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IHMD 114

CPM in Construction

Duration: 35 hours

This course discusses some factors that make the case for why planning and scheduling is best performed by the Critical Path Method (CPM).

It covers some of its development and relays some thoughts on where the process may be going in the future.

The interplay between the theory of mathematics that underlies the methodology and the modifications needed to make the methodology more practical are themes that continue throughout the course.

It is hoped that the conclusion drawn by the trainee will be that it is the Scheduler who must balance these two ideals, mathematics and engineering, to provide a useful and user friendly tool to the users of CPM in construction management, manufacturing, software design and other users in the world of projects that must be finished on time and within budget.

Who Should Attend?

This course is valuable for engineers, planners, managers and professionals participating in managing construction projects.

The following major topics will be covered:

- ☑ **Acquire a comprehensive knowledge of CPM objectives, methods, and updates**
- ☑ **Understand the activities' dependency arrangement and optimization**
- ☑ **Master the interrelationship between time and cost**

- ☑ **Develop a master schedule including activities' attributes**
- ☑ **Control the project using manual and electronic tools**
- ☑ **Isolate the appropriate methods for project updates and delay claims**

☑ Course Contents

☑ The Initial Logic Network—Input

- The Logic of the Logic Network
- Arrow Diagram
- Logic Diagrams
- Logical Loop

☑ Network Construction

- Form and Format
- Events
- Problems with Multi-sheet Networks

☑ The Durations of the Logic Network

- Definition of an Activity
- Setting a Minimum and Maximum Duration
- Estimating versus Scheduling Durations
- CPM versus PERT Durations

☑ What Comes Out

- Attributes of an Event
- Attributes of an Activity
- The Forward Pass
- The Backward Pass

☑ Cranking the Engine

- Manual and Computer Solutions for PERT and ADM
- Activity Start and Finish Times
- Critical Activities
- Total Float
- Free Float
- Independent Float
- Time Scale Network

☑ Adding Complexity

- Original versus Remaining Durations
- Percent Complete
- Defined Subtasks and Check-off Updating
- Calendar versus Work Period Conventions
- Multiple Starting and Ending Activities
- Artificial Constraints to Dates
- Negative Float
- Definition of Criticality
- Actual Start and Finish Dates
- Retained Logic versus Progress Overrides
- Events and Milestones
- Hammocks and Summary Network Logic
- Summary Activity Bars
- Adding Resources to Activities
- Adding Costs and Cost Codes to Activities
- Resource Driven Scheduling

- Master Schedules Local versus System-wide Updating

☑ PDM and Precedence Networks

- Precedence Logic
- Work Package Calculations

☑ Respecting the Power of PDM

- Durations between Activities: Percent Lead/Lag Relationships
- Defining Overlapping Activities: Durations between Activities
- Negative Durations between Activities
- Remaining Durations between Activities
- PDM and Hammocks
- Total Float Calculation

☑ The Tools of CPM Planning and Scheduling

- Measure Twice—Cut Once
- The Pure Logic Diagram
- Format for Ease of Data Collection versus for Ease of Data Entry
- Bar Chart: May Be Based upon Logic, but Is not a Logic Network
- Logic Restrained Bar Chart
- PERT

☑ Acquiring the Durations

- Best Estimate with Utilization of Resources Envisioned
- Compare with PERT Durations: Optimistic, Most Likely, Pessimistic
- Schedule Durations versus Estimating Durations
- Estimated Durations versus Calculated Durations

- Durations and the Project Calendar or Calendars

☑ Specifying the Relationships Between Activities

- Mandatory and Discretionary Physical Restraints
- Mandatory and Discretionary Resource Restraints
- Mandatory and Discretionary Timing Constraints
- Choosing the Type of Relationship between Activities
- The Case for Restricting Relationships to Traditional “FS” Without Lag
- Minimum Restrictions for Proper Usage of PDM
- Choosing the Algorithm for the Initial Schedule

☑ The Practice of CPM Planning

- Equipment and Workforce Planning
- Workforce Leveling
- Multi-project Scheduling
- Turnaround Application
- Resource Leveling Significance

☑ Evolution of the Project Schedule

- Preliminary Schedule
- Preconstruction Analysis
- Contractor Preconstruction Analysis
- Milestones
- Resources
- Fast Track
- Responsibility
- Schedule versus Calendar

- Contingency

☑ CPM and Cost Control

- CPM Cost Estimate
- Progress Payments
- Cost Forecasting
- Network Time Expediting
- Minimum Cost Expediting

☑ Updating the Schedule

- Distinguishing Updates from Revisions
- Information Required for Schedule Control: AS, RD, AF
- Determination of Actual Start and Actual Finish Dates
- Determination of Remaining Duration of Activities: Repeat the Steps of the Master
- Expected Completion and Renewing Promises
- The Forgotten Step: Determination of Remaining Duration between Activities

☑ Delay Analysis

- Delay versus Disruption
- Responsibility/Types/Force Majeure
- As-Planned Logic Network
- As-Should-Have-Been CPM Network
- As-Planned Schedule
- As-Built Schedule
- As-Built Logic Network
- Causative Factors

- As-Impacted Logic Network
- As-Impacted Schedule
- Time Impact Evaluations

☑ Disruption Analyses

- Traditional Methodologies
- CPM Out-of-Sequence Methodology

IHMD 116

Estimating in Construction

Duration: 35 hours

Building construction estimating is the determination of probable construction costs of any given project. Many items influence and contribute to the cost of a project; each item must be analyzed, quantified, and priced.

Because the estimate is prepared before the actual construction, much study and thought must be put into the construction documents.

The estimator who can visualize the project and accurately determine its cost will become one of the most important persons in any construction company.

During the design process, the contractor prepares and maintains a cost estimate based on the current, but incomplete, design. This is often referred to as a preliminary estimate.

In addition, the contractor may prepare estimates that are used to select between building materials and to determine whether the cost to upgrade the materials is justified.

What all these estimates have in common is that the design is incomplete. Once the design is complete, the contractor can prepare a detailed estimated for the project.

Who Should Attend?

This course is valuable for engineers, planners, estimators, managers and professionals participating in managing construction projects.

☑ Course Contents

☑ INTRODUCTION TO ESTIMATING

- Types of Estimates
- Detailed Estimate
- Assembly Estimating
- Parametric Estimates
- Model Estimating
- Project Comparison Estimates
- The Estimator
- Quantity Surveying
- Types of Bids
- Contract Documents
- Sources of Estimating Information

☑ CONTRACTS, BONDS, AND INSURANCE

- The Contract System
- Types of Agreements
- Lump-Sum Agreement (Stipulated Sum, Fixed Price)
- Unit-Price Agreement
- Cost-Plus-Fee Agreements
- Agreement Provisions
- Bonds
- Bid Bond
- Performance Bond
- Labor and Material Bond

- Insurance

☑ PROJECT MANUAL

- Construction Specifications Institute
- Invitation to Bid (Advertisement for Bids)
- Instruction to Bidders (Information for Bidders)
- Bid (Proposal) Forms
- General Conditions
- Supplementary General Conditions
- Specifications
- Alternates

☑ THE ESTIMATE

- Organization
- Planning the Estimate
- To Bid or Not to Bid
- The Estimate
- Site Investigation
- Specialty Contractors
- Materials

☑ OVERHEAD AND CONTINGENCIES

- Overhead
- Home Office Overhead
- Job Overhead (General Conditions, Direct Overhead)
- Scheduling
- Contingencies

- Checklist
- Undistributed Labor
- Temporary Buildings, Enclosures, and Facilities
- Temporary Office
- Barricades and Signal Lights
- Temporary Utilities
- Repairs and Protection
- Relocating Utilities
- Cleaning
- Permits
- Labor Burdens and Taxes
- Bonds and Insurance
- Miscellaneous Equipment and Services

☑ LABOR

- Labor Hours and Productivity
- Unions—Wages and Rules
- Open Shop
- Labor Burden

☑ EQUIPMENT

- Operating Costs
- Depreciation
- Interest
- Ownership Costs
- Rental Costs
- Cost Accounting

- Mobilization

☑ EXCAVATION

- Soil
- Calculating Excavation
- Equipment
- Earthwork—New Site Grades and Rough Grading
- Cross-Section Method
- Topsoil Removal
- Backfilling
- Excess and Borrow
- Spreading Topsoil, Finish Grade
- Landscaping
- Pumping (Dewatering)
- Rock Excavation
- Piles
- Asphalt Paving

☑ CONCRETE

- Concrete Work
- Estimating Concrete
- Reinforcing
- Vapor Retarder
- Concrete Finishing
- Curing
- Transporting Concrete
- Forms

