CANADIAN CONSTRUCTION ASSOCIATION
CANADIENNE DE LA CONSTRUCTION

National curriculum standard

Gold Seal Certification
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Preface

This curriculum standard is designed to assist administrators, course designers and instructors. In addition, it is meant to serve as a guide for those responsible for construction management courses as it sets a standard for all courses to meet.

This curriculum standard will be amended periodically. Comments or suggestions for improvement should be directed to the Gold Seal Certification program (goldseal@cca-ac.ccom).

Acknowledgements

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Content and structure

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Introduction

The Canadian Construction Association's (CCA) Gold Seal Certification program recognizes continued excellence in the management of construction, including in the heavy civil, industrial, commercial and institutional (ICI) sectors of the construction industry in Canada. Supported by CCA and managed by the national Gold Seal Committee, Gold Seal Certification reflects an ongoing commitment to excellence in the Canadian construction industry.

Gold Seal Certification—a nationally-recognized certification—is available in six designations and recognizes personal achievement in education, experience, and excellence in the construction industry. These designations include estimator, foreman, owner's construction manager, project manager, safety coordinator and superintendent.

In addition to a nationally-recognized achievement of excellence, Gold Seal Certification enhances individual mobility and supports recognizing existing and ongoing professional development of construction managers.

With over 10,000 certificate holders in Canada, Gold Seal continues to be the premiere designation for the management of construction.

About CCA

The Canadian Construction Association is the national voice of the Canadian non-residential construction industry. With over 20,000 member firms across Canada, CCA is one of Canada's largest industry associations. Overall, the construction industry employs more than 1.5 million Canadians and accounts for 7 per cent of Canada's gross domestic product.

Introduction to course outlines

The following pages provide information on each of the eleven courses that are recommended in support of the Gold Seal Certification program. It is important for the reader to understand that the information for each course is intended to be a guideline. Each course is comprised of the following elements:

Title – indicates the subject matter area.

Overview – provides a broad view of the course's goals.

Prerequisite – indicates what knowledge or skills the participants should have previously acquired prior to taking the course.

Learning objectives – summarizes the participants' expected performance upon completion of the course.

Content – elaborates each learning objective as to the specific topics that should be covered.

Methodology – provides a list of learning activities and experiences that will help the participants reach the learning objectives.

Assessment – serves as a guideline to the preparation of incremental examinations for training purposes; it includes the weight given to each learning objective when developing these examinations. The assessment may also indicate a specific performance that each participant is expected to attain.

Note: The information in this section serves as a guideline only and does not represent the specifications for the Gold Seal exam.

Resources – provides a list of publications, websites, and other teaching/learning materials that are deemed relevant to the learning objectives within each course. However, since the lists are non-exhaustive, instructors and learners are encouraged to search electronic databases, such as those found on the Library and Archives's website, for additional resources.

Education and training – Gold Seal applicants may be granted credits for courses that cover any of the subject matter areas listed within this Gold Seal curriculum standard. All candidates require a minimum of 25 education and training credits.

Content outline

Overview of the construction industry

Overview of the construction industry

Overview

This course stresses the impact the construction industry has on the economy. In addition, attention will be given to the changes in conducting business brought about by concern for the environment and advances in technology.

In order to appreciate the construction process, the function of key players and the interaction between people and various contractors involved in the construction industry, participants will be exposed to a complete project life cycle from concept to closeout.

Prerequisite
Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

Learning objectives

Upon successful completion of this course, participants will be able to:

- identify the role of the construction industry in the economy;
- define types of contractors;
- identify key elements and players in the construction process;
- identify standards, procedures, protocols, and policies within the industry;
- identify the impact of technological changes on the construction industry;
- explain the role of various industry associations;
- identify environmental requirements;
- identify safety requirements.

Content

1. **Identify the role of the construction industry in the economy.**
    - businesses (small, medium, large, and national/international level)
    - types and structures of small businesses
    - impact of the construction industry on the national economy
    - impact of the underground economy
2. **Define types of contractors.**
    - general contractors
    - construction managers
    - sub-contractors
    - road builders
    - heavy civil
    - design-build

- home builders
- marine
- insurance reconstruction
- speciality trades
- modular builders
- professional project managers
- facilities managers
- others

3. Identify key elements and players in the construction process.

- rationalization of the need for the project in terms of social, political and economic impact
- feasibility study
- design and development phase
- tender and award phase
- demolition and re-cycling phase
- project construction phase
- commissioning and acceptance phase
- building maintenance phase
- roles and responsibilities of key players (internal – within a construction firm)
    - owners (presidents)
    - general managers
    - support staff
    - project managers
    - accountants
    - estimators
    - superintendents
    - tradespeople
    - foremen
    - field engineers
- roles and responsibilities of key players (external)
    - buyers
    - suppliers
    - end users
    - consultants
    - owners

- o construction regulatory authorities (public and private)
- o facilities managers
- o collaborative

4. Identify the standards, procedures, protocols, and policies within the industry.

- specifications, codes, and standards
- bidding procedures
- awarding of contracts
- warranty requirements
- code of ethics
- union agreements / labour laws
- project organizational hierarchy
- health and safety policies
- jurisdictional differences (federal, provincial, municipal)

5. Identify the impact of technological changes on the construction industry.

- e-bidding
- electronic technology
- management information systems
- electronic plan rooms
- construction materials
- construction procedures
- standardizing
- globalization
- smart and automated building systems
- component building
- construction tools and equipment
- multi-dimensional modelling
- emerging trends in construction methods

6. Explain the role of various industry associations.

- list the roles of various associations at the local, provincial, national, and international level
- describe the role of the construction associations in terms of:
  - o labour relations
  - o lobbying
  - o standard documents

- o ethics
- o rules and regulations
- o plan rooms
- o education
- o communication
- o bid depository

7. Identify sustainability issues.

- applicable federal and provincial laws and acts
- waste management
- construction site environmental conditions (dust, noise, water and sewer)
- environmental assessment phases
- greening
- emerging trends in construction methods
- energy consumption reduction

8. Identify safety requirements.

- applicable federal and provincial health and safety laws and acts
- internal and external health and safety policies and programs
- due diligence

