

國立臺北大學自然資源與環境管理研究所

101 學年度第二學期『環境系統分析』

課程講義(一)：課程簡介 Introduction

• THE COURSE

- Handout Download: <http://web.ntpu.edu.tw/~yml/download/system2013s>
<https://www.box.com/ntpu-inrm-prof-lee-classes> => system2013s
- 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
 - ⇒ Classification: Prescriptive vs. Descriptive; Deterministic vs. Stochastic
 - ⇒ Solution Techniques: Symbolic/Graphical Interpretation; Analytical vs. Numerical
 - ⇒ Algorithms, Numerical Methods => Linearity, Convexity, and Complexity

• SOFTWARE TO BE COVERED

- [GAMS \(General Algebraic Modeling System\)](#):
“GAMS is a high-level modeling system for mathematical programming problems.”
- [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.”
- [What’sBest! \(LINDO System’s Product\)](#) lets you build linear, nonlinear, and integer models in Excel. Models are easy to build and understand using standard spreadsheet equations.
- [GNU Linear Programming Kit](#): The GLPK (GNU Linear Programming Kit) package is intended for solving large-scale linear programming (LP), mixed integer programming (MIP), and other related problems. It is a set of routines written in ANSI C and organized in the form of a callable library.
- [DEAP](#): A Data Envelopment Analysis (Computer) Program.
- [EMS](#): Efficiency Measurement System -- A Data Envelopment Analysis (DEA) Software
- [Vensim \(Vensim from Ventana Systems\)](#): “Vensim is used for developing, analyzing, and packaging high quality dynamic feedback models.”
- [ExpertChoice](#): A decision support software using Analytical Hierarchy Process (AHP)
- [GNU Octave](#): GNU Octave is a high-level interpreted language, primarily intended for numerical computations. It provides capabilities for the numerical solution of linear and nonlinear problems, and for performing other numerical experiments.
- [EULER](#): “EULER is a numerical matrix system. It is not a MatLab clone, but very similar to that.”