- Form Liners
- Precast Concrete
- Specifications
- Estimating
- Precast Tees
- Precast Slabs
- Precast Beams and Columns
- Precast Costs

☑ MASONRY

- Specifications
- Labor
- Bonds (Patterns)
- Concrete Masonry
- Concrete Block
- Estimating—Concrete Masonry
- Estimating Brick
- Estimating Tile
- Stone Masonry
- Mortar
- Accessories
- Reinforcing Bars
- Cleaning
- Equipment

☑ METALS

- Structural Metal

- Metal Joists
- Metal Decking
- Miscellaneous Structural Metal
- Metal Erection Subcontractors

☑ THERMAL AND MOISTURE PROTECTION

- Waterproofing
- Membrane Waterproofing
- Integral Method
- Metallic Method
- Damp proofing
- Painting Method
- Plastering
- Insulation
- Roofing
- Roof Areas
- Shingles
- Asphalt Shingles
- Built-Up Roofing
- Corrugated Sheets (Including Ribbed, V-Beam)
- Metal Roofing
- Tile
- Sheets, Tile, and Shingles Formula
- Liquid Roofing
- Insulation
- Roofing Trim
- Labor

- Equipment

☑ DOORS AND WINDOWS

- Window and Curtain Wall Frames
- Doors
- Pre-fitting and Machining (Pre-machining) Doors
- Pre-finishing Doors
- Door Frames
- Hardware
- Glass

☑ FINISHES

- Drywall and Wet wall Construction
- Suspended Ceiling Systems
- Wallboard Types
- Drywall Partitions
- Column Fireproofing
- Wet wall Construction
- Plaster
- Lath
- Drywall and Wet wall Checklist
- Flooring
- Wood Flooring
- Laminate Flooring
- Resilient Flooring
- Carpeting
- Tile

- Painting
- Floors and Painting

☑ ELECTRICAL

- Electrical Work
- Single Contracts
- Separate Contracts
- Coordination Requirements

☑ PLUMBING

- Plumbing Work
- Single Contracts
- Separate Contracts
- Coordination Requirements

☑ HEATING, VENTILATING, AND AIRCONDITIONING

- HVAC Work (Heating, Ventilating, and Air-Conditioning)
- Single Contracts
- Separate Contracts
- Coordination Requirements

☑ OTHER ESTIMATING METHODS

- Project Comparison Method
- Square-Foot Estimating
- Assembly Estimating

IHMD 118

Earned Value Management System

Duration: 35 hours

Earned Value Management (EVM) is a project planning and control approach, which provides cost and schedule performance measurements. It compares actual accomplishment of scheduled work and associated cost against an integrated schedule and budget plan. Its benefits include visibility into the true progress of the project work against the budget, projections of anticipated project schedule and cost trends and the ability to take timely corrective actions for undesired variances. EVM is considered one of the most powerful and productive concepts utilized in managing today's complex projects in private, commercial or government environments.

Who Should Attend?

This seminar is designed for those who want to learn the basic principles of EVM used for project performance measurement, a proven method to evaluate project work progress in order to identify early potential schedule slippage and areas of budget overruns. It provides practical coverage of an accurate and realistic reflection of the integrated scope, cost and schedule parameters of a project to assist both contractors and client management in the decision-making process.

The following major topics will be covered:

- ☑ **Obtain basic knowledge in understanding and using an effective performance management system in managing technical projects effectively.**

- ☑ **Manage projects using a proven, effective performance measurement technique.**
- ☑ **Work with clients to define project objectives, develop a project plan, and put it into action.**
- ☑ **Make project decisions concerning scope, cost and schedule parameters faster, more effectively and more confidently.**
- ☑ **Stay on top of schedules, budgets, workloads and human resources issues and delegate practically and fairly.**
- ☑ **Learn to avoid the pitfalls of project management by quickly identifying potential project risks and mitigate them as early as possible.**

Course Contents

- ☑ **Introduction to Earned Value Management (EVM)**
  - o Management Criteria versus Engineering Criteria
  - o Evolution of the Earned Value Management (EVM) Concept
  - o The Cost/Schedule Control System Criteria (C/SCSC)
  - o The EVM System Criteria
  - o Performance Measurement- An Effective EVM Technique
  - o EVM in Project Management
- ☑ **Scope the Project**
  - o Understanding the Project Work Scope
  - o Work Breakdown Structure (WBS)
  - o Make-or-Buy Choice
  - o WBS and Earned Value
- ☑ **Plan and Schedule the Project**
  - o Understanding the Project Objective
  - o Planning the Project
  - o Scheduling the Project

- o Scheduling and Earned Value

☑ **Estimate and Budget Project Resources to Form Control Account Plans (CAPs)**

- o Integrating the Project Work Scope with Cost and Schedule
- o Earned Value CAPs
- o Cost Estimates and Budgets
- o Management Reserves

☑ **Establish the Earned Value Project Baseline**

- o Methods Used to Plan and Measure Earned Value
- o Control Account Plans (CAPs)
- o The Performance Measurement Baseline (PMB)
- o Maintaining the Baseline :Managing Changes in Scope

☑ **Monitoring Performance Against the Baseline**

- o CAPs Performance Measurement
- o Presentations to Project Management
- o Earned Value Cost and Schedule Variances
- o Materials and Subcontracts in EVM

☑ **Final Cost and Schedule Forecasting**

- o Determining Factors
- o Cost and Schedule Results Methodology
- o Management Reserve or Contingency Reserve
- o Estimate At Completion (EAC)
- o The Over Target Baseline (OTB) Process
- o Predicting the Project's Time Duration

☑ **EVM Reporting**

- o Subcontractors' Reporting
- o Preparing and Interpreting the Integrated Cost/Schedule Report
- o The EVM Reporting Formats

IHMD 122

Construction Life-Cycle Risk Management

Duration: 35 hours

Construction projects encounter high level of uncertainty. All large scale projects experience numerous changes and disputes through its life cycle. Risk management has been very important to be implemented in systematic processes to mitigate the probability and the impact of the potential risk events within the considered projects.

This course provides the trainee with the required methodologies and tools to identify, analyze, and control different types of risks during the life cycle of the construction projects with focus on large scale projects.

Who Should Attend?

The course is very important to construction managers, project managers, risk managers, functional managers and all construction management personnel.

The following major topics will be covered:

- ☑ Plan for the risk management process
- ☑ Identify potential risks in different areas of the construction life cycle
- ☑ Assess the impact and probability on basis of unique scale
- ☑ Identify the required tools to be utilized in the management activities
- ☑ Develop time and cost contingency plan
- ☑ Create and track construction risks through well-organized risk register

Course Contents

☑ Introduction and Basic Concepts

- Projects and Risk

- Construction projects
- Decision making
- Risk management strategy
- Project planning
- The Project Environment
- Project organization
- Project phases
- The Human Aspects
- People
- Organizations
- The risk management process
- The risk workshop
- Communication
- Risk and Value Management

☑ Plan Construction Risk Management

- Risk management team
- Risk threshold
- Risk scales
- Contracts
- Categorization
- Templates
- Budget
- Timing
- Communication
- Construction method

☑ Identify Construction Project Risks

- Workshops
- Brainstorming
- Delphi

- Focus groups
- Risk register
- Risk preliminary assessment
- High level risks

☑ Perform Construction Project Qualitative Risk Analysis

- Qualitative risk assessment
- Review of project programs and budgets
- The risk log
- Qualitative methods
- Probability-impact matrix

☑ Construction Project Quantitative Risk Analysis

- Project appraisal
- Project evaluation
- Expected monetary value analysis
- Decision tree analysis
- Sensitivity analysis
- Probabilistic analysis
- Modelling and simulation
- Contingency analysis

☑ Plan Construction Project Risk Responses

- STAIR Technique
- Sharing risk
- Insurance
- Contracts
- Accepting risk
- Response to opportunities
- Selecting appropriate response

☑ Monitoring & Control Construction Project Risks

- Residual risks
- Secondary risks
- Emerging risks
- Risk audits
- Additional construction risks & responses

☑ Financial Risks in Construction Projects

- Project financing
- Appraisal and validity of financing projects
- Typical financial risks
- Financial risk in concession contracts

☑ Construction Health & Safety Management

- Safety planning
- Prevention strategies/ response strategies
- Perform safety assurance
- Hazard assessment
- Safety control measurements, non-conformance reports
- Communication

☑ Risk Allocation in Procurement Cycle

- Procurement processes
- Plan for value
- Potential risks in contracts
- Risk allocation according to contract type
- Claim quantification
- Statement of claim
- Direct & indirect costs
- Extension of time

- Claim resolution
- Changes claim resolution
- Negotiation
- ADR

☑ Enterprise Risk Management

- Introduction
- Risk management
- The risk management process
- Benefits of risk management
- Recognizing risks
- Model for enterprise risk management

IHMD 124

Quality in Construction

Duration: 35 hours

Quality may mean different things to different people. Some take it to represent customer satisfaction, others interpret it as compliance with contractual requirements, yet others equate it to attainment of prescribed standards.