Methodology

This course lends itself to lectures by the instructor and guest speakers for the first six objectives while case studies are appropriate for the last two objectives. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- development of a company organization chart;
- development of a project organization chart;
- case studies on environmental and safety issues;
- preparation of a flow chart describing the key elements and players in a construction project.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective		Weight (%)
1.	Identify the role of the construction industry in the economy	10
2.	Define types of contractors	10
3.	Identify key elements and players in the construction process	20
4.	Identify standards, procedures, protocols and policies within the industry.	15
5.	Identify the impact of technological changes on the construction industry	15
6.	Explain the role of various industry associations.	10
7.	Identify environmental requirements	10
8.	Identify safety requirements	10
		100

Resources

Reports, manuals, textbooks and documents

Utilities Tendering Guide 2002 ecao.org/publications (membership required for access)

Government/association websites

Canadian Construction Association cca-acc.com

Canadian Industrial Relations Board cirb-ccri.gc.ca

Canadian Human Rights Commissions chrc-ccdp.ca

Canadian Standards Association csa.ca

Construction Specifications Canada csc-dcc.ca

Government of Canada gc.ca

Lean Construction Institute leanconstruction.org (fee required to access)

McGraw-Hill Construction sweets.construction.com

National Electrical Contractors Association necanet.org

National Research Council nrc-cnrc.gc.ca

Royal Architecture Institute of Canada raic.org

Statistics Canada statcan.ca

Underwriters Laboratory of Canada ulc.ca

Other resources

Biddingo biddingo.com

e-Builder Enterprise e-builder.net

Local bid depository websites

National codes (supplemental handbooks, building, electrical, fire, etc.) nationalcodes.ca

National labour associations

National professional associations

Content outline

Construction safety

Construction safety

Overview

This course is intended to provide assistance in designing and monitoring construction safety programs within the framework established by local, provincial, and federal acts and regulations.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

In addition, exposure to WHMIS, first aid/CPR, provincial safety training and certification is beneficial as per provincial requirements.

Learning objectives

Upon successful completion of this course, participants will be able to:

- interpret safety legislation and corporate safety policies;
- identify the key elements of developing a job site safety program;
- identify the key elements of monitoring a job site safety program;
- identify document management requirements.

Content

1. **Interpret safety legislation and corporate safety policies.**
   - applicable federal, provincial, and municipal acts and regulations*
   - corporate responsibility
   - due diligence
2. **Identify the key elements of developing a job site safety program.**
   - applicable federal, provincial and municipal acts and regulations*
   - employee/employer obligations and liabilities
   - planning safety meetings
   - economic/social consequences of incidents
   - safety training plan
   - emergency procedures
   - assistance from safety associations for developing safety programs
   - recognizing the impact of project or site specific safety requirements
   - conducting a pre-job safety analysis

3. **Identify the key elements of monitoring a job site safety program.**
    - inspection program
    - safety devices
    - enforcement procedures
    - safety meetings
    - review and update of the program
    - appropriate safety certification
    - safety training
    - auditing
4. **Identify document management requirements.**
    - collecting and processing information
    - preparing reports and forms (accident, worker's compensation, insurance liability, etc.)
    - follow-up reporting

* Note: Special attention should be given to the importance of this topic.

Methodology

This course lends itself to lectures by the instructor and guest speakers as well as case studies and practical exercises. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- completion of accident and worker's compensation forms;
- resourcing of a guest speaker from provincial safety authority;
- case study of an incident;
- development of a job site safety plan.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Interpret corporate safety policies	10
2. Identify the key elements of developing a job site safety program	40
3. Identify the key elements of monitoring a job site safety program	20
4. Identify document management requirements	30
	100

Resources

Reports, manuals, textbooks and documents

Managing World Class Safety by J.M. Stewart; Wyley Publishing (ISBN: 0-471-44386-7) wiley.com/en-ca

Means Forms for Contractors, R.S. Means Company, Inc. (ISBN: 0-87629-214-7)

Government/association websites

Canadian Centre of Occupational Health and Safety ccohs.ca

Other resources

Accident report forms

Generic company safety policy

Occupational health and safety videos

Provincial/federal/municipal safety acts, regulations, and by-laws

Safety association booklets

WHMIS handbooks

Workers' compensation forms

Content outline

Communication

Communication

Overview

This course provides participants with an overview of the communication process and emphasizes the nature, elements and processes of written, oral and electronic communication within the construction industry.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

As well, participants should have previously acquired basic computer competencies.

Learning objectives

Upon successful completion of this course, participants will be able to:

- explain the key elements of good written communication skills;
- identify and improve oral communication skills;
- identify interpersonal communication skills;
- prepare construction related documents;
- apply appropriate computer tools to improve communication skills;
- perform independent research.

Content

1. **Explain the key elements of good written communication skills.**
    - importance of using proper grammar and spelling in written communication
    - importance of writing clearly and concisely
    - resource material (dictionaries, spellcheckers, grammar checkers, internet)
    - key elements in a business letter
    - key elements in a memorandum
    - key elements in construction related reports
    - key elements in minutes of meeting
    - key elements in a job diary (electronic or otherwise)
    - key elements of an e-mail message
2. **Identify and improve oral communication skills.**
    - elements in communication (sender, receiver, method, and message)
    - types of oral communication (formal and informal setting)
    - public speaking techniques
    - listening techniques

- barriers (sender, content, environment, listener)
- verbal and non-verbal communication
- techniques for improving verbal communication (repetition, tell back, feedback, follow up)

3. **Identify interpersonal communication skills.**
   - primary reception skills (listening, observing, getting feedback, tell back)
   - techniques of effective observation in interpersonal and group situations
   - conducting meetings
   - negotiation skills
   - dealing with difficult people
   - giving and receiving instructions
4. **Prepare construction-related documents.**
   - job progress reports
   - agenda and minutes of meeting
   - job diary or journal
   - letters and memoranda
   - photographs
5. **Apply appropriate computer tools to improve communication skills.**
   - computer tools and software identification
   - basic features of word processing software
   - basic features of spreadsheet software
   - access and management of electronic information (file transfer, e-mail, Internet, Intranet, electronic bulletin boards, project management software)
   - digital imagery
6. **Perform independent research.**
   - electronic
   - products
   - product literature
   - supplies
   - historical database
   - interviews
   - questionnaires
   - journals
   - research papers

