# Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

## CM1: Construction Project Delivery Systems

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | Learning Objectives:  
      | Understand the Construction Industry  
      | Classify Different Types of Construction  
      | Define a Construction Project and its Attributes  
      | Supplementary Reading: Construction Project Types Handout  
      | Homework: HW #1 |
| 02   | Learning Objectives:  
      | Understand the Construction Project Life Cycle  
      | Differentiate Project Participants and their Roles  
      | Understand the Project Acquisition Process  
      | Understand the Elements of a Construction Contract  
      | Supplementary Reading: Project Life Cycle  
      | Homework: HW #2 |
| 03   | Learning Objectives:  
      | Define a Project Delivery System  
      | Understand Different Project Delivery Methods  
      | Design – Bid – Build  
      | Pure Construction Management  
      | Construction Management @ Risk  
      | Discuss Advantages and Disadvantages of Each Delivery Method  
      | Supplementary Reading: Traditional Project Delivery Systems  
      | Homework: HW #3 |
| 04   | Learning Objectives:  
      | Design – Build  
      | Integrated Project Delivery  
      | Discuss Advantages and Disadvantages of Each Delivery Method  
      | Supplementary Reading: Contemporary Project Delivery Systems  
      | Homework: HW #4 |
| 05   | Learning Objectives:  
      | Understand Different Project Financial Contract Types  
      | Lump sum or Fixed Price  
      | Unit Price  
      | Cost Plus Percentage and Cost Plus Fixed Fee  
      | Guaranteed Maximum Price  
      | Supplementary Reading: Financial Contract Types  
      | Homework: HW #5 |
| 06   | Learning Objectives:  
      | Understand Different Project Procurement Methods  
      | Competitive Bidding  
      | Negotiated  
      | Best Value  
      | Supplementary Reading: Construction Project Procurement Method  
      | Comprehensive Final Exam |
# Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

## CM2: Financial Accounting for Construction Projects

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | Learning Objectives:  
      |   Introduction to Construction Industry and Course Module  
      |   Preparing and Analyzing Financial Statements  
      |   Supplementary Reading: Financial Accounting Handout  
      |   Homework: HW #1 Preparation of Financial Statements |
| 02   | Learning Objectives:  
      |   Generally Accepted Accounting Principles (GAAP)  
      |   Financial Transactions in Construction  
      |   Supplementary Reading: GAAP Handout  
      |   Homework: HW #2 Detailed Analysis of Income Statement |
| 03   | Learning Objectives:  
      |   Representing Partial Completion In Construction Projects  
      |   Measurement of Construction Project Revenue and Expense  
      |   Supplementary Reading: Construction Revenue and Expense Handout  
      |   Homework: HW #3 Revenue and Expense Accounts |
| 04   | Learning Objectives:  
      |   Measuring Financial Status of a Construction Project  
      |   The Percentage of Completion Method  
      |   Supplementary Reading: Project Financial Status Handout  
      |   Homework: HW #4 Construction Project Financial Status |
| 05   | Learning Objectives:  
      |   Measures of Progress for Construction Projects  
      |   Summary of Course Module  
      |   Supplementary Reading: Measures of Progress Handout  
      |   Comprehensive Final Exam |
# Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

## CM3: Construction Project Planning, Scheduling, and Control

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | Learning Objectives:  
|      | Introduction to Planning, Scheduling and Control  
|      | Purposes and Importance  
|      | Supplementary Reading: Planning and scheduling handout  
|      | Homework: HW #1 Preparation of planning and scheduling  
| 02   | Learning Objectives:  
|      | Network Scheduling Techniques  
|      | Critical Path and Float  
|      | Supplementary Reading: Critical Path Method Handout  
|      | Homework: HW #2 Creating of Network Diagram  
| 03   | Learning Objective:  
|      | Resource Loaded Schedule  
|      | Supplementary Reading: Resource Leveling Handout  
|      | Homework: HW #3 Resource Leveling  
| 04   | Learning Objective:  
|      | Time-Cost Tradeoffs  
|      | Supplementary Reading: Time-Cost Tradeoff Handout  
|      | Homework: HW #4 Construction Project Financial Status  
| 05   | Learning Objectives:  
|      | Measures of Construction Project Progress  
|      | Earned Value Analysis  
|      | Supplementary Reading: Earned Value Analysis Handout  
|      | Comprehensive Final Exam  

Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

CM4: Construction Equipment and Methods

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | **Learning Objectives:**  
|      | Introduction to Construction Equipment and Course Module  
|      | Understanding Construction Equipment Types  
|      | Supplementary Reading: Equipment Types and Characteristics Handout  
|      | Homework: HW #1 Selection of Earthwork Equipment |
| 02   | **Learning Objectives:**  
|      | Fundamentals of Site Clearing and Finishing  
|      | Engineering Principles of Dozers and Graders  
|      | Supplementary Reading: Earthmoving Equipment Handout  
|      | Homework: HW #2 Earthwork Production Estimation |
| 03   | **Learning Objectives:**  
|      | Fundamentals of Greenfield and Brownfield Excavation  
|      | Engineering Principles of Excavators and Haulers  
|      | Supplementary Reading: Excavation Safety Handout  
|      | Homework: HW #3 Excavator Production Factors |
| 04   | **Learning Objectives:**  
|      | Introduction to Mobile and Tower Cranes  
|      | Understanding Load Charts  
|      | Supplementary Reading: Cranes and Lifting Devices Handout  
|      | Homework: HW #4 Crane Capacity and Working Range |
| 05   | **Learning Objectives:**  
|      | Economics of Construction Equipment  
|      | Summary of Course Module  
|      | Supplementary Reading: Equipment Economics Handout  
|      | Comprehensive Final Exam |
# Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

## CM5: Construction Safety and Human Factors

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | Learning Objectives:  
Introduction to Construction Safety and Health  
Fatalities and Non-Fatal Injury Statistics  
Definitions on Safety and Health Terms  
Supplementary Reading: Accident Statistics handout  
Homework: HW #1 Terms on Safety and Health |
| 02   | Learning Objective:  
Key OSHA Guidelines and Reporting  
Supplementary Reading: OSHA Recordkeeping Handout  
Homework: HW #2 Reporting Examples |
| 03   | Learning Objective:  
Measures of Safety Performances  
Supplementary Reading: Safety Performance Handout  
Homework: HW #3 Cross Comparison of Safety Performance |
| 04   | Learning Objective:  
Characteristics of Ergonomic Injuries in Construction  
Measurement of Ergonomic Risks  
Supplementary Reading: Ergonomic Risk Handout  
Homework: HW #4 Identifying Ergonomic Risks |
| 05   | Learning Objectives:  
Reduction and Prevention of Ergonomic Injuries  
Engineering, Administrative and Education Solutions  
Supplementary Reading: Ergonomic Program Handout  
Comprehensive Final Exam |
# Master Track Certificate (MTC) in Construction Engineering and Management (CEM)

## CM6: Sustainable Construction Practices

<table>
<thead>
<tr>
<th>WEEK</th>
<th>ACTIVITY</th>
</tr>
</thead>
</table>
| 01   | Learning Objectives:  
Energy and Efficiency  
Water  
Reduced Human Health  
Construction and Demolition Waste  
Development Patterns  
  
Supplementary Reading: Need for Sustainable Construction Practices  
  
Homework: HW #1 | |
| 02   | Learning Objectives:  
Sustainability Concepts and Definitions  
Principles and Fundamental Concepts  
Life cycle Phases  
Effect on Resources  
  
Supplementary Reading: Sustainable Construction Framework  
  
Homework: HW #2 | |
| 03   | Learning Objectives:  
Review Time Value of Money Concepts  
Life Cycle Cost Analysis Framework  
Life Cycle Cost Analysis Usefulness for Environmental Decision Making  
  
Supplementary Reading: Life Cycle Cost Analysis for Construction Projects  
  
Homework: HW #3 | |
| 04   | Learning Objectives:  
Process Model  
Economic Input Output Model  
Application for Construction Project Material Decision Making  
  
Supplementary Reading: Life Cycle Analysis for Construction Projects  
  
Homework: HW #4 | |
| 05   | Learning Objectives:  
What are green building material?  
Construction and Demolition Material  
Managing Construction and Demolition Material to Reduce Environmental Impact  
What criteria govern the selection of materials?  
What are new approaches to think about materials used in buildings?  
Some motivating examples for LCA…  
  
Supplementary Reading: Sustainable Building Material  
  
Homework: HW #5 | |
| 06   | Learning Objectives:  
Definition and Classification of Net Zero Energy Buildings  
Methods to Achieve Net Zero Energy Buildings  
Embodied and Operational Energy Demand  
Renewable Energy Technologies for Net Zero Energy Buildings  
  
Supplementary Reading: Net Zero Energy Buildings  
  
Comprehensive Final Exam | |