Quality of construction is even more difficult to define. First of all, the product is usually not a repetitive unit but a unique piece of work with specific characteristics. Secondly, the needs to be satisfied include not only those of the client but also the expectations of the community into which the completed building will integrate. The construction cost and time of delivery are also important characteristics of quality.

Based on the foregoing, the quality of construction projects can be defined as follows:

Construction project quality is the fulfillment of the owner's needs per defined scope of works within a budget and specified schedule to satisfy the owner's/user's requirements. The phenomenon of these three components can be called the "construction project trilogy".

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction industry.

The following major topics will be covered:

- ☑ Acquire a comprehensive knowledge of applying quality concepts in construction projects

☑ Understand the different terminologies, methodologies, methods, and tools of quality

☑ Master the know-how of quality implementation in the life-cycle construction projects

☑ Integrate cost, time, and quality in construction projects

☑ Course Contents

☑ Overview of Quality

- Quality Definition
- Quality Inspection
- Quality Control
- Quality Assurance
- Quality Engineering
- Quality Management
- Quality Gurus
- PDCA Cycle
- Statistical Process Control
- 14 Principles for Transformation
- The Seven-Point Action Plan
- Summary of Philosophies
- Total Quality Management
- Quality Function Deployment
- Six Sigma
- The DMAIC Process
- Six Sigma in Construction Projects
- The DMADV Process

- TRIZ
- Building Information Modeling
- Value Methodology
- Function Analysis System Technique (FAST)

☑ Integrated Quality Management

- Quality Standards
- International Organization for Standardization (ISO)
- ISO 9000 Quality Management System
- ISO 14000 Environmental Management System
- Occupational Health and Safety Assessment Series (OHSAS) 18000

☑ Construction Projects

- Construction Projects
- Construction and Manufacturing
- Quality Cost
- Systems Engineering
- Construction Project Life Cycle

☑ Quality in Construction Projects

- Design/Bid/Build
- Design/Build
- Project Manager
- Construction Manager
- Guaranteed Maximum Price
- Build–Own–Operate–Transfer

- The Turnkey Contract
- Conceptual Design
- Preliminary Design
- Detailed Design
- Detail Design of the Works
- Regulatory/Authorities' Approval
- Contract Documents and Specifications
- Detail Plan
- Budget
- Cash Flow
- Tender/Bidding
- Construction
- Testing, Commissioning, and Handover

☑ Operation and Maintenance

- Categories of Maintenance
- Preventive Maintenance
- Scheduled Maintenance
- Breakdown Maintenance
- Routine Maintenance
- Replacement of Obsolete Items
- Predictive Testing and Inspection
- O&M Program

☑ Facility Management

- Facility Management
- Facility Management Outsourcing

- Computer-Aided Facility Management (CAFM)
- Benefits of FM
- Quality Requirements of FM

☑ Assessment of Quality

- Assessment Categories
- Cost of Poor Quality
- Organization’s Standing in the Marketplace
- Quality Cultures in the Organization
- Operation of Quality Management System
- Self-Assessment

IHMD 128

Sustainable Construction

Duration: 35 hours

The built environment presents us with a major challenge. The construction, fit-out, operation and ultimate demolition of buildings is a huge factor in human impact on the environment both directly (through material and energy consumption and the consequent pollution and waste) and indirectly (through the pressures on often inefficient infrastructure).

The built environment also has a crucial impact on the physical and economic health and well-being of individuals, communities and organizations. A good building is a delight and will enhance a community or organization, enhance our ability to learn or increase our productivity. A poor building will do the opposite. Where buildings and built environments contribute to ill-health and alienation, undermine community and create excessive financial liability, they are undesirable and unsustainable.

To meet the challenge we have to enhance quality of life for all by designing healthy buildings and environments fit for individuals and communities both now and in the future. We need to minimize resource throughputs, waste and pollution, and to fulfill our responsibility to protect other species and environments.

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction industry.

The following major topics will be covered:

- ☑ Acquire a comprehensive knowledge of sustainable construction
- ☑ Master environmental and durability construction requirements

☑ Capture the control points of ecology with respect to construction

☑ Differentiate between the available alternatives; benefits and economy

☑ How to design construction utilities and preserve wastes

☑ Course Contents

☑ Sustainability drivers

- Development
- Optimism versus pessimism
- Oversimplification
- Inertia
- Recent progress?

☑ Policy and legislation

- Impact
- Changes in attitude
- Policy integration
- Policy responses
- Key players
- Limitations of policies
- Potential barriers and how to deal with them

☑ Cost issues

- Can we afford sustainable buildings?
- Policy trends
- Old idealism versus modern realism
- What do sustainable buildings cost?

- Cost information
- Adding value through design
- Cost and quality benefits
- What are the economic benefits of sustainable buildings?
- Whole-life costs
- Redefining progress

☑ Appraisal tools and techniques

- A hierarchy
- Labels and certification
- Benchmarking
- Critical path tools
- Targeting tools

☑ Materials selection

- The life cycle approach
- Resource base
- Embodied pollution
- Extraction
- Processing and production
- Impact in use
- Detailing
- Toxicity
- Passive environmental control
- Local issues
- Final destination
- Durability

- Maintenance
- Lifespans

☑ Low-impact construction

- Context
- Back to the future
- Sourcing
- Performance
- Maintenance
- Labor and skills
- Earth techniques
- Construction using reused, recycled materials or waste
- Planning and low-impact development

☑ Heating

- Pollution – the global context
- Minimizing demand
- Passive design
- Form and fabric – how to minimize heat requirements
- Context – how a site can be exploited
- Fuel – the least polluting sources of affordable energy
- System design – efficient and controllable equipment
- Controls – minimize heating and maintain comfort?
- Management tools
- Heating rules of thumb

☑ Electrical installations

- Basics
- Electrical generation
- Reducing use of electricity
- Transmission and distribution
- Waste and health issues
- Policy aimed at reversing unsustainable energy use
- Handy hints and tips

☑ Lighting and day lighting

- Principals of lighting design
- Quality
- Energy efficiency, capital and running costs
- Light quantity
- Natural lighting
- Integration
- Maintenance
- Control
- Daylight factor
- Glare from day lighting
- Modelling and simulation
- Artificial lighting
- Sources of technical information

☑ Ventilation and cooling strategies

- Building related ill-health (BRI)
- The indoor environment
- Methods of ventilation

- Natural ventilation
- Mechanical ventilation
- Design issues
- Methods of cooling
- Modelling and simulation
- Ventilation and cooling rules of thumb

☑ Renewable technology

- Development
- Eco-minimalism
- Renewable technologies
- Biomass
- Photovoltaic (PV)
- Solar thermal
- Hydro power
- Wave and tidal energy
- Geothermal
- Wind
- Fuel cells
- Autonomy
- Future potential

☑ Water and sewage management

- Main considerations
- Conservation
- Delight
- Pollution

- Rainwater drainage
- Environmental impacts
- Education
- Closing the circle
- Sewage treatment options
- Economics

☑ Construction processes

- Scope
- Key issues
- Procurement
- Protecting the aspiration
- Production information and tender
- Tender action
- Mobilization
- Construction to practical completion

☑ Urban ecology

- What is urban ecology?
- Global context
- Communities
- Urban environment
- Urban ecology in history
- Post-industrial cities
- The systems approach to cities
- Urban form
- Growth

- Transport
- Climate
- Landscape
- Permaculture
- Regeneration
- Pioneer communities

IHMD 132

Construction Administration

Duration: 35 hours

“Construction administration” and “contract administration” are terms easily confused. As used in this course, the term contract administration means the management or handling of the business relations between the parties to a contract, which is popularly thought of as being limited to the administrative paperwork or electronic project management applications.

In this course, the term construction administration is used to refer to the much broader responsibility of relating to all project-related functions between the parties to a contract—not only the traditional contract administration duties, but also the conduct of the parties, relations with the contractor, communications, business systems, procedures, responsibility, authority, duties of all of the parties, documentation requirements, construction operations, planning, scheduling, coordination, materials control, payment administration, change orders, extra work, dispute procedures, claim handling, negotiations, all project closeout functions including punch list inspections, final cleanup, and administrative closeout.