- trade publications
- suppliers
- conferences and trade shows

Methodology

This course lends itself to role-playing exercises for objectives two and three, while practical projects, lectures and demonstrations are appropriate for the remaining objectives. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- demonstrations (i.e., how to use Internet, word-processing and presentation software);
- video taping oral presentations;
- having participants engage in one-on-one verbal communication exercises to demonstrate listening and verbal communication techniques;
- having participants conduct a meeting including:
    - o preparation of the notice of meeting,
    - o preparation of the agenda,
    - o preparation of the minutes,
- having participants keep a diary of their classroom training events;
- identifying information available on the Internet;
- preparing a questionnaire / interview.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Explain the importance of good written communication skills	15
2. Identify and improve oral communication skills	20
3. Identify interpersonal communication skills	20
4. Prepare construction related documents	20
5. Apply appropriate computer tools to improve communication skills	15
6. Perform independent research.	10
	100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, [ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

Communicating in the Workplace, Francis Dombeck, Margaret S. Camp & M Satterwhite, McGraw-Hill Ryerson, ISBN: 0-07-560535-X

Essentials of Business Communication, Mary Ellen Guffrey & Brendan Hagle, Nelson Thompson Learning, ISBN: 0-17-622325-8

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

Government/association websites

Toastmasters International toastmasters.org

Other resources

Construction newspapers

Grammar check website grammarcheck.com

Content outline

Law and contracts

Law and contracts

Overview

This course provides a general overview of Canadian contract law. It also examines specific concepts as they relate to the construction industry. Particular attention is directed to contract and construction law cases.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

Learning objectives

Upon successful completion of this course, participants will be able to:

- define concepts related to the legal system
- define principles of construction contract law
- list characteristics of various forms of contracts
- interpret construction contract documents
- identify concepts related to insurance
- identify concepts related to construction bonding
- identify methods of dispute resolution
- identify implications of national, provincial, and municipal codes, by-laws, acts and regulations on a project
- compare warranties and guarantees
- compare a claim, back-charge, and change order
- define a custom contract
- describe the litigation process

Content

1. **Define concepts related to the legal system.**
    - definition of law
    - origin of law
    - sources of law
    - classification of law (statute, common, evidence)
    - judicial system
    - torts, common, case, precedence, etc.
    - trust provisions

2. **Define principles of construction contract law.**
   - offer, acceptance, and consideration (contract A / contract B principles)
   - legal capacity to make binding contracts
   - illegal and / or non-binding contracts
   - letter of intent
   - privity of contract
   - breach of contract
   - misrepresentation
   - mistakes
   - quantum meruit
3. **List characteristics of various forms of contracts.**
   - forms
   - stipulated price
   - cost plus
   - owner designer
   - unit price
   - construction management
   - purchase orders
   - labour
   - consultancy
   - tender
   - design/build
   - combination
   - oral and written contacts
   - forms of sub-contracts
   - P3
4. **Interpret construction contract documents.**
   - hierarchy of documents (specifications and drawings)
   - purpose of general conditions
   - purpose of supplementary conditions
   - identify the general conditions of standard form contracts (CCDC, CCA)
   - identify sources of standard and non-standard contracts
   - prescriptive vs. performance specifications
   - penalties

- liquidated damages
- privilege clauses (onerous conditions)
- risk transfer

5. **Identify concepts related to insurance.**
   - liability policies
   - risk policies
   - indemnity agreements
   - insurance policy components
   - insurance policy providers
   - statute of limitations
   - transfer of insurance (timing issue of transferring the liability

6. **Identify concepts related to construction bonding.**
   - principles of surety
   - types of construction bonding
     - bid bond
     - performance
     - labour and material
     - maintenance
     - lien bond
     - warranty
   - alternatives
     - letters of credit
     - cash

7. **Identify methods of dispute resolution.**
   - negotiation
   - mediation
   - arbitration
   - litigation

8. **Identify impact of national, provincial, and municipal codes, bylaws, acts and regulations on a project.**
   - lien legislation
   - health and safety
   - environmental

9. **Compare warranties and guarantees.**
    - definition of warranties
    - definition of guarantees
    - when each would be used
10. **Compare a claim, back-charge, and change orders.**
    - definition of claim, back-charge, and change order
    - identification of documentation required
    - steps involved
    - dispute
11. **Define a custom contract.**
    - when to do it - when not to
    - how to do it
    - list advantages/disadvantages
    - avoiding unenforceable conditions
    - terms and conditions
    - waivers and exclusions
    - supplemental conditions
    - owner's conditions (privilege clause/custom contract)
12. **Describe the litigation process.**
    - statement of claim
    - examination for discovery
    - court proceedings
    - documentation (job diaries, memos, minutes of meetings)

Methodology

This course lends itself to lectures by guest speakers and the instructor. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- case studies for the following subjects:
    - offer and acceptance,
    - common vs. statute law,
    - privity,
    - bidding (Ron Engineering),
    - breach of contract,

- o lien,
- o letter of intent,
- o abandonment,
- o quantum meruit,
- o claim / back-charge / change orders/dispute
- o draft a custom contract.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective		Weight (%)
1.	Define concepts related to the legal system	8
2.	Define principles of construction contract law	8
3.	List characteristics of various forms of contracts	8
4.	Interpret construction contract documents.	8
5.	Identify concepts related to insurance	6
6.	Identify concepts related to construction bonding.	10
7.	Identify methods of dispute resolution.	8
8.	Identify impact of national, provincial and municipal codes, bylaws, acts and regulation on a project	8
9.	Compare warranties and guarantees.	8
10.	Define a claim, back-charge, and change order/dispute.	10
11.	Define a custom contract.	10
12.	Describe the litigation process	8
		100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

