

Jan 21th, 2025

# New Jersey Institute of Technology Newark Campus

Course Syllabus: **EM 691 Cost Estimating Capital Projects**

## **Course Information**

Course: **EM 691 Capital Estimating**

Quarter: Spring **2025**

Module: **Online**

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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 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 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
- Project Management- A Managerial approach by Jack. R. Meredith & Samuel J. Mantel, Jr.
- AACE sponsored Papers and Manuals

### Supporting Bibliography:

Engineering Economy (W/Bind-in Access Code) 16th edition

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 participation.
- (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<sup>st</sup> part of the semester)
  - 10% Summary (2<sup>nd</sup> 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 ( $C_{new} = C_{old} * (C_{new}/C_{old})^n$ )

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

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

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- : 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

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: 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: Final Exam and Final Presentation**

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