Thus, as used in this course, contract administration, whether electronic or traditional paperwork, is just a part of construction project administration.

Who Should Attend?

This course is valuable for engineers, technicians, managers and professionals participating in managing construction projects.

The following major topics will be covered:

- ☑ **Acquire the appropriate construction administration knowledge**
- ☑ **Define the roles and responsibilities of key persons in the project**
- ☑ **Compare different documentation requirements for the construction project**
- ☑ **Isolate the required optimum documentation process with respect to different construction situation**
- ☑ **Optimize the management process with respect to project contract type**

☑ Course Contents

☑ THE PROJECT DELIVERY SYSTEM

- **Construction Administration**
- **Control of Quality in Construction**
- **Organizational Structure of a Construction Project**
- **Professional Construction Management**
- **Design–Build Contracts**
- **Definitions of Individual Construction Responsibilities**
- **Defining Scope of Work in a CM Contract**
- **Responsibility for Coordination of the Trades**
- **The Partnering Concept**

☑ RESPONSIBILITY AND AUTHORITY

- **The Resident Project Representative and Inspectors as Members of the Construction Team**
- **Lines of Authority on Construction Projects**
- **Authority and Responsibility of the Resident Project Representative**

☑ RESIDENT PROJECT REPRESENTATIVE OFFICE RESPONSIBILITIES

- **Setting up a Field Office**
- **Equipping the Field Office**
- **Establishment of Communications**
- **Handling Job-Related Information**
- **Staffing Responsibilities**
- **Derivation of the Field Cost Indexes (FCIs)**
- **Selection of Trailer-Type Field Offices**
- **Construction Safety**
- **Development of an Inspection Plan**
- **Requests for Information (RFIs)**

☑ DOCUMENTATION: RECORDS AND REPORTS

- **Project Documentation as Evidence in Claims**
- **Files and Records**
- **Construction Progress Record**
- **Electronic Record Keeping**
- **Construction Reports**
- **Construction Diary**
- **Documentation of Dangerous Safety Hazard Warnings**
- **Labor Standards Review Records**

- **Contractor Submittals**
- **Photographic Equipment and Materials**

☑ ELECTRONIC PROJECT ADMINISTRATION

- **Web-Enabled Project Management Applications**
- **Building Information Modeling (BIM)**

☑ SPECIFICATIONS AND DRAWINGS

- **Conflicts Due to Drawings and Specifications**
- **Unenforceable Phrases**
- **CSI Specifications Format—Its Meaning and Importance**
- **Heavy Construction Engineering Specification Format**
- **Project Specifications (Project Manual) versus Special Provisions Concept**
- **Allowances and Tolerances in Specifications**

☑ USING THE SPECIFICATIONS IN CONTRACT ADMINISTRATION

- **General Conditions of the Construction Contract**
- **International Construction Contracts**
- **Differing Site Conditions**
- **Materials and Equipment**
- **The Contractor and Subcontractors**
- **Shop Drawings and Samples**
- **Technical Provisions of the Specifications**
- **Standard Specifications**
- **Master Specifications (Guide Specifications)**
- **Special Material and Product Standards**

☑ CONSTRUCTION LAWS AND LABOR RELATIONS

- **Compliance with Laws and Regulations**
- **Public versus Private Contracts**
- **Traffic Requirements during Construction**
- **Code Enforcement Agency Requirements**
- **Work within or Adjacent to Navigable Waterways**
- **Fair Subcontracting Laws**
- **The Hazardous Waste Problem**
- **Labor Relations**

☑ CONSTRUCTION SAFETY

- **OSHA and Construction Safety**
- **General Responsibility for Construction Safety**
- **Owner Participation in the Safety Program**
- **Safety Responsibility under Construction Management and Turnkey Contracts**
- **Effect of Including Contractor's Safety Obligations in the Specifications**
- **Applicability of State and Federal OSHA Provisions to a Project**
- **Special Applications**
- **Procedural Guidelines**
- **Shoring and Bracing**
- **The Competent Person**
- **Safety Requirements in Construction Contracts**

☑ PRECONSTRUCTION OPERATIONS

- **Description of Approach**

- **Constructability Analysis**
- **Advertise and Award Phase**
- **Issuance of Bidding Documents**
- **Prequalification of Bidders**
- **Bonds**
- **Liability Forms of Insurance**
- **Property Forms of Insurance**
- **Opening, Acceptance, and Documentation of Bids**
- **Development of a Quality Control or Assurance Program**
- **Inspection and Testing Manual**
- **Field Office Organization of the Owner or the Field Representative**
- **The Preconstruction Conference**
- **Study Plans and Specifications**
- **Key Dates**
- **Listing of Emergency Information**
- **Agency Permits**
- **Starting a Project**

☑ PLANNING FOR CONSTRUCTION

- **Construction Schedules as Related to Building Costs**
- **Scheduling Methods**
- **Bar Charts**
- **S-Curve Scheduling or Velocity Diagrams**
- **Line-of-Balance Charts**
- **Network Diagrams**
- **Specifying CPM for a Project**

☑ CPM SCHEDULING FOR CONSTRUCTION

- **CPM: What It Is and What It Does**
- **Basic Procedure in Setting Up a CPM Schedule**
- **Project Planning**
- **Fundamentals of CPM**
- **Who Owns Float?**
- **Precedence Formats**

☑ MEASUREMENT AND PAYMENT

- **Contracts for Construction**
- **Construction Progress Payments**
- **Approval of Payment Requests**
- **Basis for Payment Amounts**
- **Force Account**
- **Payment for Extra Work and Change Orders**
- **Payment for Mobilization Costs**
- **Partial Payments to the Contractor**
- **Retainage**
- **Liquidated Damages during Construction**
- **Standard Contract Provisions for Measurement and Payment**
- **Interpreting the Contractor's Bid**
- **Measurement for Payment**
- **Measurement Guidelines for Determination of Unit-Price Pay Quantities**
- **Final Payment to the Contractor**

☑ CONSTRUCTION MATERIALS AND WORKMANSHIP

- **Materials and Methods of Construction**
- **Requests for Substitutions of Materials**
- **Access to the Work by Quality Assurance Personnel**
- **Inspection of Materials Delivered to the Site**
- **Rejection of Faulty Material**
- **Construction Equipment and Methods**
- **Quality Level and Quality Assurance**
- **Delivery and Storage of Materials**
- **Handling of Materials**

☑ CHANGES AND EXTRA WORK

- **Contract Modifications**
- **Changes in the Work**
- **Types of Changes**
- **Elements of a Change Order**
- **Evaluating the Need**
- **Change Orders for Differing Site Conditions**
- **Starting the Change Order Process**
- **Cost of Delays Caused by Change Orders**

☑ CLAIMS AND DISPUTES

- **Five Principles of Contract Administration**
- **Construction Problems**
- **Protests**
- **Claims**
- **Claims and Disputes**

- **Differences between the Parties**
- **Home Office Overhead**
- **Scheduling Changes**
- **Constructive Changes**
- **Other Causes of Claims and Disputes**
- **Resolving Differences**
- **Preparations for Claims Defense**
- **The Use of Project Records in Litigation**
- **Order of Precedence of Contract Documents**
- **Obligations of the Contractor**
- **Alternative Methods for Dispute Resolution**
- **Arbitration or Litigation?**
- **The Mediation Process**
- **Settlement of Disputes by Arbitration**
- **Preliminary Notice of Potential Claim**

☑ PROJECT CLOSEOUT

- **Acceptance of the Work**
- **Guarantee Period**
- **Contract Time**
- **Liquidated Damages for Delay**
- **Cleanup**
- **The Punch List**
- **Preparations for Closeout**
- **Completion versus Substantial Completion**
- **Substantial Completion versus Beneficial Occupancy or Use**
- **Beneficial Use/Partial Utilization**

- **Final Payment and Waiver of Liens**
- **Stop Notice Release Bond**
- **Post Completion**

IHMD 134

Contract Claims

Duration: 35 hours

The objective of this course is to examine various aspects of evaluating claims for additional reimbursement arising from contracts for construction projects. There is no intention to produce a legal treatise or to address the issues of establishing liability for additional reimbursement. The starting point is that liability has been established or agreed and the amount of remuneration is the issue.

The approach taken is to attempt to demonstrate the process, principles and standard of analysis that will be required to produce acceptable claims for additional payment, not to produce a guide to calculating payments under any specific form of contract.

