔請遵守智慧財產權觀念，不可非法影印〕

序號	作者	書名	出版社	出版年	出版地	ISBN#
No.	Author	Title	Publisher	Year of publish	Publisher place	ISBN#
1	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye	Probability & Statistics: For Engineers and Scientists	Pearson	2011	London, UK	978-0321629111
2	劉志尉	機率論 (Probability & Statistics for Engineers and Scientists 9E)	高立圖書	2012	台灣	978-9862801406
3	張翔, 廖崇智	提綱挈領學統計	鼎茂圖書	2016	台灣	978-9863452232
4	Douglas C. Montgomery, George C. Runger	Applied Statistics and Probability for Engineers	John Wiley & Sons	2011	New Jersey, USA	978-0470053041
5	李輝煌	田口方法：品質設計的原理與實務	高立圖書	2023	台灣	978-9864126668

彈性暨自主學習規劃: Alternative learning periods :

本門課程是否有規劃實施學生彈性或自主學習內容 (每1學分2小時)

Is any alternative learning periods planned for this course (with each credit corresponding to two hours of activity)?

否：教師需於「每週課程內容及預計進度」填寫18週課程進度 (每1學分18小時之正課內容)。

No: The instructor will include an 18-week course plan in the weekly scheduled progress (each credit corresponds to 18 hours of instruction)

是：教師需於「每週課程內容及預計進度」填寫16週課程內容 (每1學分16小時之正課內容)，並於下列欄位填寫每1學分2小時學生彈性或自主學習內容。

Yes: The instructor will include a 16-week course plan in the weekly scheduled progress (each credit corresponds to 16 hours of instruction); the details of the planned alternative learning periods are provided below (each credit corresponds to two hours of activity).

本門課程規劃學生彈性或自主學習內容 (每1學分2小時) :

Alternative learning periods planned for the course (each credit corresponds to two hours of activity):

學生彈性或自主學習活動 Alternative learning periods	勾選或填寫規劃內容 Place a check in the appropriate box or provide details	時數 Number of hours
學生分組實作及討論 Group work and discussion	<input checked="" type="checkbox"/> <input type="text"/>	6 <input type="text"/>
參與課程相關作業、作品、實驗 Participation in course-related assignments, work, or experiments	<input type="checkbox"/> <input type="text"/>	<input type="text"/>
參與校內外活動 (研習營、工作坊、參訪) 或競賽 Participation in on- or off-campus activities (e.g., seminars, workshops, and visits) or competitions	<input type="checkbox"/> <input type="text"/>	<input type="text"/>
課外閱讀 Extracurricular reading	<input type="checkbox"/> <input type="text"/>	<input type="text"/>
線上數位教材學習 Learning with online digital learning materials	<input type="checkbox"/> <input type="text"/>	<input type="text"/>
其他 (請填寫規劃內容) Other (please provide details)	<input type="checkbox"/> <input type="text"/>	<input type="text"/>

每週課程內容及預計進度 Weekly scheduled progress

週次	日期	授課內容及主題
Week	Date	Content and topic
1	2025/02/16~2025/02/22	機率 (Probability)
2	2025/02/23~2025/03/01	機率 (Probability), 離散隨機變數與機率分佈 (Discrete Random Variables and Probability Distributions)
3	2025/03/02~2025/03/08	離散隨機變數與機率分佈 (Discrete Random Variables and Probability Distributions), 連續隨機變數與機率分佈 (Continuous Random Variables and Probability Distributions)
4	2025/03/09~2025/03/15	連續隨機變數與機率分佈 (Continuous Random Variables and Probability Distributions)
5	2025/03/16~2025/03/22	聯合機率分佈 (Joint Probability Distributions)
6	2025/03/23~2025/03/29	敘述統計 (Descriptive Statistics), 抽樣分佈與點估計 (Sampling Distributions and Point Estimation of Parameters)
7	2025/03/30~2025/04/05	4/3: 兒童節補假 (Holiday)
8	2025/04/06~2025/04/12	抽樣分佈與點估計 (Sampling Distributions and Point Estimation of Parameters), 單樣本區間估計 (Statistical Intervals for a Single Sample)
9	2025/04/13~2025/04/19	單樣本區間估計 (Statistical Intervals for a Single Sample)
10	2025/04/20~2025/04/26	期中考 (Midterm)
11	2025/04/27~2025/05/03	單樣本假說檢定 (Tests of Hypotheses for a Single Sample)
12	2025/05/04~2025/05/10	單樣本假說檢定 (Tests of Hypotheses for a Single Sample)
13	2025/05/11~2025/05/17	單因子實驗設計與變異數分析 (Design of Single-Factor Experiments and the Analysis of Variance)
14	2025/05/18~2025/05/24	多因子實驗設計 (Design of Experiments with Several Factors)

