國立台灣科技大學 114學年 第2學期　課程大綱

Spring 2026 NTUST Course Outline

授課教師：Fandi Dwiputra
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課程名稱：計算流體力學

Course Title：Computational Fluid Mechanics

2026/6/22

課程代號： ME6802701 Course Code 學分數： 3 Credits	必選修：選修/半學年 Required/Electve:Elective/Half Yr. 先修課程： Prerequisites
節次教室： Time/Location	R6(T3-303) R7(T3-303) R8(T3-303)
專業核心能力： Core Professional Competencies	
課程網址： Course Website	https://sites.google.com/view/cfd-lecture-taiwantech/首頁
課程宗旨： Course Objectives	各種不同的描述流體運動的數學模式，結構性／非結構性網路之建立方法，有限差分法，有限體積法及有限元素法之介紹；各種不同邊界條件之處理方法，人工黏滯性模式，流場之後處理：升力，阻力之計算，力矩之計算，流線、等壓線、等溫線之繪製；高速計算及程式之最佳化處理; 包含向量化及平行化。 Computational Fluid Dynamics (CFD) is a popular method to simulate flow motion and heat transfer in engineering problems. Tis course aims to introduce fundamentals knowledge of CFD such as governing equations, discretization method, numerical schemes and programming skills to students. The finite volume method which is commonly used in commercial CFD packages is presented in this course. It will be used to discretize the continuity equation, Navier-Stokes equations and the energy equation. Turbulence models such as the standard k-e model are explained. Fluid-structure interaction problems are considered as the benchmark test in this course, so students can understand how a flow problem is solved by the proposed CFD method.
課程大綱： Outline of Lectures	1. Introduction 2. Governing Equations 3. 1-D Transport Equation 4. Finite Volume Method 5. Projection Method 6. Benchmark Flow Problems 7. Turbulence Models 8. Parallel Computation
授課方式： Method of Instruction	講授 Lecture：50% 分組討論 Group discussion：10% 案例研討 Case study：20% 操做練習 Practical exercises：20% 講授 Lecture：%

教科書： Textbooks	Kajishima, T. and Taira, K. 2017 Computational Fluid Dynamics. Springer, Cham, Switzerland.
參考書目： References	Chorin, A.J. 1968 Numerical solution of the Navier-Stokes equations. Mathematics of Computation 22, 745-762. Ghia, U., Ghia, K.N., and Shin, C.T. 1982 High-Re solutions for incompressible flow using the Navier-Stokes equations and a multigrid method. Journal of Computational Physics 48, 387-411. Chern, M.J., Noor, D.Z., Liao, C.B., and Horng, T.L. 2015 Direct-forcing immersed boundary method for mixed heat transfer. Communications in Computational Physics 18, 1072-1094.
修課須知： Notice	Students are encouraged to bring a laptop to class for coding exercises and numerical simulations.
評量方式： Grading	The final score is based on those two examinations (40%) and five homeworks (60%)
備註說明： Notes	Prior programming experience is helpful but not required, as programming concepts will be taught from the fundamentals.