Canadian Building Law, CIQS, ISBN: 978-1-896606-29-6

Construction Law by Brian M. Samuels, Prentice Hall, ISBN: 0133251926

Law for Professional Engineers, McGraw Hill, Ryerson Limited, ISBN: 007552628-x

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

The Revay Report, Revay and Associates revay.com

The Law & Business Administration in Canada

Government/association websites

Canadian Construction Documents Committee ccdc.org

Construction Specifications Canada csc-dcc.ca

Surety Association of Canada surety-Canada.com

Other resources

CCA sub-contract forms (all inclusive)

CCDC standard form contracts (all inclusive)

National Building Code and other provincial / municipal acts Provincial Lien Act and regulations

Sample bid bond, performance bond, and labour and material bond Sample contractor's application for bonding

Sample division O from specifications (CSI master format) Sample unit price contract

Statutory declaration

Content outline

Construction estimating

Construction estimating

Overview

This course is designed to provide participants with the knowledge and skills necessary to prepare, assemble and submit a bid. In addition, participants learn how to set up a historical database.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

As well, participants should have previously acquired basic computer competencies.

In addition, participants should be able to interpret drawings, specifications, and codes and have knowledge of materials, construction methods, and systems.

Learning objectives

Upon successful completion of this course, participants will be able to:

- identify potential business opportunities
- identify the steps in the bid process
- collect and review documents to scope project
- prepare a preliminary estimate
- prepare a detailed estimate
- submit a bid
- maintain historical data

Content

1. **Identify potential business opportunities.**
    - bid depository
    - pre-qualification
    - process in developing leads
    - promotion
    - identifying sources
        - o Internet
        - o construction daily newspapers
        - o newspapers
        - o construction associations

2. **Identify the steps in the bid process.**
   - identifying potential business opportunities
   - collecting and reviewing documents
   - preparing a preliminary estimate
   - preparing a detailed estimate
   - submitting a bid
   - maintaining historical data

3. **Collect and review documents to scope project.**
   - obtaining bid documents
   - verifying documents for discrepancies, ambiguities, and omissions
   - attending pre-bid site visit
   - scoping the project
   - addenda clarification

4. **Prepare a preliminary estimate.**
   - single rate method (elemental)
   - multiple rate method
   - cost planning

5. **Prepare a detailed estimate.**
   - estimate referencing the MasterFormat system
   - quantity take-offs
   - direct and indirect costs
   - unit prices (burdens, rent/lease/buy)
   - draft schedule
   - soliciting competitive prices and quotations
   - analyzing sub-contractor bids
   - determining unit costs
   - basic electronic spreadsheet formats
   - proprietary estimating software packages
   - bid depository

6. **Submit bid.**
   - assembling bid package
   - bid review
     - o ensuring information is complete (insurance and bid security)

  - summarizing estimate
  - analyzing competition
  - preparing for bid review meeting
- closing the bid

  o ensuring bid requirements are met
- submitting the bid
- unethical bid practices

7. Post-award functions.

- maintain historical data
- change process
- organizing bid documents
- storing and retrieving information
- classifications and standards
- using the database
- analysing information
- reviewing bid results
- performing cost analysis

Methodology

This course lends itself to practical projects and case studies supplemented by short lectures. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- preparing an estimate using a set of drawings and specifications for a commercial or industrial project;
- performing quantity take-offs for various trade divisions;
- calculating unit pricing;
- visiting a bid depository location;
- having a vendor demonstrate electronic measuring tools and estimating software packages;
- conducting a productivity analysis;
- completing a stipulated sum bid or unit price bid;
- assembling a bid package of standard documents.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective		Weight (%)
1.	Identify potential business opportunities	5
2.	Identify the steps in the bid process	10
3.	Collect and review documents to scope project	10
4.	Prepare a preliminary estimate	15
5.	Prepare a detailed estimate	35
6.	Submit a bid	15
7.	Maintain historical data	10
		100

Resources

Reports, manuals, textbooks and documents

CIQS syllabus, textbooks and form of estimates ciqs.org

Estimating in Building Construction,Frank R. Dagostino, Leslie Feigenbaum and Clint Kissoon, ISBN: 0-13-039126-3 abebooks.com; ciqs.org

Means Estimating Handbook, ISBN: 0876296991

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

Paul Gervais et Jean Paradis, *Estimation, Éditions Beauchemin*

Government/association websites

Association for the Advancement of Cost Engineering (AACE) International aacei.org

Canadian Institute of Quantity Surveyors ciqs.org

Frank R. Walker Company frankrwalker.com

International Cost Engineering Council icoste.org

National Electrical Contractors Association necanet.org

RsMeans rsmeans.com

Other resources

Pricing guides Productivity handbooks Equipment handbooks

Trade contractor resources Proprietary estimating software

Content outline

Management of human resources

Management of human resources

Overview

This course is designed to provide an overview of management skills. Special attention is given to developing interpersonal skills and identifying problem-solving techniques.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

Learning objectives

Upon successful completion of this course, participants will be able to:

- identify the functions of management
- demonstrate human relations skills
- demonstrate a problem solving technique
- demonstrate time management skills
- identify staffing issues

Content

1. Identify the functions of management.

- planning
- leading
- organizing
- controlling
- company representative
- evaluation

2. Demonstrate human relations skills.

- attributes of a successful team
- ways to increase the motivation of employees
- job instructional techniques
- coaching, mentoring and counselling skills
- conflict resolution techniques
- collective agreements
- leadership techniques
- effective interpersonal skills
- impact of appropriate attitude

- open/closed shop environment issues
- diversity issues in the workplace
- leadership versus management skills

3. **Demonstrate problem-solving skills.**
   - guidelines to problem solving
   - methods of problem solving
   - steps in the problem solving model
     - defining the problem
     - stating nature and limitations
     - generating alternative solutions
     - evaluating alternative solutions
     - selecting the best alternative
     - implementing the solution
     - follow up
   - partnering approaches
4. **Demonstrate time management skills.**
   - benefits of time logs
   - prioritization of projects and tasks
   - recognizing time wasting situations
   - tools used to save time
5. **Identify staffing issues.**
   - recruiting and retaining employees
   - purpose of a performance management system
   - benefits of a performance management system
   - conducting a performance review
   - terminating/dismissing employees