Who Should Attend?

This course is valuable for managers and professionals responsible for managing and implementing contracts.

The following major topics will be covered:

- ☑ **Identify claim components and understand the process from start to finish**
- ☑ **Select the right claim management means for your project**
- ☑ **Choose the offer that will result in the best value for the project**
- ☑ **Negotiate favorable terms and make revisions to the contract**
- ☑ **Administer contracts appropriately and know when and how to terminate before or upon completion**

☑ Course Contents

☑ Introduction

- o Risk analysis and management
- o Risks and records
- o Reimbursable risks
- o Non-reimbursable risks
- o Sources of change and disruption

☑ Establishing the base

- o Planned change
- o Unplanned change

☑ Effect of change on programs of work

- o Use of programs
- o Use of as built programs
- o Change without prolongation
- o Prolongation of the works
- o Analysis of time and delay

☑ Sources of financial information for evaluation

- o The contract provisions
- o Tender documents and information
- o Tender calculations and assumptions
- o Invoices and cost records
- o Accounting information

☑ **Evaluation of the direct consequences of change**

- Unit rates and prices
- Unit costs
- Subcontractor and supplier costs

☑ **Evaluation of the time consequences of change**

- The causal link
- Prolongation
- Disruption
- Acceleration
- Global claims
- Overheads and profit
- Formula approaches

☑ **Other sources of claims**

- Letters of intent
- Termination of employment
- Errors, omissions and contradictions
- Fluctuations in prices
- Incomplete and defective work, etc.

☑ **Minimizing the consequences of change**

- Contract preparation
- Alliance and partnering contracts
- Early warning systems
- The claims industry

IHMD 142

Construction Equipment and Productivity

Duration: 35 hours

Buildings are connected to the earth by foundation systems to achieve stability. Utilities are located underground so that they are not visible and not placed in the way of other systems.

Building sites are shaped to drain water away from the structure to a safe place. Bridges spanning rivers and valleys or tunnels through mountains provide suitable safe surfaces for travel. Refineries provide fuel for cars traveling on our highways and bridges. Dams are built to change the face of the earth, harness to change natural power, and provide an essential resource to our existence, namely water. Construction of these projects requires heavy equipment or “big iron” to assist many of the work activities. Heavy construction equipment is one of the primary reasons construction has reached this status.

Heavy construction work typically requires high-volume or high-capacity equipment. These requirements are typically driven by the large amount of work to be done and the amount of time to complete it. This work can further be classified by whether the construction is vertical or horizontal.

This course provides comprehensive knowledge to manage the construction equipments.

Who Should Attend?

This course is valuable for engineers, technicians, managers and professionals participating in managing and utilizing construction equipments.

The following major topics will be covered:

- ☑ Select the appropriate construction equipments
- ☑ Quantify the productivity and estimates of equipments
- ☑ Compare different alternatives for construction optimization
- ☑ Acquire the required knowledge for earthmoving and lifting equipments
- ☑ Schedule the equipment task in a professional rational manner
- ☑ Make the necessary safety and security precautions

☑ Course Contents

☑ Cost of Owning and Operating Construction Equipment

- Ownership Cost
- Initial Cost
- Depreciation
- Investment (or Interest) Cost
- Insurance Tax and Storage Costs
- Total Ownership Cost
- Cost of Operating Construction Equipment
- Methods of Calculating Ownership and Operating Cost

☑ Equipment Life and Replacement Procedures

- Equipment Life
- Physical Life
- Profit Life
- Economic Life

- **Replacement Analysis**
- **Replacement Equipment Selection**

☑ **Earthmoving, Excavating, and Lifting Equipment Selection**

- **Basic Considerations for Equipment Selection**
- **Earthmoving and Excavating Considerations**
- **Tracks and Tires**
- **Buckets and Blades**
- **Earthmoving and Excavating Work**
- **Earthmoving Equipment Selection**
- **Bulldozers**
- **Front-End Loaders**
- **Motor Graders**
- **Scrapers**
- **Trucks**
- **Excavating Equipment Selection**
- **Excavators**
- **Backhoes**
- **Front Shovels**
- **Lifting Considerations**
- **Lifting Equipment Selection**
- **Cranes**
- **Forklifts**
- **Personnel Lifts**

☑ **Advanced Methods in Estimating and Optimizing Construction Equipment System**

- **Productivity**
- **Cycle Time and Optimum Number of Units**
- **Phelps' Method**
- **Optimizing the Hauling System Based on Loading Facility Characteristics**
- **Comments on Optimizing Equipment Fleets**

☑ **Stochastic Methods for Estimating Productivity**

- **Developing Mathematical Models**
- **Probability Theory**
- **Statistical Analysis**
- **Historical Data**
- **Simulations**
- **Monte Carlo Simulation Theory**
- **Other Simulations**
- **Expected Production**
- **Cost Estimating Factors**
- **Production Management Factors**
- **Validating Simulation Models**
- **Verifying Assumptions and Inputs**
- **Sensitivity Analysis**

☑ **Scheduling Equipment-Intensive Horizontal Construction Projects**

- **Precedence Diagramming Method**
- **Determining the Critical Path**
- **Critical Resource Identification**
- **Resource Loading the Schedule**

- **Cost Loading the Schedule**
- **Linear Scheduling Method**
- **Developing Equipment Resource Packages (Crews)**
- **Rules for Developing Crew Sizes**
- **Developing Crew Costs**
- **Establishing Project Management Assessment Parameters**

☑ **Scheduling Lifting Equipment for Vertical Construction**

- **Lifting and Vertical Constructions**
- **Lifting Productivity**
- **Scheduling Lifting for High-Rise Work**
- **Concrete-Placing Cranes**
- **Bucket Pouring**
- **Pumping**
- **Scheduling and Ordering Concrete**
- **Tower Crane Erection and Dismantling**

☑ **The Buy, Lease, or Rent Decision**

- **Acquiring Heavy Equipment**
- **Financing Methods**
- **Outright Cash Purchase**
- **Conventional Financing Purchase**
- **Leasing**
- **Renting**
- **Rent-to-Own (Rental Purchase)**
- **Equipment Financing Comparison**
- **Acquisition Comparison**

- **Rental and Lease Contract Considerations**
- **The Buy, Lease, or Rent Decision**

☑ **Construction Equipment Maintenance**

- **Need for a Maintenance Program**
- **Types of Maintenance Programs**
- **Designing the Maintenance Program**
- **Define Objectives and Goals**
- **Establish Responsibility and Authority**
- **Actions and Controls**
- **Preventive and Predictive Maintenance Management**
- **Maintenance Performance Control**
- **Maintenance Labor Productivity Control**
- **Preventive Maintenance Programs**
- **Field Maintenance**

☑ **Construction Equipment Site Safety**

- **Safety as a Profit Center**
- **The Job Safety Plan**
- **Heavy Construction Equipment Site Safety Considerations**
- **A Job Safety Analysis for Earthmoving**
- **Lifting Safety**
- **OSHA Accident Reporting and Record Keeping**
- **Reporting**
- **Record Keeping**
- **Safety Requirements for Construction Equipment**

☑ Construction Equipment Security

- **Security Issues**
- **Theft and Vandalism**
- **Security Programs**
- **Insurance**

☑ Inventory Procedures and Practices

- **Objectives of Inventory Control**
- **Equipment and Parts Identification**
- **Equipment Identification**
- **Parts Identification**
- **Inventory Record Keeping and Management Systems**
- **Paper-Based Record Keeping**
- **Electronic Record Keeping**
- **Equipment Location and Utilization**
- **Geographic Information System Applications**
- **Global Positioning System Equipment Fleet Management Systems**
- **Comparing GPS Systems**

IHMD 144

Construction Management

Duration: 35 hours

A unique situation in construction is that we are spread out across a region on jobsites. Unlike a business with all of their employees in one building, regular one-on-one contact and coaching from the more experienced executives to the younger people is just not geographically possible.

In this industry, a format for knowledge gained by younger people simply by being in the presence of more experienced people is lacking. Secondly, this industry runs at a much faster and more frantic pace than a run-of-the-mill industry, leaving little time in the day for experienced executives to coach, or just sit down and talk to, the younger generation and future leaders of our industry.

This course is quite unique in that it concentrates on the nuts and bolts of a construction project by use of countless real-life examples, rather than on the basic philosophies and concepts of a construction project as most books tend to do.

Whether you are a young project engineer or an experienced vice president, we truly hope this course provides a boost to your career development and wish you the very best in furthering your exciting career in construction.

