Fall 2019, ENME 770
(Tuesdays 1:00-3:40 pm and on the web)

Life-Cycle Cost and System Sustainment Analysis

Peter Sandborn
CALCE, Electronic Systems Cost Modeling Laboratory (ESCML)
Department of Mechanical Engineering
University of Maryland

This course melds elements of traditional engineering economics with manufacturing process and sustainment modeling, and life cycle cost management concepts to form a practical foundation for predicting the cost of products and systems. Various manufacturing cost analysis methods will be presented including: process-flow, parametric, cost of ownership, and activity based costing. The effects of learning curves, data uncertainty, test and rework processes, and defects will be considered. Aspects of system sustainment including the impact on the life cycle (and life-cycle costs) of reliability (warranty), maintenance (sparing and availability), and obsolescence will be treated.

This course will use real life design scenarios from integrated circuit fabrication, electronic systems assembly, and substrate fabrication as examples of the application of the methods mentioned above.

Tentative ENME 770 Lecture, Homework and Exam Schedule (**Fall 2019**)

Date	Topic	Book Sections	Comments
Week 1	Course Introduction, Manufacturing Cost Modeling Intro, Process-Flow Analysis	Chapter 1, Part I Intro, Chapter 2	
Week 2	Yield, Producibility, COO	Chapter 3, Chapter 4	Homework 1 Due
Week 3	ABC, Parametric, WACC, (review process-flow homework solution)	Chapter 5, Chapter 6, Appendix B	
Week 4	Test, Rework	Chapter 7, Chapter 8	Homework 2 Due
Week 5	Monte Carlo, Learning Curves	Chapter 9, Chapter 10	Homework 3 Due
Week 6	Life-Cycle Cost Intro, Reliability	Part II Into, Chapter 11	Homework 4 Due
Week 7	Exam 1 (in class)		
Week 8	Sparing, Warranty	Chapter 12, Chapter 13	
Week 9	Burn-in, Availability	Chapter 14, Chapter 15	
Week 10	Discrete-Event Simulation, Obsolescence, Newsvendor Problem	Appendix C, Chapter 16	Homework 5 Due
Week 11	ROI, Software Costs	Chapter 17, Chapter 19	
Week 12	Time to Market and Schedule, Outcome-Based Contracts, Contract Engineering, LCOE/PPA		Homework 6 Due
Week 13	Real Options Analysis	Chapter 22	
Week 14	Cost-Benefit Analysis	Chapter 21	Homework 7 Due
Week 15	Exam 2 (in class)		

Book (required):
Cost Analysis of Electronic Systems, **2nd edition**, P. Sandborn, World Scientific, 2017.
Either the paper book or an electronic version is acceptable

Note, the 1st edition of the book will **not** work

Homework Policy:
Homework w graded for completion only. Each homework assignment will be worth a total of 10 points divided evenly amongst the assigned problems. You will receive the following:

- 0 = no attempt made
- Half credit = minimal attempt to solve the problem
- Full credit = reasonable attempt to solve the problem

All homework must be submitted by midnight on the due date (no late homework). Homework should be emailed to sandborn@umd.edu. Please put "ENME770 Homework X" in the subject line.

Extra Credit Points
You can earn extra credit points by being the first to find and report errors in the Sandborn book (*Cost Analysis of Electronic Systems, 2nd Edition*).

- 1 point (homework) for identification of an *erratable** error in the book. Examples:
  - Sign errors in equations
  - Numerical errors
  - Errors in referring to equations, figures, tables, or references
  - Incorrect/inconsistent symbols or subscripts
- 0.5 point (homework) for identification of a grammatical/formatting error in the book. Examples:
  - Missing or misplaced commas
  - Spelling errors
  - Italic/non-italic errors
  - NO points for style things, if you don't like my style, write your own book!
- Only the first person to identify an error will get the points.
- No points given for reporting errors that are already in the errata for the book (check the posted errata before you report an error).
- No points given for reporting errors in the course lecture slides.
- The errata for the book will be updated as errors are reported – check the list before you email me your error.
- Errors in the 1st edition of the book do not count (no points unless the error also appears in the 2nd edition).
- Errors that are unique to the electronic version of the book may exist, note, there were many (100s) of formatting errors in the electronic version of the book that were supposed to have been fixed in summer 2017. If these are not fixed, I will post the errors that are known.

*Erratable = an error that would warrant listing in an errata.

Exams
There will be two exams in the class:

- Exam 1 - TBD
- Exam 2 – TBD (last day of class)

Both exams will be open-book, open-note exams.

Course Grading Policy:

- 30% Homework
- 30% Midterm Exam
- 40% Final Exam

Office Hours (2115 Potomac Building):

- 7:30 – 9 am any day I am in town
- Email me to arrange any other time