Methodology

This course lends itself to the use of role plays and case studies. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- reviewing job descriptions of foreman, superintendent, etc.;
- analysing case studies that deal with dismissals;
- reviewing collective agreements;
- simulating a performance review.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Identify the functions of management	20
2. Demonstrate human relations skills	20
3. Demonstrate problem solving skills	20
4. Demonstrate time management skills	20
5. Identify staffing issues	20
	100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

First Things First by Steven Covey, 2001 (ISBN: 1883219078)

How to Get Control of Your Time and Your Life, Alan Lakein, ISBN: 0451167724

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

Quality Circles, a Guide to Participation and Productivity, Croker et al., ISBN: 0816011613

The Team Handbook, Peter Scholtes et al., ISBN: 1884731112

The Time Trap: The Classic Book on Time Management, Alec Mackenzie, ISBN: 0-8144-7926-X

Time is Money: Save IT, Lothar J. Seiwert et al., ISBN: 1556231857

Tools for Success, Soft Skills for the Construction Industry, Steve Rigolosi, Prentice Hall, Upper Saddle River, New Jersey, ISBN: 0-13-025927-6

What Every Supervisor Should Know, Lester Bittle and John Newstrom, ISBN: 0070055890

Government/association websites

Canadian Industrial Relations Board cirb-ccri.gc.ca

Other resources

Construction management textbooks

Job descriptions of construction participants (foremen, superintendents, etc.)

Sample employee performance/review/evaluation forms

Case study on dismissal for substance abuse

Local collective agreement and local labour standards regulations

Content outline

Jobsite controls

Jobsite controls

Overview

The purpose of this course is to provide participants with the knowledge necessary to manage a construction site. Participants will learn how to layout a job site, manage documents, materials, tools, and equipment as well as coordinate labour and sub- contracts.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

Learning objectives

Upon successful completion of this course, participants will be able to:

- plan site layout
- manage materials
- manage equipment and tools
- maintain document control
- manage site labour and sub-contractors
- practice environmental controls
- identify concepts related to quality
- establish monitoring programs
- conduct project close-out

Content

1. Plan site layout.

- areas for material storage, site office, temporary services, and parking
- access routes
- existing services
- possible public safety, fire, and environmental considerations
- layout/lines/levels (boundaries)
- site security

2. Manage materials.

- purchasing / ordering material
- sources for alternate materials
- receiving procedures

- storing materials
- inventory control systems
- safe material handling procedures
- scheduling material delivery
- review shop drawings, product data sheets, samples, mock-ups
- WHMIS
- minimizing material handling
- security of materials
- coordination of deliveries
- waste management

3. Manage tools and equipment.

- tools and equipment
- maintenance programs
- equipment lists
- suppliers
- scheduling equipment use
- rental inventory
- product data sheets
- rental / purchase agreements
- security of equipment
- loss control

4. Maintain document control.

- methods of controlling documents
- methods for document storage
- document retrieval methods
- change documents (site, design, time, etc.)
- shop drawings
- job site journal (consequences of not keeping current)
- digital imagery/pictures

5. Manage site labour and sub-contractors.

- trade overlaps
- union agreements
- good working environment / safety

- back-charges
- production management
    - o establish benchmark performance
    - o time logging process
    - o time management
- sub-contracts
- own forces

6. Practice environmental controls.

- laws and regulations (federal, provincial, and municipal)
- procedures to minimize waste (reduce, reuse, recycle)
- hazardous materials, dust, noise and air pollution

7. Identify concepts related to quality.

- quality control / quality assurance
- existing corporate national and international standards

8. Establish monitoring programs.

- quality / quantity control
- safety
- interrelationship of job progress, schedule, costs, and reporting
- changes / potential claims
- as builts
- cost controls
- inspections
- sustainability (LEED®)

9. Conduct project close-out.

- deficiency list
- as built documents and manuals
- commissioning
- final inspections
- permits and certificates
- lessons learned

Methodology

This course lends itself to short lectures, case studies, and practical projects. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- completing a purchase order and matching it to a packing slip;
- visiting a job site;
- exercises on rent vs. purchase;
- completing a purchase order;
- given a specification, identifying:
    - o shop drawings, product data sheets, samples, mock-ups,
    - o applicable codes and standards,
    - o testing requirements,
    - o required tool list,
- resourcing a guest to speak on environmental / safety issues;
- analysing a safety program;
- analysing a quality assurance program;
- analysing a quality control program;
- working with drawings and specifications;
- establishing a benchmark performance (productivity).
- sustainability issues

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Plan site layout	20
2. Manage materials	5
3. Manage tools and equipment	5
4. Maintain document control	20
5. Manage site labour and sub-contractors	15
6. Practice environmental controls	10
7. Identify concepts related to quality	10
8. Establish monitoring programs	10
9. Conduct project close-out	5
	100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

Construction Site Management, William R. Mincks and Hal Johnston, Delmar, ISBN: 0-8273-7152-7 abebooks.com

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., IBN: 0-7821-4106-4

Tool and Material Control Systems, James E. Rowings and Mark O. Federle, National Electrical Contractors Association necanet.org

Government/association websites

Canadian Construction Association cca-acc.com

Canadian Construction Document Committee ccdc.org

Local construction associations

Other resources

Applicable acts and regulations

Standard close-out documents such as OGCA – OAA (Ontario General Contractors Association – Ontario Association of Architects)

Content outline

Planning – scheduling

Planning – scheduling

Overview

This course is designed to assist construction managers in planning a construction project, scheduling the use of labour, equipment and material, subtrades, and organizing the construction process. In addition, participants will learn how to prepare progress reports.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

As well, participants should have previously acquired basic computer competencies and must be able to interpret an estimate, drawings, and specifications.