Who Should Attend?

This course is valuable for engineers, technicians, managers and professionals participating in managing construction projects.

☑ Course Contents

☑ Module One

- Demolition
- Scope of Work Issues Related to Demolition
- Shoring and Underpinning
- Coordination with the Waterproofing System
- Procuring the Shoring Piles
- Mass Excavation and Site Grading
- Dewatering

☑ Module Two

- Below-Grade Waterproofing
- Reinforcing Steel
- Formwork
- Concrete Placing and Finishing
- Shotcrete

☑ Module Three

- Structural Steel
- Metal Decking
- Miscellaneous Metals
- Expansion Joint Covers
- Spray-Applied Fireproofing

☑ Module Four

- **Above-Grade Waterproofing**
- **Lath and Plaster**
- **Precast Concrete**
- **Masonry**
- **Metal Panels**
- **Roofing**
- **Flashing and Louvers**
- **Glass and Glazing**
- **Caulking and Sealants**

☑ Module Five

- **Framing and Drywall**
- **Building Insulation and Fire Safing**
- **Doors, Frames, and Hardware**
- **Coiling Doors and Grilles**
- **Casework and Millwork**
- **Painting and Wall Coverings**
- **Ceramic Tile and Stone Flooring**
- **Terrazzo and Epoxy Flooring**
- **Acoustical Treatment**
- **Carpeting and Resilient Flooring**
- **Wood Flooring**

☑ Module Six

- **Miscellaneous Specialty Work**
- **Toilet Partitions and Accessories**
- **Trash Chutes**

- **Fire Protection Specialties**
- **Residential Appliances**
- **Manufactured Natural Gas Fireplace Units**
- **Loading Dock Levelers and Equipment**
- **Metal Lockers**
- **Projection Screens**
- **Operable Partitions**
- **Roof Hatches and Prefabricated Skylights**
- **Signage**
- **Window Treatments**
- **Marker, Chalk, and Tack Boards**
- **Corner and Wall Guards**
- **Postal Specialties**
- **Recessed Floor Mats**
- **Flagpoles**
- **Payphones and Enclosures**
- **Food Service Equipment**
- **Elevators**

☑ **Module Seven**

- **Plumbing**
- **Fire Sprinklers**
- **Mechanical (HVAC)**
- **Electrical**
- **Fire Alarm**
- **Telecommunications**

☑ Module Eight

- **Site Utilities**
- **Asphaltic-Concrete Paving**
- **Site Concrete**
- **Chain Link Fencing**
- **Landscaping and Irrigation**

☑ Module Nine

- **Subcontractor Scope Issues**
- **Common Subcontractor Scope Issues**
- **General Contractor Responsibilities**
- **Ethics**

IHMD 152

Engineering Economy

Duration: 35 hours

As a project manager, you must be able to work effectively with finance managers, purchasing professionals, accounting managers, and subcontractors to accomplish key objectives. Because projects are developed in an increasingly complex economy, including the variable rates of contracted supplies and services throughout government and industry, a solid understanding of the economics is critical, and can give you an advantage whether you are on the buyer's or seller's side.

Gain an overview of all phases of economy, from requirements development to closeout. See how incentives can be used to improve benefit-cost results. This course explores these vital issues from the project manager's perspective, highlighting your roles and responsibilities to give you greater influence over how work is evaluated. You will also discuss actions that can be taken to help ensure that project is performing as required.

Who Should Attend?

This course is valuable for managers and professionals participating in managing and implementing contracts.

The following major topics will be covered:

- ☑ **Use time value of money concept**
- ☑ **Evaluate different alternatives**

☑ **Evaluate different method of payments and receivables**

☑ **Consider inflation rate in the project evaluation**

☑ **Include depreciation of properties in the project metrics**

☑ **Calculate tax impact on project economic metrics**

☑ Course Contents

☑ Foundations of Engineering Economy

- What is Engineering Economy?
- Interest Rate, Rate of Return, and MARR
- Equivalence
- Cash Flows: Their Estimation and Diagramming

☑ Factors: How Time and Interest Affect Money

- Single-Payment Formulas
- Uniform Series Formulas
- Gradient Formulas
- Calculations for Cash Flows that Are Shifted
- Using Spreadsheets for Equivalency Computations

☑ Nominal and Effective Interest Rates

- Nominal and Effective Interest Rate Statements
- Effective Interest Rate Formulation
- Reconciling Compounding Periods and Payment Periods
- Equivalence Calculations Involving Only Single-Amount Factors
- Equivalence Calculations Involving Series

☑ Present Worth Analysis

- Present Worth Analysis of Equal-Life Alternatives
- Present Worth Analysis of Different-Life Alternatives
- Capitalized Cost Analysis
- Evaluation of Independent Projects

☑ Annual Worth Analysis

- Evaluating Alternatives Based on Annual Worth
- AW of a Permanent Investment

☑ Rate of Return Analysis

- ROR Calculation
- Understanding Incremental ROR Analysis
- ROR Evaluation of Two or More Mutually Exclusive Alternatives

☑ Benefit/Cost Analysis and Public Sector Projects

- Benefit/Cost Analysis of a Single Project
- Incremental B/C Evaluation of Two or More Alternatives

☑ Breakeven, Sensitivity, and Payback Analysis

- Breakeven Analysis for a Single Project
- Breakeven Analysis between Two Alternatives
- Sensitivity Analysis for Variation in Estimates
- Sensitivity Analysis of Multiple Parameters for Multiple Alternatives
- Payback Period Analysis

☑ Effects of Inflation

- Understanding the Impact of Inflation
- PW Calculations Adjusted for Inflation
- FW Calculations Adjusted for Inflation
- AW Calculations Adjusted for Inflation

☑ Depreciation Methods

- Straight Line (SL) Depreciation
- Declining Balance Depreciation
- Modified Accelerated Cost Recovery System (MACRS)
- Switching Between Classical Methods; Relation to MACRS Rates
- Depletion Methods

☑ After-Tax Economic Analysis

- Income Tax Terminology and Relations
- Before-Tax and After-Tax Alternative Evaluation
- How Depreciation Can Affect an After-Tax Study
- After-Tax Replacement Study
- Capital Funds and the Cost of Capital
- After-Tax Value-Added Analysis

IHMD 154

Accounting & Financial Management for Construction Projects

Duration: 35 hours

This course is prepared to help construction professionals—both those who are working in the construction industry and those seeking a degree in construction management—learn how the principles of financial management can be adapted to and used in the management of construction companies. This course will be most useful for general managers and owners of companies who are responsible for managing the finances of the entire company; however, many of these principles are useful to project managers and superintendents. For the project manager or superintendent who desires to stand out in a company, there is no better way than to improve the profitability of their project through the principles of sound financial management. The book also discusses how owners and general managers can manage construction projects by sound management of their project managers, superintendents, and crew foreperson.

This course explains common financial principles, demonstrating how these principles may be applied to a construction situation and how these principles affect the financial performance of a company.

Who Should Attend?

This course is valuable for managers and professionals responsible for managing and implementing contracts.

The following major topics will be covered:

- ☑ **Identify cost components and understand the process from start to finish**
- ☑ **Select the right means to manage for your project**
- ☑ **Choose the offer that will result in the best value for the project**
- ☑ **Understand favorable terms and make revisions to the accounting and financing aspects**
- ☑ **Administer contracts appropriately and know when and how to terminate before or upon completion**
- ☑ **Control cost and profit to minimize effort and waste in administrative work in the project**

Course Contents

☑ **CONSTRUCTION FINANCIAL MANAGEMENT**

- o What Is Financial Management?
- o Why Is Construction Financial Management Different?
- o Decentralized Production
- o Payment Terms
- o Heavy Use of Subcontractors
- o What Does a Financial Manager Do?
- o Accounting for Financial Resources
- o Managing Costs and Profits
- o Managing Cash Flows
- o Choosing among Financial Alternatives

☑ **CONSTRUCTION ACCOUNTING SYSTEMS**

- o Cost Reporting versus Cost Control
- o The General Ledger
- o Method of Accounting

- Cash
- Accrual
- Percentage of Completion
- Completed Contract
- The Balance Sheet
- Assets
- Liabilities
- Owner's Equity
- The Income Statement
- Revenues
- Construction Costs
- Equipment Costs
- Overhead
- Other Income and Expenses
- Income Tax
- The Job Cost Ledger
- The Equipment Ledger

☑ ACCOUNTING TRANSACTIONS

- Invoice Charged to a Job without Retention
- Invoice Charged to a Job with Retention
- Paying Invoices
- Labor Charged to a Job
- Labor Charged to General Overhead
- Paying an Employee's Wages
- Paying Payroll Taxes
- Paying for Benefits
- Vacation Time for Jobsite Employees

