

**Course: System Simulation -13 Lectures (2015.09.16-2015.12.23)****Instructor: Wheyming Song 桑慧敏**

\*\*\*\*\*

- Using Simulation as an initial spotter and validator (Song 2016)
- Course Design:
  - Lecture for each class includes: (1) Theory and (2) Implementing theory via computer (課程編排: 每節課皆有理論, 與落實理論之電腦實作).
  - 所有上課的講義與小考皆上傳, 方便課外的同學學習。需要諮詢老師可連絡桑慧敏, email: wheymingsong@gmail.com
  - 錄影的部分不包括「學生實作」。建議課外的同學可根據上傳的講義實作。
  - 此課程編排與一般書本的編排不同之處:
    - \* 一般書本的編排是同類的的放在一起。也就是教完一個單元, 如: Input Analysis, 再教另一個單元, 如: Output Analysis。
    - \* 而此課程編排: 爲了「每節課理論與實作」並行, 理論部分由淺入深, 交錯的編排。如從 Lectures 7-9: Output Analysis (I), Input Analysis (I), Output Analysis (II), Input Analysis (II), 交錯的編排。

Reference: Wheyming Song (2016). Simulation & the Song Rule as Spotters and Validators of Analytical Results —A Note Correcting “System Reliability Results” in a Review of the Literature. Proceeding of the Summer Computer Simulation Conference (SCSC), Montreal, Quebec, Canada, July 24-27, 2016.

\*\*\*\*\*

- **Lecture 1 (09.16). System Thinking, Global View of Simulation**

- **System Thinking** – Begin with the End
  - \* 理論 = 無限個實例
  - \* 讓理論可口好消化
- Global View of **Simulation** (No Videotaping). See the Attached Speech Slides.

- **Lecture 2 (09.23). Global View of Simulation**

- Global View of Simulation
  - \* Basic tasks: Input Analysis, Modeling, Output Analysis
  - \* Examples: Obtain  $\int_b^a g(x)dx$ , P(win the prize|change door) for the Monty Hall Problem
- Review Probability: Relationship of 25 Well-known Distributions
  - \* 醍醐統計學: 桑慧敏著. “機率”, “隨機變數”, “機率模型”: 三輪車調
  - \* Relationship of 25 Well-known Distributions

- **Lecture 3 (09.30). Analytical vs. Simulation (I) via MM1 and CLT**
  - 再談 醜聞統計學: 桑慧敏著. Review Probability (I)
  - Quiz 2 and discussion
  - Flexsim: Queueing Models include MM1, MM2, G/G/k, ...
  - Discuss and Prove Central Limit Theorem (CLT)
- **Lecture 4 (10.07). Analytical vs. Simulation (II)**
  - Quiz 3 and discussion
  - Review Probability (II)
  - Flexsim Case 1: LCD-1
- **Lecture 5 (10.14). Flexsim Functions (I), Students' Presentation: Comparing Ways to Present CLT**
  - Quiz 4 and discussion
  - Mindmap of Simulation: Design, Basic Tasks, Meta Model
  - Mindmap for Flexsim 4 basic objects, Experimenter, Dashboard
  - Flexsim Functions (I): getnodenum, getlabelnum, gettablenum,...
- **Lecture 6 (10.21). Flexsim Functions (II)**
  - Transient vs. Steady-state. MM1 Model
  - Global Table and Experimenter in Flexsim
- **Lecture 7 (10.28). Simu. Output Analysis (I), Flexsim Case 2**
  - Misleading Your Boss via Meaningless: A Sin to Avoid
  - Simulation Output Analysis (I): Check Flexsim Output
  - Flexsim Case 2, LCD-II: More Flexsim Functions
- **Midterm (11.04) (No Videotaping)**
- **Lecture 8 (11.11). Input Analysis (I), Flexsim Case 3**
  - Input Analysis (I): Fit Distribution via R:  $\chi^2$  test and K-S Test
  - Flexsim Case 3: Physical Examination (PE) model
  - Discuss Midterm.
- **Lecture 9 (11.25). Input Ana. (II), Output Analysis (II), CRN, Flexsim Functions (III)**
  - Quiz 5 and discussion
  - Input Analysis (II): K-S Test
  - Output Analysis (II): Criteria of Good Estimators
  - Common Random Numbers (CRN)

- **Lecture 10 (12.02). Meta-Models in Simu., Flexsim Functions (IV)**
  - Quiz 6 and discussion
  - DOE, “Block” Concept
  - Graphical User Interface (GUI)
  - Flexsim Function: byprobability
- **Lecture 11 (12.09). Flexsim Functions (V)**
  - Quiz 7 and discussion
  - Macro and Micro Replications (In Flexsim: Reset)
  - Efficiency vs. Effectiveness (In Flexsim: MTBF)
  - Export and Import Data: MSAccess
  - Treenode Functions in Flexsim
- **Lecture 12 (12.16). Thank Note, Flexsim Functions (VI)**
  - Quiz 8 and discussion
  - Open Data Base Connection (ODBC, 資料庫系統連結)
  - Flexsim Case 4: Optimum Dispatching Rule in Solar Ingot-Wafer Manufacturing System-Integration of Machines and manpower Allocation
  - Flexsim Case 5: Emergence Department (ED) (No Videotaping. See the attached speech slides.)
- **Lecture 13 (12.23). Final Lecture and Students’ Presentation**
  - What should we learn in school? (在學校應學什麼?)
    - \* Specialty (專業)
    - \* Self Learning (自學)
    - \* Think Big (想的大)
  - Students’ Presentation
- **Students’ Final Projects (12.30) (No Videotaping)**