Learning objectives

Upon successful completion of this course, participants will be able to:

- develop a construction project plan
- develop a schedule
- modify/accelerate a schedule
- prepare a progress report
- prepare a post job review

Content

1. **Develop a construction project plan.**
    - site visit
    - contract documents
    - work breakdown structure
    - estimates
    - alternative courses of action
    - resources
    - change management plan
2. **Develop a schedule.**
    - methods: logic diagram, CPM, GANTT (Bar), line of balance, pictorial, cash flow, histogram, installation, resource levelling and resource allocation
    - scheduling software packages and benefits
3. **Modify/accelerate a schedule.**
    - crash a schedule

- resource levelling
- fast tracking
- updating

4. **Prepare a progress report.**
   - interrelationship of job progress/schedule/costs and budget
   - percent complete
   - earned value
   - cost to complete
5. **Prepare post-job review.**
   - productivity
   - historical data
   - lessons learned

Methodology

This course lends itself to lectures, demonstrations and projects. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- group activity where each group is given a set of plans and specifications and each group must develop a methods statement for a work breakdown structure;
- developing cash flows using "S" curve;
- developing a construction plan and a schedule;
- computer scheduling software demonstration;
- exercises with progress reports and modifying / accelerating schedules;
- evaluating a completed project for successes and failures.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Develop a construction project plan	25
2. Develop a schedule	25
3. Modify / accelerate a schedule	15
4. Prepare a progress report	25
5. Prepare post-job review	10
	100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

Construction Planning & Scheduling – An Introduction, CIQS, ISBN: 1-896606-16-4

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

Project Scheduling and Management for Construction, David Pierce, Jr., ISBN: 0876295332

Scheduling in a Nutshell valuation-opinions.com/ev/nutshell.lasso

Government/association websites

Canadian Institute of Quantity Surveyors ciqs.org

Other resources

Scheduling software packages

Content outline

Project cost control and accounting

Project cost control and accounting

Overview

This course is designed to provide participants with a general background to the process of measuring, recording, and summarizing the financial events of a construction project. With this basic background, participants will then learn how to maintain records and perform various project cost control functions.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

Learning objectives

Upon successful completion of this course, participants will be able to:

- identify accounting terminology
- perform project accounting functions
- perform project cost control functions
- maintain records
- manage payables

Content

1. **Identify accounting terminology.**
    - cost accounting, financial accounting and managerial accounting
    - accounts payable
    - accounts receivable
    - general ledger
    - journal entries
    - job cost accounting
    - job cost budgeting
    - financial statements
    - cash flows
    - tax implications
2. **Perform project accounting functions.**
    - financing
    - issuance of progress claims (Statutory declaration, WCB)
    - billing breakdown
    - cash flow / scheduling

- invoice approvals (receivable)
- payment / holdbacks
- substantial completion / total performance
- back charges / claims / liquidated damages/disputes/change orders
- payment certificates
- penalties / bonuses

3. Perform project cost control functions.

- prepare budget
- purchase orders
- cost coding the estimate
- time cards / labour summaries
- invoice approvals / payable
- productivity analysis
- project cost variances
- cost forecasting (i.e., estimate through to completion)
- reporting procedures (levels of reporting systems)
- post job review
- change order process
- use a computer software package

4. Maintain records.

- set up filing system (alpha, alpha-numeric, Master Format)
- control documents
- update documents

5. Manage payables.

- provide an uninterrupted flow of materials, supplies, and services
- maintain and control inventories
- maintain quality standards
- find or develop competent vendors
- identify advantages of standardizing
- minimize costs

Methodology

This course lends itself to lectures, projects, and exercises. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- case study to prepare a one month job site report that includes: variances, percent complete, start-up and completion reports, and cost forecasting;
- case study to prepare: quote sheets, purchase orders, inventory of material, internal material requisition, and shipping schedule;
- demonstrating the use of a job-costing software package;
- resourcing a speaker on cost control;
- demonstrating samples of the following: purchase orders, payment certificates, budgets, invoices, packing slips, change orders, claims/back-charge forms, time cards, statutory declaration/WCB Clearance Certificates.

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Identify accounting terminology	15
2. Perform project accounting functions.	20
3. Perform project cost functions	40
4. Maintain records	15
5. Manage payables	10
	100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

Cost Control for Contractors, Council of Ontario Construction Association coca.on.ca

Change Orders in Electrical Construction, Awad S. Hanna necanet.org

Financial and Cost Concepts for Construction Management, Daniel W. Halpin, ISBN: 0471897256

National Change Notice Procedure Guide, Canadian Mechanical Contracting Education Foundation cmcef.org

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

RsMeans documents rsmeans.com

Government/association websites
Canadian Construction Association cca-acc.com

Canadian Construction Document Committee ccdc.org

Other resources
Sample contractor forms and reports

Job costing software

Content outline

Project management process

Project management process

Overview

This course is designed to provide participants with the knowledge and skills necessary to manage a project.

Prerequisite

Participants must be familiar with basic computer operating and word processing programs. It is recommended that participants have successfully completed the following courses:

- Overview of the construction industry;
- Construction safety;
- Communication;
- Law and contracts for the construction industry;
- Management of human resources in the construction industry;
- Planning and scheduling.

Learning objectives

Upon successful completion of this course, participants will be able to:

- develop a business case
- develop the scope of a project
- manage project procurement
- manage the construction contract process
- manage project risk
- manage the change process
- manage project close-out / commissioning

Content

1. **Develop a business case.**
    - feasibility study
    - site evaluation (access, soils, zoning)
    - land procurement
    - environmental impact
    - financing
    - return on investment
    - marketing & sales

2. **Develop scope of project.**
   - project charter
   - project stakeholder requirements
   - project definition (work breakdown structure)
   - alternative evaluation
3. **Manage project procurement.**
   - selecting designer
     - pre-qualification
     - expression of interest
     - request for proposal
     - evaluation of submissions
     - award design contract(s)
   - selecting contract strategy
     - pre-qualification
     - stipulated price
     - cost plus
     - unit price
     - standing offering
     - sole sourcing
     - best value
   - selecting project delivery
     - Engineering-procurement-construction-management (EPCM)
     - Design build operate transfer (DBOT)
     - partnerships/joint venture
     - partnering/contract alliance
     - construction management
     - design-build
     - purchase agreement
     - public-private partnerships (P3)
     - standing offering
     - invitational
     - unethical bid practices
   - managing design process
     - review and comment on concept, preliminary, bidding and final design

