淡江大學土木工程學系 九十五 學年度第 一 學期課程綱要

課程名稱(中文)	授課教師	廖國偉	先修課程	
可靠度分析	開課年級	研究所	上機實習	□是☑否
課程名稱(英文)	必修/選修	☑必修□選修	學分數	3
Reliability Analysis				

課程綱要及教學要點概述

Variability and uncertainty exist in engineering design parameters is a common phenomenon. How to consider variability/uncertainty in engineering problems is the focus of this course. This course will first review the fundamental concept of probability theory including many usual and useful probability distributions. Then, the difference between deterministic analysis and reliability analysis will be introduced. Two major reliability analysis approaches, the sampling method and approximated method are discussed and applied to the real engineering problem. Sampling method such as Monte-Carlo Simulation or Importance Sampling is a time-consuming technique, but usually provides analyst a more reliable result. Approximated methods such as FORM, SORM or RSM method, on the other hand, provides a more efficient way to perform the reliability analysis. However, the accuracy needs to be ensured, especially, for a complicated and highly non-linear problem. Inverse reliability analysis (PMA) has been attracted many researchers recently. PMA has also been applied in many fields such as reliability-based design optimization (RBDO). Response Surface method (RSM) and Design of Experiment (DOE) are two major techniques for RBDO in industry and they will be introduced with the RBDO and PMA. In addition, system reliability is also introduced in this class. Bayesian theory and other recent applications of reliability analysis in civil engineering will be discussed in this class depending on the time frame.

課程內容與系學生核心能力之關聯性 (請勾選)

- ☑ A. 使學生具工程專業知識，並能運用數學、力學處理相關問題。
- ☑ B. 使學生具土木工程相關課題之基本設計和分析能力。
- □ C. 使學生具備操作測量儀具或基礎材料實驗能力，並能處理分析其數據。
- □ D. 使學生具基礎資訊技術能力以協助解決工程問題。
- □ E. 使學生具營建實務有關知識，了解工程團隊合作重要性，並能尊重專業倫理和道德規範與責任。
- □ F. 使學生了解工程和環境社會之相互影響，並能建立終身學習觀念。
- □ G. 培養學生社會科學之知識背景。
- □ H. 使學生具跨領域之知識訓練經驗，了解科技整合對於現代化工程和未來發展之重要性。
- ☑ I. 使學生了解國際化潮流趨勢並能持續提昇外語能力。

教科書(書名、作者、出版者、出版日期)

Probability Concepts in Engineering Planning and Design, Volume I & II
Authors: Alfredo H-S. Ang & Wilson H.Tang
Publisher: John Wiley & Sons / 2007
Publish Year: Volume I: 2007 / Volume II: 1984

參考書目(書名、作者、出版者、出版日期)

Structural Reliability Analysis and Prediction, Second Edition
Author: Robert E. Melchers
Publisher: John Wiley & Sons / 1999
ISBN: 0 471 98324 1

評分項目及標準	☑ 平時成績(15 %) ☑ 期中考(30%) ☑ 期末考(30%) ☑ 其他(25% ，說明：Homework & Assignment)
教學資源	☑ 教學支援平台□ 個人教學網頁(http:_____)
授課方式	☑講授 □示範 □實作 □參觀 ☑討論 □其他( )

S0061 可靠度分析

Reliability Analysis

土木系碩士班

95 學年度第一學期

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❖ **上課時間 / 地點：**
週五　上午第 **2.3.4** 節　/　**T314** 教室

❖ **Textbook**

Probability Concepts in Engineering Planning and Design, Volume I & II
Authors: Alfredo H-S. Ang
Wilson H.Tang
Publisher: John Wiley & Sons
ISBN: 0-471-03200-X (Volume I)

❖ **Reference**

Structural Reliability Analysis and Prediction, Second Edition
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ISBN: 0 471 98324 1

❖ **Grading**

Homework & Assignment	25%
Midterm	30%
Final Exam	30%
Attendance & Participation	15%

❖ **Tentative Class Schedule**

Week	Date	Topic	Assignments/Reading
1	9/15	Introduction and review the basic probability theory	
2	9/22	No Class on this week	
3	9/29	No Class on this week	

4	10/6	Make up class: Sampling methods 中秋節放假	
5	10/13	Approximated methods - 1	
6	10/20	Approximated methods - 2	
7	10/27	RIA and PMA	
8	11/3	PMA and RBDO	
9	11/10	DOE and RSM	
10	11/17	Midterm	
11	11/24	System reliability – 1	
12	12/1	System reliability – 2	
13	12/8	Bayesian Theory -1	
14	12/15	Bayesian Theory – 2	
15	12/22	Recent reliability analysis in civil engineering – fragility analysis	
16	12/29	Recent reliability analysis in civil engineering – redundancy analysis	
17	01/5	Final Exam	