

100 學年度第一學期
電腦輔助能源與熱流科學分析
Computer-Aided Analysis on Energy and Thermofluid Sciences

授課教師：施陽正 老師

連絡方式：辦公室：綜科館 516-1，分機：3517，行動電話：0919024166，
E-mail: f10958@ntut.edu.tw

討論時間：週一 2:30 PM~5:30 PM，週二 2:00 PM~5:00 PM

課程簡介：

本課程適合修過工程數學及基礎熱流的碩博士班學生選修。授課內容主要是應用 Matlab 及 CFD 套裝軟體分析能源與熱流科學領域的相關問題，並著重於案例分析。課程內容主要包括利用數值分析解析邊界層問題、有限差分法求解穩態與暫態熱傳導以及二維強制驅動流問題，案例分析包括室內氣流運動、潔淨室氣流分佈、熱交換器性能分析、儲冰系統分析、電子散熱以及氫能系統等。

教科書：自編講義

評分標準：出席率與上課表現 10%，Homework 30%，Projects (Two) 60%

參考書籍：

1. Fox, R.W., Pritchard, P.J. and McDonald, A.T., "Introduction to Fluid Mechanics", 7th ed., 2010, John Wiley & Sons, Inc. (滄海書局)
2. Kundu, P. K. and Cohen, I.M. "Fluid Mechanics", 2008 (巨擘)
3. White, F.M., "Viscous Fluid Flow", 3rd ed., 2006.
4. JiJi, L.M., "Heat Convection", Springer, 2006. (巨擘書局)
5. Wong, K.F., "Intermediate Heat Transfer", Marcel Dekker, Inc, 2003. (亞勃克國際圖書)
6. Incropera, F.P., Dewitt, D.P., Bergman, T.L., and Lavine, A.S., "Introduction to Heat Transfer", 5th ed., 2007 (東華書局).
7. Cengel, Y.A., "Heat and Mass Transfer: A Practical Approach", 3rd ed., 2006. (滄海書局)
8. Versteeg, H.K, W. Malalasekera (2007), An Introduction to Computational Fluid Dynamics---The Finite Volume Method. (www.amazon.com), (巨擘)
9. Patankar, S.V. (1980), Numerical Heat Transfer and Fluid Flow. (圖書館)
10. Anderson, D.A., J.C. Tannehill, R.H. Pletcher (1984,1997), Computational Fluid Mechanics and Heat Transfer, 1984 ed. (圖書館), 1997ed.(巨擘)
11. Cebeci, T., Shao, J.P., Kafyeke, T., and Laurendeau, E., "Computational Fluid Dynamics for Engineers", 2005. (電子書)
12. Tu, J., Liu, C., and Yeoh, G.H., "Computational Fluid Dynamics: A Practical Approach", 2008. (電子書)
13. 張智星，MATLAB 程式設計(入門篇), 2007. (鈺思科技出版)
14. Chapra, Steven C. , "Applied Numerical Methods with MATLAB for Engineers and Scientists" , 2nd ed., 2008. (高立書局) (應用數值方法 王晉中 翻譯)
15. Gerald, C.F. and Wheatley, P.O., "Applied Numerical Analysis", 7th Edition, 2004. (台北圖書)

課程內容：

週次	講授內容
1.	Introduction
2.	Governing Equations
3.	Introduction to Matlab
4.	Runge-Kutta Method & Shooting Method
5.	Prommaging by Matlab
6.	Basics of Finite Difference
7.	Elliptic Partial Differential Equation, I
8.	Elliptic Partial Differential Equation, II
9.	Mid-term Exam
10	Parabolic Partial Differential Equation
11.	Finite Volume Method-Diffusion
12.	Finite Volume Method-Convection
13.	Finite Volume Method-Numerical Scheme
14.	Finite Volume Method-SIMPLE Algorithm
15.	Case Study-Airflow Simulation & Cleanroom
16.	Case Study-Energy Storage
17.	Case Study-Electronic Cooling
18.	Case Study-Hydrogen