- Recording Office Rent
- Recording Office Depreciation
- Recording General Overhead Invoices
- Billing a Client
- Billing for Retention
- Receiving Payment from a Client
- Purchase of Equipment with a Loan
- Loan Payment
- Equipment Depreciation
- Leased Equipment with an Operating Lease
- Leased Equipment with a Capital Lease
- Lease Payments on a Capital Lease
- Amortization of a Capital Lease
- Invoice for Equipment Repairs
- Equipment Charged to a Job
- Equipment Charged to an Employee
- Sale of Equipment
- Purchase of Inventory

☑ DEPRECIATION

- Straight-Line Method
- Sum-of-the-Years Method
- Declining-Balance Method
- MACRS
- Placing in Service and Disposing of an Asset

☑ ANALYSIS OF FINANCIAL STATEMENTS

- Depreciation and Financial Analysis

- Quick Ratio
- Current Ratio
- Current Liabilities to Net Worth Ratio
- Debt to Equity Ratio
- Fixed Assets to Net Worth Ratio
- Current Assets to Total Assets Ratio
- Collection Period
- Average Age of Accounts Payable
- Assets to Revenues Ratio
- Working Capital Turns
- Accounts Payable to Revenues Ratio
- Gross Profit Margin
- General Overhead Ratio
- Profit Margin
- Return on Assets
- Return on Equity
- Degree of Fixed Asset Newness

☑ MANAGING COSTS

- Monitoring and Controlling Construction Costs
- Material Purchases
- Labor
- Subcontracts
- Equipment
- Other
- Monitoring and Controlling General Overhead Costs
- Monitoring Job Profitability
- Cost-Loaded Schedule

- Schedule Performance Index
- Cost Performance Index
- Target Levels for CPI and SPI
- Project Closeout Audit

☑ DETERMINING LABOR BURDEN

- Cash Equivalents and Allowances
- Payroll Taxes
- Workers' Compensation Insurance
- General Liability Insurance
- Retirement
- Other Benefits

☑ MANAGING GENERAL OVERHEAD COSTS

- What Is General Overhead?
- The General Overhead Budget
- Items to Include in the General Overhead Budget
- Estimating General Overhead
- Types of Costs

☑ SETTING PROFIT MARGINS FOR BIDDING

- The Profit Equation
- Contribution Margin
- Projecting Break-Even Volume of Work
- Projecting Break-Even Contribution Margin Ratio
- Adjusting the Financial Mix
- Profit and Overhead Markup

☑ PROFIT CENTER ANALYSIS

- Allocation of General Overhead
- Profit Center Analysis
- Crews as Profit Centers
- Project Management as Profit Centers
- Estimators as Profit Centers
- Types of Jobs as Profit Centers
- Customers as Profit Centers
- Equipment as Profit Centers

IHMD 212

Certified Cost Professional (CCP) Exam Preparation Course

Duration: 35 hours

Cost Engineering is defined as the area of cost/management practice where judgment and experience are used in the application of scientific principles and techniques to problems of cost estimating, cost control, business planning and management science, profitability analysis, project management, planning and scheduling

The purpose of any professional certification or licensing program is to provide official and public recognition of the capabilities of an individual in a professional area. Certification is not licensing or registration and does not provide legal authority to practice a profession.

Certification indicates demonstrable expertise in the most current skills and knowledge of the profession. Individuals designated as Certified Cost Professionals (CCP) are recognized as having capabilities detailed within the definition of cost engineering. Certification in these areas is rapidly becoming the industry standard.

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction projects

OBJECTIVES

1. To raise professional standards and improve the practice of cost engineering by giving special recognition by their peers to those who, in fulfilling prescribed standards of performance and conduct, have demonstrated and maintained a high level of competence and ethical practices.
2. To identify for employers, clients, and the public, persons with a broad knowledge of cost engineering, and the capability to professionally apply the principles of total cost management.
3. To establish a program with the goal of continuous improvement of individual cost engineering skills and professional development.

4. To clarify the skills and knowledge and standards of conduct for the practice of cost engineering.

Course outline

☑ Cost

- Cost Elements
- Pricing
- Materials,
  - Labor
  - Engineering
  - Equipments, parts and tools
- Economic Costs
- Activity-Based Cost Management

☑ Cost Estimating

- Estimating
- Process Product Manufacturing
- Discrete Product Manufacturing

☑ Planning and Scheduling

- Planning
- Scheduling

☑ Progress and Cost Control

- Progress Measurement and Earned Value
- Earned Value for Variable Budgets
- Tracking Cost and Schedule Performance
- Performance and Productivity Management

☑ Project Management

- Project Management Fundamentals
- Project Organization Structure
- Project Planning
- Project Labor Cost Control
- Leadership and Management of Project People
- Quality Management
- Value Analysis
- Contracting for Capital Projects
- Strategic Asset Management

☑ Economic Analysis

- Basic Engineering Economics
- Applied Engineering Economics

☑ Statistics, Probability and Risk

- Statistics & Probability
- Basic Concepts in Descriptive Statistics
- Risk Management

☑ Exam tips

☑ Paper preparation

IHMD 214

Planning & Scheduling Professional (PSP) Exam Preparation Course

Duration: 35 hours

The PSP Certification course should be a beneficial and useful for all planning and scheduling professionals. It primarily serves the needs of planning and scheduling professionals who are preparing to take AACE International's PSP certification examination. This course is intentionally concise and does not probe deeply into any subject, yet it broadly touches upon all topics within the required skills and knowledge of a planning and scheduling professional. Much of the information contained in this PSP course parallels and amplifies information presented in Skills and Knowledge of Cost Engineering and the CCC/CCE Certification Study Guide. They also include sample problems related to the subject matter.

The PSP Certification course incorporates terms and phrases that are generic to the profession, and some are specific to AACE International. Terms and phrases used in industry and technical software may not always agree precisely with one's previous understanding, or how the terms are used in a specific organization or industry. One should consult the list of terms found in Appendix C and the terminology definitions in the latest edition of AACE International Recommended Practice 10S-90, Cost Engineering Terminology, to learn the definitions as applied in the exam. AACE International's Recommended Practices can be obtained from AACE International's web site at www.aacei.org.

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction projects

OBJECTIVES

1 To raise professional standards and improve the practice of cost estimating by giving special recognition by their peers to those who, in fulfilling prescribed standards of performance and conduct, have

demonstrated and maintained a high level of competence and ethical practices.

2 To identify for employers, clients, and the public, persons with a broad knowledge of cost estimating, and the capability to professionally apply the principles of cost estimating.

3 To establish a program with the goal of continuous improvement of individual cost estimating skills and professional development.

4 To clarify the skills and knowledge and standards of conduct for the practice of cost estimating.

Course outline

☑ PLANNING

- Planning Development
- Input and Data
  - Contract Requirements
  - Identification of Stakeholders
  - Constructability Methods
- Considerations and Constraints
  - Identification of Resources
  - Value Engineering
  - Stakeholder Considerations
  - Project Variables
- Planning Product
- Planning Output and Deliverables
  - Define Scope of Work
  - Define Project Goals
  - Define Project Plan
  - Phase Definition

- Establish Work Breakdown Structure (WBS
- Establish Organizational Breakdown Structure (OBS)
- Cost Breakdown Structure (CBS
- Sequencing and Phase Relationships
- Review by Stakeholders
- Cost Estimate Development
- Baseline Plan
- Periodic Forecasts
- Risk and Recovery Plan

☑ SCHEDULING

- Schedule Development
- Input and Data (from Planning
  - Define Schedule Scope
  - Breakdown Structures (WBS/OBS/CBS)
  - Schedule Specification
  - Feedback from Stakeholders
  - Cost Estimate Model
- Creating Schedule
  - Types of Schedules
  - Activities
  - Durations
  - Relationships
  - Constraints and Calendars
  - Cost/Resource Loading
  - Milestones
  - Schedule Quality Analysis and Compliance Review
  - Schedule Basis Documentation

- Schedule Maintenance/Controlling
- Maintain Schedule
  - Baseline Schedule
  - Tracking Schedule Progress
  - Cost and Resource Management
  - Schedule Change Management
  - Acceleration
  - Schedule Maintenance Feedback
- Schedule Output and Deliverables
  - Control Level Schedules
  - Variances and Trends
  - Schedule Analysis
  - Schedule Forecasts
  - Constructability Review
  - Progress Reports and Reviews
  - Recovery Schedules
  - Management Summary

IHMD 216

Certified Estimating Professional (CEP) Exam Preparation Course

Duration: 35 hours

The AACE® International *Certified Estimating Professional™ (CEP™)* is being developed to accomplish two purposes similar to that of the AACE® International *CCP™ Certification*. First, it is intended to aid aspiring candidates for the certification by summarizing the fields of study recommended for preparation for the certification examination.

