

數值分析 10110MATH481000

2013 第一學期

上課時間: T5F5F6 地點: 綜三 201

演習課時間: T6 and W7:00-9:00pm

授課老師: 朱家杰
辦公室: 綜三 733 分機: 31056
E-mail: ccchu@math.nthu.edu.tw
Office Hours: By appointment only.

助教: 阮俊維
研究室: 綜三 212 分機: 33066
E-mail: s101021604@m101.nthu.edu.tw
Office Hours: W 3:00-5:00pm

沈林弘
研究室: 綜三 207 分機:
E-mail: xvmon123@gmail.com
Office Hours: M34

教科書:
B. Bradie, A friendly introduction to numerical analysis, 2006, Pearson Prentice Hall.
參考書:
R. L. Burden and J. D. Faires, Numerical analysis, 8th ed., 2005, Thomson Brooks.

課程網頁:
http://www.math.nthu.edu.tw/~ccchu/Teaching/num_ana_2013f/NA13f.html

I. 課程目標和大綱:

Introduction to the mathematical properties of numerical methods and their applications in computational science and engineering. Study and use of numerical methods for solutions of linear systems of equations, non-linear least-squares data fitting, numerical integration of multi dimensional, non-linear equations and systems of initial value ordinary differential equations. We will study primarily chapters 1-7(skip 4) of the B. Bradie textbook listed above. More detail is provided in tentative schedule listed below.

II. 預備知識: 無擋修但需要基本的微積分和線性代數知識.

III. 成績計算方式: 成績是由以下四個項目

- (a) 10% 作業成績. 可以丟掉最低的兩次成績.
- (b) 20% 小考. 多數為上機考試.
- (c) 40% 兩次期中考, 各佔 20%
- (d) 30% 期末考. 範圍是整個學期的內容

作業: 作業每周五會放在課程網址上. 隔周五上課 1:30pm 前時交給我或是助教. 1:30pm 之後都算是遲交的作業, 遲交的作業可以批改但是以 0 分計算.

期中考和期末考: 兩次期中考的日期是: **10/25 F5F6** 和 **11/22 F5F6**. 除非有醫生證明或是家裡急事, 否則沒有補考的機會. 考試不能使用書本或計算機.

成績: 百分轉換請參考<http://registra.web.nthu.edu.tw/ezfiles/86/1086/img/609/grade-point.pdf>

IV. 電腦教室資源: 綜三數學系圖書館內的電腦教室都裝有 Matlab 可以使用.

V. Matlab 的相關網站:

- o Check out the following Getting Started Guide
http://www.mathworks.com/access/helpdesk/help/pdf_doc/matlab/getstart.pdf
- o Another tutorial at <http://www.math.ufl.edu/help/matlab-tutorial/>

VI. 上課的規定:

作業遲交: 除非有醫生證明或是家裡有急事, 作業遲交一律 0 分計算.

加退選: 10/2 加退選截止. 12/2 第二階段退選截止.

出席率: 本課沒有出席率的要求, 但是上課不定期會有隨堂小考. 隨堂小考成績用在期末總成績不及格時加分使用. 最高可以加 5 分.

作弊: 作業抄襲或是考試作弊的情形被抓到且確定後, 該次作業或考試成績已 0 分計算. 情節重大者會呈報學校.

VII. 預定的課程進度表:

1. (1 weeks) Mathematical preliminaries and error analysis: Algorithms, convergence, and errors.
2. (2 weeks) Solutions of equations in one variable: Bisection, method of false position, fixed point iteration, and Newton's methods.
3. (2.5 weeks) Direct methods for solving linear systems: Gaussian elimination and LU factorization, stability and condition number, and pivoting strategies.
4. (2.5 weeks) Interpolation and polynomial approximation: Lagrange, Hermite, and cubic spline interpolation.
5. (3 weeks) Numerical differentiation and integration: Forward, backward, and multi-point differencing, Richardson's extrapolation, Newton-Cotes rule, Romberg, and Gauss integration.
6. (4 weeks) Initial value problems for ordinary differential equations: Euler, Taylor, Runge-Kutta, variable step size, stability, convergence, stiffness.