

111 學年度第一學期教學大綱表

Course Contents of 2021 Fall

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|--|---|---------------|---------------|-----------------|---------------------|----------------------------|
| 課程名稱：彈性力學 Course Name: Elasticity | | | | | 開課單位 Department | 前瞻 |
| | | | | | 課程代碼 Course Code | 4456024 |
| 授課教師 Lecture | 林派臣 Pai-Chen Lin | 學分數 Credit | 3 | 選修 Selective | 開課年級 Grade | 碩博士班 M.S. & Ph.D. |
| 先修科目或先備能力：靜力學、材料力學 Required Courses: Statistics, Mechanics of Materials | | | | | | |
| <p>課程概述：本課程主要介紹彈性力學，包含張量介紹、力學基本理論、直角座標之二維問題、極座標之三維問題及能量法等。主要是使學生能掌握分析彈性體應力和變形的的基本方法，為以後進一步研究實際工程構件和結構的強度、剛度、可靠性、斷裂和疲勞等固體力學問題建立必要的理論基礎。</p> <p>Course Descriptions: This course is mainly to introduce the elasticity, including tensor introduction, fundamental mechanics theory, 2D Cartesian coordinate problems, polar coordinate problems, and energy method, etc. This course can help students to handle the basic methods for elastic stress and strain, to build up a strong theoretical basis for study the strength, stiffness, reliability, fracture and fatigue problems of practical engineering components and structures.</p> <p>目標：本課程的目標是希望學生瞭解有關彈性力學領域內之基本常識及原理，並將此基本理論應用於工程上的問題，使學生了解如何將實際問題以方程式及邊界條件表示出來，為學習有限元素法、複合材料力學、斷裂力學和疲勞等課程奠立基礎。使學生能具有對工程問題分析的能力及技巧。</p> <p>Objective: The purpose of this course is to allow students to understand the common sense and theory of elastic mechanics, and then to apply them to many engineering problems, such as how to present the formulas and boundary conditions of a real problem, and how to prepare the courses of finite element analysis, fracture mechanics, and fatigue. Finally, allow students to have ability and skill to analyze the engineering problems.</p> | | | | | | |
| 教科書 | 1. <i>Elasticity</i> , J. R. Barber, 3ed., Springer, 2009 2. <i>Theory of Elasticity</i> , Timoshenko and Goodier, McGraw-Hill, 1970 3. <i>Elasticity in Engineering Mechanics</i> , Arthur P. Boresi and Ken P. Chong, John Wiley & Sons, New York, 2000 | | | | | |
| 課程大綱 Course Outlines | | | 分配時數 Hours | | | |
| 單元主題 Unit Title | 內容綱要 Contents | 講授 Lecture | 示範 Demo | 習作 Practice | 其他 Others | 可達成核心能力 Core Competence |
| Introduction | 1. Elasticity 2. Plasticity | 3 | | | | D1 D2 D4 |
| Tensor | 1. Cartesian coordinate 2. Notation 4. Tensor operation | 3 | 1 | | | D1 D2 D4 |

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|---|---|---|---|--|--|----------|
| Deformation | Mathematical expression Strain Stress Equilibrium | 24 | 1 | | | D1 D2 D4 |
| Formulation | Elastic materials 1. General formulation 2. Stress function | 12 | 2 | | | D1 D2 D4 |
| Plane problem | 1. Plane problem 2. Polar coordinate | 6 | 2 | | | D1 D2 D4 |
| 可達成核心能力 Core Competence of Graduate Program | | 核心能力達成指標 Index of Core Competence | | | | |
| D1 | 具固力領域之專業知識。 Well established advanced knowledge in solid mechanics | 具固力領域之專業知識。 Well established advanced knowledge in solid mechanics | | | | |
| D2 | 策劃及執行固力及其相關領域專題研究之能力。 Competence in planning and conducting research and development projects in solid mechanics and related disciplines | 策劃及執行固力及其相關領域專題研究之能力。 Competence in planning and conducting research and development projects in solid mechanics and related disciplines | | | | |
| D4 | 創新思考及獨立解決固力問題之能力。 Capacity of innovative thinking and independent problem solving for solid mechanics challenges | 創新思考及獨立解決固力問題之能力。 Capacity of innovative thinking and independent problem solving for solid mechanics challenges | | | | |

教學要點概述:

| 上課時間 Course Time | 上課地點 Course Location | 學習成果評量方式 Grading | Office hour | 教學品質評量方式 Evaluation |
|---------------------|---|---|--------------------|--|
| 星期一 13-15 | 工二館 215 右 ME Bldg. Rm. 215R | 作業 30%(Hw) 期中考 30% (Mid term Ex.) 期末考 40% (Final) | 星期一 13:00-16:00 | 教學意見調查核心 能力重要性及達成 度分析問卷 Questionnaire |
| 週次 Weeks | 教 學 與 作 業 進 度 Teaching & Homework Progress | | | 備 註 Note |
| 1 | Introduction | | | |
| 2 | Cartesian Tensor | | | HW#1 due in 4 th week |
| 3 | Transformations, | | | HW#2 due in 5 th week |
| 4 | Deformation | | | HW#3 due in 6 th week |
| 5 | Strain | | | HW#4 due in 7 th week |
| 6 | Strain | | | HW#5 due in 8 th week |
| 7 | Strain, Stress | | | HW#6 due in 8 th week |
| 8 | Stress | | | |
| 9 | 期中考(Midterm Exam) | | | |
| 10 | Equilibrium | | | HW#7 due in 11 th week |
| 11 | Equilibrium | | | |
| 12 | Elastic Materials | | | HW#8 due in 14 th week |
| 13 | General Formulation | | | |
| 14 | Plane Problems | | | HW#9 due in 16 th week |
| 15 | Stress Functions | | | |
| 16 | Stress Functions | | | HW#10 due in 17 th week |
| 17 | Polar Coordinates | | | |
| 18 | 期末考 (Final Exam) | | | |

其他 (Others):