

SE 520 Engineering Economics

January 12, 2009

Course Objective:

This course will provide an overview of financial accounting and economic principles employed by engineers involved in product and system development. It is intended to familiarize engineers with methods in project accounting, budgeting, cost estimation, financial management, design optimization and economics.

Topics will include:

- Project scope
- Project accounting
- Cost estimation
- Budgeting
- Cost management and earned-value assessments
- Cost-driven optimization techniques.
- Economics underlying project selection and investment strategies.

This course will emphasize a systems engineering perspective and is a core requirement for the IPFW Masters of Science in Engineering systems engineering focus

Credits: 3

Professor: Dr. Steve Walter
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Office: ETCS 229B
(2nd floor NE corner in the Center of Excellence Suite)

Class Website: <http://elearning.ipfw.edu/> (Use eLearning log-in)
Or <https://blackboard.purdue.edu/webct//logonDisplay.dowebct>
This is a backup if the IPFW server is down.

Evaluation: The course will be graded on a curve.
30% Homework (Homework will be assigned weekly.)
30% First Exam
40 % Final Exam (The final exam will be comprehensive.)

Course Outcomes:

A student who successfully completes the course will have demonstrated:

1. Use of a work breakdown structure (WBS) to document project scope.
2. The ability to read and understand project financial reports.
3. An understanding of techniques used to estimate project costs.
4. Knowledge of criteria for developing basis of estimates for project costing.
5. Techniques for quantifying risk.
6. Use of risk in determining cost reserves.
7. Use cost as a criteria in making design and development decisions.
8. Familiarity with EVMS metrics.
9. An understanding of the time value of money.
10. An ability to read and understand corporate financial reports.

Tentative Class Schedule

| Class | Topic | Comments |
|-------|--|---------------|
| 1 | Course Obj./ Project Scope –WBS/ Intro Cost Est. | Classes Begin |
| 2 | Cost Estimation: Methods and Basis of Estimates | |
| 3 | Cost Allocation/ Cost Pools / Overhead / Accounting | |
| 4 | More on Cost Pools and Overhead / Sarbanes-Oxley | |
| 5 | Scheduling and Budgeting | |
| 6 | Cost Risk and Risk Management | |
| 7 | Trade Studies/Decision Trees/Matrices /Exam Review | |
| 8 | Value Engineering/Cost as an Independent Variable / Exam | |
| 9 | Design to Cost / Cost Reduction Strategies | |
| 10 | EVMS and the EV Baseline | |
| 11 | Monitoring EV Performance / Nunn-McCurdy - Over runs | |
| 12 | Production Economics | |
| 13 | Cash Flow and Net Present Value | |
| 14 | Corporate Valuation and Financial Statements / Exam Review | |
| | Final Exam (8:00 PM – 10:00 PM - TBR) | Final |

Other Significant Dates: Jan. 18 – Last Day for Full Refund (for full-term classes)
Feb 9 – Pass/Not Pass and Audit-to-Credit Deadline
Mar. 20– Credit to Audit Deadline/Last Day to Withdraw

Books: *Modern Cost Management, 2nd Ed., 2000 (In paperback)*
Jae K. Shin, Joel G. Siegel, Ph.D.
Barron’s Educational Series, Inc.
<http://www.barronseduc.com>

This book will be supplemented by government or professional society guides, which will be called out during the semester. Examples include:

Work Breakdown Structures

- Mil-Std-881A- HDBK, *Work Breakdown Structures*, DoD, 2005
- *US Department of Energy Work Breakdown Structures*, June 2002

Cost Estimating

- *NavSEA Cost Estimating Handbook*, U.S. Navy, 2004
- *Cost Estimating Guide For Program And Project Management*, U.S. Dept. of Energy, April 2004
- Appendix A, *The Cosmos on a Shoestring, Small Spacecraft for Space and Earth Science*, Liam P. Sarsfield, RAND Corp Document Number: MR-864-OSTP, 1998.
- The Estimate Review and Validation Process, Larry Dysert, CCC, and Bruce G. Elliott, CCC, *Cost Engineering* Vol. 44/No. 1 17-22 Jan. 2002.
- Is “Estimate Accuracy” an Oxymoron?, Mr. Larry R. Dysert CCC, 2006 AACE International Transactions, EST.01.2- EST 01.5.
- Scope Development Problems in Estimating, Larry Dysert, CCC, 1997 AACE International Transactions, EST.04.1- EST 04.1.

Basis of Estimates

- *Documentation Guidance for FAA Cost Estimates (Cost Basis of Estimate [BOE])*, Investment Cost Analysis Branch, ASD-410, FAA Ver, 1.0, Oct. 2002.
- *Preparing a Basis of Estimate*, Mr. Todd Pickett, CCC, 2005 AACE International Transactions, EST.10.2- EST 10.5.

Scheduling

- Scheduling guide for Program Managers, Defense Systems Management College Press, Fort Belvoir, Va Oct. 2001.

Cost Allocation/Cost Pools/ Accounting Structures and Production Economics

- *Modern Cost Management*, Jae K. Shin, Joel G. Siegel, Ph.D., Barron’s Educational Series, Inc., 2nd Ed., 2000 (In paperback)

Risk Management

- *Risk Management Guide for DoD Acquisition, 6 Edition*, V1,0 DoD Aug. 2006

Earned Value

- *Earned Value Management Systems Intent Guide, ANSI/EIA-748A*, NDIA, PMSC, Jan 2005.
- *An Introduction to Earned Value Analysis*, Suketu Nagrecha, white paper, 2002
- *Earned Schedule: An Emerging Enhancement to Earned Value Management*, Walt Lipke and Kym Henderson, CROSSTALK The Journal of Defense Software Engineering, November 2006.
- *Forecasting Project Schedule Completion With Earned Value Metrics*, D. S. (Dave) Jacob, Doren Associates, Undated ~2002