國立臺北大學自然資源與環境管理研究所
105 學年度第二學期『環境系統分析專題』

課程講義(01)：課程與應用軟體簡介
Introduction to the Course and Software Applications

- THE COURSE
  - Handout Download: http://web.ntpu.edu.tw/~yml/download/system2017s
    https://www.box.com/ntpu-inrm-prof-lee-classes => system2017s

  - Content ⇒ Systems Analysis Models and Applications Concerning the *Environment*
    - ⇨ Systems vs. Systems Analysis
    - ⇨ Systems Analysis vs. Operations Research (Operational Research)
    - ⇨ Systems Analysis vs. System Simulation
    - ⇨ Systems Thinking and System Dynamics
    - ⇨ Programming vs. Planning => Simulation and Optimization
    - ⇨ Conceptual models => Mathematical models => Simulation/Optimization models

  - Mathematical Models (Quantitative Models)
    - ⇨ Classification: Prescriptive vs. Descriptive; Deterministic vs. Stochastic
    - ⇨ Solution Techniques: Symbolic/Graphical Interpretation; Analytical vs. Numerical
    - ⇨ Algorithms, Numerical Methods => Linearity, Convexity, and Complexity

  - Computer Applications
    - ⇨ Command Line Interface vs. Graphical User Interface (GUI)
    - ⇨ Imperative Programming vs. Object Oriented Programming
    - ⇨ Commercial Packages vs. GNU General Public License; Open Source & Open Data

- SOFTWARE TO BE COVERED
  - Microsoft Office Applications: Excel, Visio, and Project
  - LINGO (LINDO System's Product):
    "LINGO is a comprehensive tool designed to make building and solving linear, nonlinear and integer optimization models faster, easier and more efficient." (v.16.0 64bit 32bit)
  - What'sBest! (LINDO System's Product) is an add-in to Excel that allows you to build large scale optimization models in a free form layout within a spreadsheet. (v.14.0 64bit 32bit)
  - EULER: "EULER is a numerical matrix system. It is not a MatLab clone, but very similar to that."
  - Open Source DEA (OSDEA GUI): A free and open source Data Envelopment Analysis Software.
  - FreeMind /Freeplane: free mind mapping software.
  - Vensim (Vensim from Ventana Systems): "Vensim is used for developing, analyzing, and packaging high quality dynamic feedback models."
  - Stella (isee Systems): "STELLA offers a practical way to dynamically visualize and communicate how complex systems and ideas really work."
  - Oracle Crystal Ball is a spreadsheet-based application for ...Monte Carlo simulation..., and ...
  - ExpertChoice: A decision support software using Analytical Hierarchy Process (AHP)