  - update cost plan
- selecting contractor
  - pre-qualification
  - bid / tender
  - evaluation
  - award

4. Manage the construction contract process.

- pre-construction
  - permits
  - safety plan
  - quality assurance plan
  - job start-up meeting
  - management tools (schedule, cost plan (budget))
  - bonding / insurance
  - site security
  - temporary facilities
  - environmental disaster recovery plan
  - emergencies
  - mobilization plan
- construction
  - quality assurance monitoring
  - safety monitoring
  - cost monitoring
  - progress monitoring
  - commission monitoring
  - payment certificates
  - statutory declaration
  - shop drawings, product data, samples, mock-ups
  - diaries
  - progress reports
  - defaults (notices, breach, bonding)
  - request for information / site instructions
  - back-charges
  - contemplated change notice/change orders

  - earned value
  - labour management
- claims
  - delays
  - impact
  - damages
  - dispute resolution

5. Manage project risk.

- developing a risk management plan
- identifying risk
- assessing risk or quantifying risk
- developing the risk response plan
  - impact of stakeholders' reaction
  - mitigating
  - avoiding
  - transferring
  - accepting
- controlling the risk

6. Manage the change process.

- owner versus contractor perspective
- change management plan
- define the need for the change (source is client, site, design, etc.)
- prepare a scope for the change
- produce a preliminary estimate of value and cost benefit / analysis
- scope / separate contract
- confirm if within the authority levels of the source / originator / facilitator
- confirm sufficient funds are available, obtain additional if required
  - obtain quotation for work and produce detailed estimate
  - receive and review quotation and assess impact to cost, schedule, and time to do the work
  - negotiate change quotation for cost, schedule, and time to do the work
  - instruction to proceed
  - analyze the change
- cumulative effect of change
- contract conditions
- documentation

7. Manage project close-out / commissioning.

- WCB
- substantial completion, total performance and final payment
- release of hold-backs
- as built drawings and manuals
- obtain warranties / guarantees
- manage warranties / guarantees
- training
- deficiency list
- lien act
- contract performance evaluation (consultants and contractors)
- client satisfaction
- historical data
- occupancy
- occupancy inspection / requirements
- lessons learned
- final commissioning and start-up
- wrap-up meeting

Methodology

This course lends itself to lectures by the instructor and guest speakers, and case studies. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- demonstrating examples of:
    - o project charters,
    - o business cases,
    - o requests for proposals (RFP) and their evaluation,
    - o expressions of interest (EOI),
    - o risk analysis,
    - o contracts,
    - o commissioning plan,
    - o safety plan,
    - o environmental plan,
    - o change order process
- developing a work breakdown structure (WBS).

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective		Weight (%)
1.	Develop business case	10
2.	Develop scope of project	10
3.	Manage project procurement	15
4.	Manage the construction contract process	25
5.	Manage project risks	15
6.	Manage the change order process	15
7.	Manage project close-out / commissioning	10
		100

Resources

Reports, manuals, textbooks and documents

A Guide to the Project Management Body of Knowledge (PMBOK), PMI Standards Committee, Project Management Institute, ISBN: 1-880410-12-5 (pbk. : alk. paper) / ISBN: 1-880410-13-3 (hdbk)]

A Guide to the Project Management Body of Knowledge, ISBN: 1-880410-23-0

Canadian Construction Association (CCA) documents cca-acc.com/en/industry-practices/cca-documents

Canadian Construction Document Committee (CCDC) documents ccdc.org

Canadian Design-Build Institute cdbi.org

Means Forms for Contractors, R.S. Means Company, Inc., ISBN: 0-87629-214-7

PMP Exam: Practice Test and Study Guide, ESI International, ISBN: 1-890367-11-7

PMP ©: Project Management Professional Study Guide, SYBEX Inc., ISBN: 0-7821-4106-4

Project Management: Engineering, Technology, and Implementation, Shtub, Avraham, Bard, Jonathan F., Globerson, Shlomo, Prentice-Hall, ISBN: 0-13-556458-1

Government/association websites

Defence Canada dcc-cdc.gc.ca

Project Management Institute pmi.org

Other resources

Applicable local association documentation

Content outline

Construction and the environment

Construction and the environment

Overview

This course stresses the importance of being acutely aware of the environmental conditions, policies, and regulations that can affect the construction industry. It also provides information for creating and monitoring environmental management plans and on-site controls.

Prerequisite

Although there is no formal educational prerequisite for this course, the participants' chances of success will be enhanced if their reading and comprehension skills are at a high school or equivalent level. Participants must be familiar with basic computer operating and word processing programs.

However, a strong knowledge of materials, construction methods, systems and building science would be useful.

Learning objectives

Upon successful completion of this course, participants will be able to:

- identify environmental regulations, policies, procedures, and guidelines;
- define key roles, responsibilities, and practices;
- identify the environmental concerns related to the construction industry;
- identify impact of building science on environmental concerns related to the construction industry;
- participate in the development of an environmental management plan.

Content

1. **Identify environmental regulations, policies, procedures and guidelines.**
   - Canadian Environmental Assessment Act (CEAA)
   - Provincial Acts and Regulations
   - Municipal By-laws and Regulations
   - ISO 14000
   - due diligence
   - best practices
2. **Define key roles, responsibilities, and practices of stakeholders.**
   - regulators (federal, provincial, municipal)
   - policy writers
   - project proponents
   - contractors / sub-contractors
   - superintendents
   - inspection agencies
   - environmental coordinators

- health and safety coordinators

3. **Identify the environmental concerns related to the construction industry.**
   - building envelope
   - mould/fungi (health issue)
   - waste reduction
     - reduce, reuse, recycle, recover
     - benefits of CRD (construction, renovation, and demolition) waste diversion
     - toxic and hazardous waste management
     - collecting, storing, and removing non-hazardous CRD waste
   - deconstruction
   - fugitive emissions
     - asphalt
     - smoke
     - dust
     - vapours
     - off-gassing
   - sediment movement into waterways and sewer systems
   - erosion during construction
   - oil/chemical spills
   - noise
   - blasting
   - cleaning and restoration processes
   - insurance, liability, and contract exclusion
   - sustainability (green construction)
   - contaminated soil
   - contractor maintenance and storage sites
   - contractor equipment
   - migratory seasons
   - Navigable Waters Act restrictions
   - archaeological sites
   - wildlife protection