15	2025/05/25~2025/05/31	多因子實驗設計 (Design of Experiments with Several Factors)
16	2025/06/01~2025/06/07	專題報告 (Project Presentation)
17	2025/06/08~2025/06/14	6/12: 彈性學習 (Flexible Learning)
18	2025/06/15~2025/06/21	6/19: 彈性學習 (Flexible Learning)

課業討論時間 Office hours

時段1 Time period 1:
 時間 Time : 星期一10:00~12:00
 地點 Office/Laboratory : MA3045
 時段2 Time period 2 :
 時間 Time : 星期二10:00~12:00
 地點 Office/Laboratory : MA3045

本課程欲培養之系所學生專業能力/全校學生基本素養與核心能力

系所學生專業能力/全校學生基本素養與核心能力 This course enables students to achieve basic disciplines and core capabilities of the department and the university	課堂活動與評量方式 Class activities and evaluation									
	本課程欲培養之能力與素養 This course enables students to	紙筆考試或測驗 Test.	課堂討論(含個案討論) Group discussion (case analysis).	個人書面報告、作業、作品、實驗 Individual paper report/ assignment/ work or experiment.	群組書面報告、作業、作品、實驗 Group paper report/ assignment/ work or experiment.	個人口頭報告 Individual oral presentation.	群組口頭報告 Group oral presentation.	課程規劃之校外參訪及實習 Off-campus visit and internship.	證照/檢定 License.	參與課程規劃之校內外活動及競賽 Participate in off-campus/on-campus activities and competitions.
※系所學生專業能力 Basic disciplines and core capabilities of the department										
1. 海下科技專業學理知能。 1. Professional skills in undersea technology.										
2. 海洋探測作業實務。 2. Ability to execute deepsea exploration.										
3. 自我學習與解決問題能力。 3. Self-learning and problem solving techniques.	√	√		√		√				
4. 表達溝通能力。 4. Communication skills.	√	√		√		√				
5. 瞭解產學發展趨勢與國際潮流 5. The sense to grasp both local and international industry development trend.										
※全校學生基本素養與核心能力 Basic disciplines and core capabilities of the university										
1. 表達與溝通能力。 1. Articulation and	√	√		√		√				

communication skills										
2.探究與批判思考能力。 2. Inquisitive and critical thinking abilities	V	V		V		V				
3.終身學習能力。 3. Lifelong learning	V	V		V		V				
4.倫理與社會責任。 4. Ethics and social responsibility										
5.美感品味。 5. Aesthetic appreciation										
6.創造力。 6. Creativity										
7.全球視野。 7. Global perspective										
8.合作與領導能力。 8. Team work and leadership										
9.山海胸襟與自然情懷。 9. Broad-mindedness and the embrace of nature										

本課程與SDGs相關項目

- SDG1-消除貧窮(No Poverty)
- SDG2-消除飢餓 (Zero Hunger)
- SDG3-良好健康與福祉(Good Health and Well-being)
- SDG4-教育品質(Quality Education)
- SDG5-性別平等(Gender Equality)
- SDG6-乾淨水源與公共衛生(Clean Water and Sanitation)
- SDG7-可負擔乾淨能源(Affordable and Clean Energy)
- SDG8-優質工作與經濟成長(Decent Work and Economic Growth)
- SDG9-工業、創新和基礎建設(Industry,Innovation and Infrastructure)
- SDG10-減少不平等(Reduced Inequalities)
- SDG11-永續城市(Sustainable Cities and Communities)
- SDG12-責任消費與生產(Responsible Consumption and Production)
- SDG13-氣候行動(Climate Action)
- SDG14-海洋生態(Life Below Water)
- SDG15-陸域生態(Life on Land)
- SDG16-和平、正義和穩健的制度(Peace,Justice And Strong Institutions)
- SDG17-促進目標實現的全球夥伴關係(Partnership for the Goals)
- 本課程和SDGS無關

本課程校外實習資訊:
This course is relevant to internship:

- 本課程包含校外實習 (本選項僅供統計使用, 無校外實習者, 得免勾記)
The course includes internship.(For statistical use only. If the course without internship, please ignore this item.)

實習定義：規劃具有學分或時數之必修或選修課程，且安排學生進行實務與理論課程實習，於實習終了取得考核證明繳回學校後，始得獲得學分；或滿足畢業條件者。(一般校內實習請勿勾選此欄位)

Internship: The required or elective courses should include credits and learning hours. Students should participate in the corporative company or institution to practice and learn the real skills. An internship certification must be handed in at the end of internship to get the credits or to fulfil the graduation requirements.

[回課程列表](#)