Second, the intent of the *Certified Estimating Professional Certification* is to assemble and summarize various topics considered essential for the Certified Estimating Professional's (CEP) knowledge, Required Skills and Knowledge of Cost Engineering, and included in the current edition of AACE International's *Skills and Knowledge of Cost Engineering*.

This course will serve the needs of estimating professionals who prepare to take the AACE International CEP certification examination. This course is organized in a concise and easy to follow format, and covers the major skills and knowledge used by a Certified Estimating Professional.

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction projects

OBJECTIVES

5 To raise professional standards and improve the practice of cost estimating by giving special recognition by their peers to those who, in fulfilling prescribed standards of performance and conduct, have demonstrated and maintained a high level of competence and ethical practices.

6 To identify for employers, clients, and the public, persons with a broad knowledge of cost estimating, and the capability to professionally apply the principles of cost estimating.

7 To establish a program with the goal of continuous improvement of individual cost estimating skills and professional development.

8 To clarify the skills and knowledge and standards of conduct for the practice of cost estimating.

Course outline

☑ Supporting Skills and Knowledge
- o Introduction: The Role of the Cost Estimator
- o Elements of Cost
- o Elements of Analysis
- o Enabling Knowledge

☑ Cost Estimating Skills and Knowledge
- o General Estimating Concepts
  - Cost Estimating Terminology
  - Cost Estimate Classifications
  - Estimate Variability
  - Estimating Algorithms
  - Codes of Accounts
  - Historical Cost Data
  - Internationalization
- o Estimating Processes and Practices
  - Planning the Estimate
  - Estimating Methodologies
  - Quantification
  - Costing

- Pricing
- Conditioning
- Risk Evaluation and Contingency Determination
- Estimate Documentation
- Estimate Reconciliation
- Estimate Review and Validation
- Estimate Reporting
- Estimate Closeout
- Building Information Modeling (BIM)

o Other Estimating Issues

- Bidding
- Budgeting
- Project and Lifecycle Costing
- Project and Product Costs
- Integrated Project Delivery

IHMD 222

Project Management Professional (PMP)

Duration: 35 hours

The bottom line is project management is about applying specific principles to bring in projects on time, within budget and to specifications. As a result, the key objective of this course is to master planning tools, management techniques and people skills that will ensure project success.

At the end of the course, participants will be able to do the following:

- Define what do we mean by, a project, a program, project management & portfolio management and stakeholders
- Understand and demonstrate each of the following:
  - General management skills such as: planning, organizing, staffing, executing, and controlling
  - The difference between management and leadership
  - The organizational influences on project management
  - The project management process groups
  - Project scope management

Who Should Attend?

This course is valuable for engineers, managers and professionals participating in managing construction projects

Course outline

- ☑ **Introduction to Projects**
- ☑ **Project Management Framework**

- Definitions
- Project Management Context
- Organizational Influences on Project Management

☑ **Project Management Skills**

- Project Management Knowledge Competency
- Project Management Performance Competency
- Personal Competency

☑ **Project Life Cycle & Product Life Cycle**

☑ **Program Management & Portfolio Management**

☑ **Project Management Process Groups**

- Initiation Process Group
- Planning Process Group
- Executing Process Group
- Monitoring & Controlling Process Group
- Closing Process Group

☑ **Role of the Project Manager and the Project Management Team in Initiating, Planning, Executing, Monitoring & Controlling and Closing the Project**

☑ **Project Scope management**

- Plan Scope Management
- Collect Requirements
- Define Scope
- Create WBS
- Validate Scope
- Control Scope

☑ **Project time Management**

- Plan Schedule Management

- Define Activities
- Sequence Activities
- Estimate Activity Resources
- Estimate Activity Durations
- Develop Schedule
- Control Schedule

☑ **Project cost management**

- Plan Cost Management
- Estimate Costs
- Determine Budget
- Control Costs

☑ **Project quality management**

- Plan quality management
- Perform quality assurance
- Control quality

☑ **Project human resources management**

- Plan human resource management
- Acquire project team
- Develop project team
- Manage project team

☑ **Project communication management**

- Plan communication management
- Manage communication
- Control communication

☑ **Project risk management**

- Plan risk management
- Identify risk
- Perform qualitative risk analysis
- Perform quantitative risk analysis
- Plan risk response
- Control risk

☑ **Project procurement management**

- Plan procurement management
- Conduct procurement
- Control procurement
- Close procurement

☑ **Project stakeholder management**

- Identify stakeholders
- Plan stakeholder management
- Manage stakeholder engagement
- Control stakeholder engagement

IHMD 224

Risk Management Professional (RMP)

Duration: 35 hours

All projects involve risk. To quantify and manage risks, you need to thoroughly analyze risk before and during a project. Aligned with the PMI Risk Management Professional (PMI-RMP)® certification, this course provides the skills to identify and measure risks in project development and implementation.

You learn to quantify risks and create risk response strategies to deliver projects that meet stakeholder expectations.

OBJECTIVES

- Manage project risk effectively to deliver successful projects that meet stakeholder needs.
- Apply customizable, industry-robust templates to create a Risk Management Plan and Risk Register
- Leverage a proven qualitative risk analysis process to identify risk exposure.
- Translate risk into actual time and cost impact using proven quantitative risk analysis tools.
- Utilize a tested technique to design your risk response strategies.
- Monitor risk triggers to control uncertainties and maximize project payoff.

Who Should Attend?

Project managers, directors, sponsors and anyone who has a stake in seeing a project through to its successful completion.

Course outline

- ☑ **Overview of Project Management – Project Risk Management Interface**
- ☑ **Overview of Project Risk Management**
  - Recognizing risk in all projects
  - Using risk management best practices, tools and techniques to achieve project success
- ☑ **Designing Critical Platforms for Success**
  - Creating a Risk Management Plan (RMP)
  - Analyzing contents of a model RMP
  - Applying a standard template to create your RMP
  - Identifying project risk
  - Common sources of project risk
  - Creating Ishikawa diagrams to analyze cause and effect relationships
  - Utilizing checklists
  - Assessing high-level risks to the organization
  - Developing a Risk Register
  - Analyzing contents of a model Risk Register
  - Applying a proven template to create your Risk Register
  - Communicating risks to stakeholders
  - Documenting risks for future assessment
- ☑ **Improving Project Performance through Qualitative Analysis**
  - Analyzing risks through qualitative measures
  - Performing probability and impact analyses of identified risk
  - Applying the probability and impact matrix

- Advanced applications of qualitative analysis
- Prioritizing analysis results
- Ranking project risks
- Differentiating between acceptable and unacceptable risks

☑ **Analyzing Risks Using Quantitative Methods**

- Quantifying effects of risk events on the project
- Determining probability of achieving cost and time objectives
- Calculating contingency reserves
- Identifying trends in quantitative analysis
- Ranking risks by actuarial cost
- Tools for analysis
- Expected Monetary Value (EMV)
- Three-point estimates
- Probability distributions
- Delphi Technique
- Simulation

☑ **Risk Response Planning**

- Implementing risk response strategies
- Accept
- Avoid
- Transfer
- Mitigate
- Exploit
- Share
- Enhance
- Quantifying residual risks and secondary responses
- Creating contingency plans

- Determining the worst-case scenario
- Recalculating confidence levels
- Finalizing risk budget
- Applying a process to risk response planning

☑ Making Decisions under Uncertainty

- Psychological factors in decision making
- Practical applications of Prospect Theory
- Recognizing bias with Utility Theory
- Tools to enhance objectivity
- Maximizing returns through the use of payoff tables
- Applying decision trees with Precision Tree software
- Dealing with unknown risks using workarounds

☑ Monitoring and Controlling Risk

- Identifying emerging project risks
- Matching identified project risk with controls including Risk Audit, Variance Reports, Reserve Analysis
- Anticipating risk events through risk triggers
- Measuring risk using earned value analysis (EVA)
- Ensuring effective change control
- Developing a reliable change request process
- Recommending corrective action

☑ Leveraging Project Experience

- Creating an end-of-project risk report
- Compiling lessons learned in a risk database
- Recognizing the value of mistakes
- Ensuring continual process improvement