Numerical Methods (2022)

- **Instructor:** 莊榮宏

  EC525, x31829

  jhchuang@cs.nctu.edu.tw

  Office hour: Thursday 2~4pm

- **TA:** 洪至德 **zackzdhung@gmail.com**

  徐培欽 **410636016@gms.ndhu.edu.tw**

  洪煥璋 **d755536@gmail.com**

  EC512, x54787

What is numerical methods?

- **The development and study of efficient and robust procedures for solving problems with a computer**
- **Numerical solution**
  - **Even an analytic solution is subject to the errors except exact arithmetic is used**
  - **Require procedures & mathematical (numerical) computation**
    - **Is always an approximation - Require error analysis**
    - **Requires computers to evaluate the numerical solutions - Require time analysis**

Topics to be covered

- **Chap 0: Numerical Computing and Computers**
- **Chap 1: Solving Nonlinear Equations**
- **Chap 2: Solving Sets of Equations**
- **Chap 3: Interpolation and Curve Fitting**
- **Chap 4: Approximation of Functions**
- **Chap 5: Numerical Differentiation and Integration**
- **Chap 6: Optimization**
- **Chap 7: Numerical Solution of Ordinary Differential Equations**
- **Chap 8: Numerical Eigenvalue and Eigenvector**

Reference books

- **Text book**
  - **Applied Numerical Analysis (7th Ed.), By C.F. Gerald and P.O. Wheatley, Addison-Wesley, 2004**
- **References:**
  - **Scientific Computing: An Introductory Survey, 2nd Ed. (2002), by Michael Heath, McGraw-Hill**
  - **Applied Numerical Methods with MATLAB for Engineers and Scientists, (2005), by S. C. Chapra, McGraw-Hill.**
  - **Numerical Recipes in C++, 2nd Ed. (2002) by William H. Press, Saul A. Teukolsky, William T. Vetterling, Brian P. Flannery, Cambridge University Press**

Quiz and Exam

- **Quiz**
  - **Questions will be assigned for practicing**
  - **At least a quiz for each chapter**
- **One midterm and final exam**
- **Grading**
  - **Quiz (33%)**
  - **Midterm (33%)**
  - **Final (34%)**