4. **Identify impact of building science on environmental concerns related to the construction industry.**
   - sustainability (green building)
   - condensation

- air quality
- thermal performance
- building envelope
- material characteristics
    - o sealants
    - o adhesives
    - o epoxies
    - o gypsum boards
    - o coatings and coverings
    - o treated lumber
    - o PCBs
    - o others
- methods
    - o scheduling
    - o planning and sequencing
    - o installation
    - o material handling
    - o public and personal protection
    - o transportation
    - o disassembly
    - o prevention
    - o containment
    - o mitigation
- energy efficiency (alternative power sources)
- meet contract certification requirements (green building)

5. Participate in the development of an environmental management plan.

- corporate policy
- environmental regulations
- site-specific considerations
- regulatory approval
- implementation and monitoring on-site environmental controls
- emergency response plan
- environmental protection plan
- public information and consultation

- compliance audit process
- project environmental risks
- environmental training
- periodic reporting
- environmental disaster recovery plan
- sustainability (green building)

Methodology

This course lends itself to short lectures, case studies, and research projects and assignments. Instructors may involve the participants in the following specific techniques and activities:

- icebreaker type activity to get students engaged as soon as possible;
- jobsite visit;
- guest speaker on environmental issues;
- analysis of a plan (environmental management plan, disaster recovery plan, emergency response plan);
- case study (environmental litigation, spills).

Assessment

In order to successfully complete this course, participants will be expected to demonstrate that they have achieved the learning objectives. They will be evaluated through various assignments, projects, and/or tests based on each of these objectives. Final assessment for the course will be determined by the following weighting:

Learning objective	Weight (%)
1. Identify environmental regulations, policies, procedures, and guidelines	20
2. Define key roles, responsibilities, and practices of stakeholders	20
3. Identify the environmental concerns related to the construction industry.	20
4. Identify the impact of building science on environmental concerns related to the construction industry.	20
5. Participate in the development of an environmental management plan	20
	100

Resources

Reports, manuals, textbooks and documents

A Best Practices Guide to Solid Waste Reduction, Canadian Construction Association cca-acc.com/en/industry-practices/cca-documents

A Guide on Construction Environmental Management Planning, Canadian Construction Association cca-acc.com/en/industry-practices/cca-documents

Environmental Code of Practice for Steam Electric Power Generation – Construction Phase, Environment Canada

Erosion and Sedimentation Control Handbook for Construction Sites, Nova Scotia Department of Environment (NSDOE)

Mould Guidelines for the Canadian Construction Industry, Canadian Construction Association cca-acc.com/documents/general-publications

Report on Energy Usage in the Construction Industry, Simon Fraser University

Government/association websites
Canadian Council of Ministers of the Environment ccme.ca

Environment Canada ec.gc.ca

Impact Assessment Agency of Canada canada.ca/en/impact-assessment-agency

International Standards Organization (ISO) iso.org

Other resources
Applicable acts, regulations, and by-laws

ISO 14000

Kyoto Accord unfccc.int

WHMIS training documents

Other resources available from the American General Contractors Association agc.org/bookstore
Construction Contractor's Environmental Risk Management Procedures Manual (AGC-1184)

Contractors Underground Storage (AGC-1181)

Exposing the Facts: Lead Exposure in the Construction Industry (AGC-145) Handle With Care: Job-Site Hazardous Waste Safety (AGC-144)

Make the Right Move: Materials Handling Safety (AGC-150) Storm Water Permit Requirements (AGC-1183)

The Hazardous Waste Cleanup Contractor's Handbook (AGC-1180)

Appendix A – Occupation definitions

Estimator

An estimator is the person responsible for providing an accurate estimate of the cost of construction and of any changes to the work. In addition, the estimator keeps historical records on costs of all kinds and assembles bids and bid closure deadlines.

Foreman

The title *foreman* has numerous connotations in the construction industry. CCA defines it as someone who directly supervises the hands-on construction work but are one step removed from working with tools. Foremen are usually experienced tradespeople who possess all the requisite technical skills of their trade or occupation.

A foreman *must* know and apply occupational health and safety rules and best practices. It's essential these supervisors identify hazards and take the measures necessary to protect themselves, co-workers, the public and the environment.

Owner's project manager

An owner's project manager is accountable to « THE » owner for time, cost, and general overall project performance, and is responsible for promoting close and harmonious relations with the stakeholders. The major objectives of the project team under the overall leadership of the owner's project manager include stakeholder relations, project scope, project cost, project schedule, project risk, project procurement, project quality, and the productive effort required to ensure that the specific project requirements and contractual obligations are met. The owner's project manager provides leadership in connection with overall project development, implementation and close-out.

Project manager

The project manager is accountable, as the company representative, for time, cost and general overall project performance, and is responsible for promoting close and harmonious relations with the owner/client and design consultants. The project manager provides leadership in connection with overall project matters and strategy. He/she may be responsible for managing one or more projects.

Superintendent

The superintendent provides the overall on-site administrative and technical management for a project. Possessing wide-ranging technical and managerial skills, the superintendent's role is normally one of independent project supervision for small to medium-sized projects or directing one major segment of a more extensive project. It is a position above the job-site foreperson. The superintendent ensures the total construction efforts is in accordance with design, budget and schedule, and reports to the project manager or owner.

Safety coordinator

Construction safety coordinators are responsible for assisting management (and other company personnel) in the administration, development, implementation and monitoring of the safety, health and environment (HSE) program of a construction company or jobsite. Safety coordinators identify and review a variety of safety, health and environment issues specific to the jobsite and keep management current on the status of any issue(s) that may impact on the work being performed. Conducting safety orientation sessions for all personnel and jobsite visitors as well as keeping current with all aspects of the HSE program by liaising with government and construction safety associations also are the responsibilities of the construction safety coordinator.