Fall 2020


Cesar Jaramillo Cueva

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Course Information

Course: EM 691 Capital Estimating
Quarter: Fall 2020
Module: Online
September 2020- December 2020

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Office Hours: By Appointment only

Course Description

The objectives of this course are to identify and develop skills necessary to be a successful Project Controls Manager with special focus on a critical components of Project Controls; Estimating. Capital Estimating is a set of skills requiring principles, methods, and techniques and mechanisms that are used to effectively estimate a project from the concept to completion including design, engineering, and procurement, construction, testing, commissioning and close out.

This course is based on of the instructor’s Engineering and Management international experience in the field of Chemical Engineering, Project Engineering and Project Controls in South America and USA.
Readings

Required Reading:
- Cost Estimator’s Reference manual by Stewart, Wyskida, Johannes
- Controls & Management of Capital Projects by John W Hackney
- Project Planning Scheduling & Controls: A Hands-On Guide to Bringing projects in On Time and on Budget by James P. Lewis
- Skills & Knowledge Track Workbook of Cost Engineers sponsored by AACE

Suggested Reading:
- The Selection Process for Capital Projects by Hans J. Land & Donald N. Merino
- Project Management- A Systems approach to Planning, Scheduling and Controlling by Harold Kerzner, P.Hd
- AACE sponsored Papers and Manuals

Supporting Bibliography:
ISBN# 9780133439274
By Sullivan

Course Requirements

Each student is expected to:
(1) Monitor daily Moodle account and the school email account
(2) Complete assignments on time
(3) Prepare, participate and be proactive in your online class discussions
(4) Participate in online group exercises
(5) Satisfactorily prepare for & pass the midterm and final examination

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(6) Understand and grasp all knowledge from Power Point Presentations and supplementary assignments
(7) Prepare a successful final presentation by combining all knowledge learned during the semester

Instructional Approach

- **In addition to the Power Point contents, additional content information will be uploaded for EACH session to reinforce the learning process.**
- The class will involve lectures, online discussions, online group exercises, quizzes, exams and a final presentation.

Grading Rubric - Final grade will be based on the following:
- 20% Online Participation including completion of assignments
- 10% Summary (1\textsuperscript{st} part of the semester)
- 10% Summary (2\textsuperscript{nd} part of the semester)
- 15% Midterm examination
- 15% Final examination
- 30% Final Power Point Presentation

General Outline and Assignments (the sequence may change)

**Session 1: Capital Estimating 1**
Student’s introductions
Overview of the project cycle
Review of the case study
Glossary
Types of estimates
Factored estimate \((C_{\text{new}}=C_{\text{old}}*(C_{\text{new}}/C_{\text{old}})^n)\)
Software used for estimation
Details of direct/indirect costs
Productivity
Sample template
Assignment for the next session

**Session 2: Capital Estimating 2**

Estimating chart
Material take offs
Direct/Indirect costs

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Engineering
Effects of escalation, Inflation, CPI, Productivity
Sample estimate

**Session 3: Capital Estimators Responsibilities**

Technical requirements
Impact of prevailing market conditions
Basis- Assumptions
Front End Loading (FELs)
Engineering
Cost Elements
Communication

**Session 4: Project Life Cycle (23) and Capital Estimating & FEL (18)**

What is FEL
- Site factors
- Engineering
- PEP (Project Execution Plan)
Sources of input for estimates
Ten estimating observations for business professionals
Estimating class exercise

**Session 5: Home Assignment: Value Engineering**

Value Eng:
- History
- Types
- Phases of
- Selection of

**Session 6: Contracting Strategy & Estimating**

What is a contract?
Contracting Strategies
Successful contracting
Major Types of Contracts
Typical contents of a Contract
Criteria to select the type

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Key Clauses
Breach of Contract
Claims & Dispute resolution

**Session 7: Estimate Organization & Ranges**

Importance and advantages of a range of estimates
Types
Organization
Following typical standards
Single point or ranges
Reasons for different types of estimates and their justification
Responsibilities & Accountability

**Session 8- Oct 12 : Home Assignment: Code of Account**

A bridge between cost, estimating and scheduling
Facilitates information
Principals of COA
Essential for internal/external communication
A typical example

**Mid term:** Midterm exam (contents to be covered will be mentioned a week before on Moodle

**Session 9: Procurement and Estimating**

Definition
  Material
  Services
Methods & mechanism
Bids and bid waiver
Sole bidding

**Session 10: Productivity**

Productivity:
Definition
By countries, regions
Factors of high, low productivity

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Maslow’s Hierarchy
How to increase

**Session 11: Best Practices**

Man-hours, Wage rates, Change management Process, Schedule

**Session 12: International Project Estimating**

- P/L analysis
- Investment risk due to local stability of government, fiscal policies, local economy, culture and labor
- Questions that an estimator should ask
  - Local Site conditions, Infrastructure,
  - Currency and its change
  - Local regulations

**Session 13: Contingency & Risk Management**

- Definition
- Risk & Contingency Identification
- Risk Mitigation & Managements
- General software used in Industry

**Session 14: Contingency & Risk Management**

- Definition
- Risk & Contingency Identification
- Risk Mitigation & Managements
- General software used in Industry

**Session 15: Class Exercise**

- Case study and Group Assignment

**Session 16: Professional Communication**

- Best Conversationalist is also the best listener
- How to prepare for estimating reviews with management
- How to communicate with difficult people

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How to listen and how not to listen
What to say & what not to say in an interview

Session 17: Nov 30th: Final Exam Summary and Final Project Presentation Assignments

Students will get individual Assignment Project to Prepare a Narrative Presentation (Research and Professional Communications Strategies are expected during narrative presentation)
Final Exam Content Summary Preparation

Session 18: Dec 7th: Final Exam and Final Presentation

Students uploading Final Project Narrative Presentations
Students completing Final Exams during this week.

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