



**ARAB ACADEMY FOR SCIENCE, TECHNOLOGY  
AND MARITIME TRANSPORT**

**COLLEGE OF ENGINEERING  
AND TECHNOLOGY  
CAIRO BRANCH**

**(GRADUATE STUDIES)**

**Master of Science Programs**

**(A) CONSTRUCTION ENGINEERING AND MANAGEMENT**

## M.Sc. in Construction and Building Engineering

### Program Structure

---

## M.Sc. in Construction and Building Engineering (A) Construction Engineering and Management

### CORE COURSES:

Course Code	Course Title	Credit Hours
CB 710	Advanced Construction Engineering	3
CB 711	Value Engineering in the Construction Industry	3
CB 712	Advanced Construction Management	3
<b>Subtotal</b>	<b>3 Courses * 3 Credit Hours</b>	<b>9</b>

### ELECTIVE COURSES: GROUP ( 1 )

Course Code	Course Title	Credit Hours
CB 713	Construction Equipment Management	3
CB 714	Advanced Systems Analysis for Construction Engineers	3
CB 715	Special Topics in Concrete Construction	3
CB 716	Estimating, Tendering and Contracting in Construction	3
CB 717	Project Planning and Control	3
CB 718	Financial Management in Construction	3
CB 719	Construction Economics and Feasibility Studies	3
CB 710-C	Construction Productivity	3
CB 711-C	Artificial Intelligence in Construction	3
CB 712-C	Research Methods in Construction Engineering and Management	3
CB 713-C	Quality Management in Construction	3
CB 714-C	Strategic Management in Construction	3
CB 715-C	Risk Management in Construction	3
CB 716-C	Human Resources Management in Construction	3
CB 717-C	Information Technology Applications in Construction	3
<b>Subtotal</b>	<b>4 Courses * 3 Credit Hours</b>	<b>12</b>

continued/...

## M.Sc. in Construction and Building Engineering

### Program Structure

---

.../continued

#### ELECTIVE COURSES:                      GROUP ( 2 )

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 723	Environmental Impact Assessment of Civil Engineering Projects	3
CB 731	Advanced Geotechnical Engineering	3
CB 740	Advanced Construction Materials	3
CB 746-S	Reliability in Civil Engineering	3
CB 753-T	Geographic Information Systems for Construction Engineering	3
CB769	Structures for Integrated Water Resources Management	3
<b>Subtotal</b>	<b>1 Course * 3 Credit Hours</b>	<b>3</b>

#### RESEARCH THESIS:

<b>Course Code</b>	<b>Course Title</b>	<b>Credit Hours</b>
CB 701	Master's Research Thesis (Part 1)	6
CB 702	Master's Research Thesis (Part 2)	6
<b>Subtotal</b>	<b>2 Parts * 6 Credit Hours</b>	<b>12</b>

<b>Total</b>	<b>36</b>
--------------	-----------

# Courses

DETAILED STRUCTURE

**Course Code :** CB 710

**Course Title :** Advanced Construction Engineering

**Credit Hours :** 3

### **Course Description**

Advanced topics in the area of construction engineering including underground construction: dewatering systems; shoring systems; and underpinning. Formwork systems in building construction: horizontal formwork; and vertical formwork systems. Cranes works. Belt-conveyor systems. Tunnel construction: driving tunnels in rock, drilling rock, drill jumbos, drilling patterns, and driving tunnels with tunnel-boring machines. Bridge construction: traditional construction; cantilever carriage method; and flying shuttering. Dam construction.

### **Course Objectives**

To provide students with an understanding of advanced topics in the field of construction engineering: building construction; bridge construction; and tunnel construction.

### **Course Topics**

- Underground construction including dewatering systems, shoring systems and underpinning.
- Formwork systems in building construction including horizontal and vertical formwork systems.
- Crane works in construction.
- Belt-conveyor systems.
- Tunnel construction: driving tunnels in rock; drilling rock; drill jumbos; drilling patterns; and driving tunnels with tunnel-boring machines.
- Bridge construction: traditional construction of bridges; cantilever carriage method; and flying shuttering.
- Dam construction

### **References**

- Peurifoy, R. L. and Schexnayder, G. J., "*Construction Planning, Equipment, and Methods*," McGraw Hill Co., New York, 2002.
- Peurifoy, R. L. and Oberlender, G. D., "*Formwork for Concrete Structures*", McGraw Hill Co., New York, 1996.
- Allen, E. and Iano, J., "*Fundamentals of Building Construction: Materials and Methods*", Wiley, New York, 2003.
- Nunnally, S. W., "*Construction Methods and Management*", Prentice Hall, 2003.
- Girmscheid, G. and Reilly, J., "*Fundamentals of Tunnel Construction*", Wiley, 2005.
- Institution of Civil Engineers, "*Current and Future Trends in Bridge Design, Construction and Maintenance: Safety, Economy, Sustainability and Aesthetics*", Thomas Telford, 2001.

**Course Code :** CB 711

**Course Title :** Value Engineering in the Construction Industry

**Credit Hours :** 3

### **Course Description**

Development of value engineering concept: its history, definitions, incentive provisions and applications. Value engineering methodology and tools: functional analysis; level of abstraction and alternative evaluation techniques. The process and procedures of a value study. Whole life cycle costing and its effect of value engineering. Case studies and applications.

### **Course Objectives**

To provide students with and understanding of the concepts of value engineering and its applications in the construction industry.

### **Course Topics**

- Value engineering concepts and definitions
- Value engineering study process and procedures
- Function analysis
- Level of abstraction and selection of alternatives
- Evaluation techniques
- Presenting value studies
- Whole life cycle costing
- Construction case studies and applications

### **References**

- Dell'Isola, A. "*Value Engineering: Practical Applications for Design, Construction, Maintenance and Operations*", MRS. Means Company Ltd, 1997.
- Kelly, J., Male, S. and Graham, D. "*Value Management of Construction Projects*" Blackwell Sciences, 2004.
- Parker, D. E., "*Management Application of Value Engineering: For Business and Government*", The Value Foundation, Washington D.C., 1994.
- Kumar, S., "*Value Engineering: A Fast Track to Profit Improvement and Business Excellence*", Narosa Publishing House, 2004.
- Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 712

**Course Title :** Advanced Construction Management

**Credit Hours :** 3

### **Course Description**

General characteristics of the construction industry and the general aspects and nature of construction management. Further management and business topics include: strategic management; risk management; human resources management; health and safety in construction; organizational behavior; business performance management; quality management, environmental management and process management.

### **Course Objectives**

To develop an understanding of general management and business topics relating to construction.

### **Course Topics**

- Characteristics of the construction industry
- Aspects and nature of construction management
- Strategic management
- Risk management
- Human resources management
- Health and safety in construction
- Organizational behavior
- Business performance management
- Quality management
- Environmental management
- Process management

### **References**

- Ellis, R. and Fryer, B. G., "*The Practice of Construction Management*", Blackwell Publishing, 2004.
- Ritz, G. J., "*Total Construction Project Management*", McGraw Hill Co., New York, 1994.
- Harris, F. and McCaffer, R. "*Modern Construction Management*", Blackwell Sciences, Oxford, 2001.
- Coble, R. J., Haupt, T, C. and Hinze, J. "*The Management of Construction Safety and Health*", Balkema, Rotterdam, 2000.
- Cooper, R. et al., "*Process Management in Design and Construction*", Blackwell Publishing, Oxford, 2004.

**Course Code :** CB 713

**Course Title :** Construction Equipment Management

**Credit Hours :** 3

### **Course Description**

Factors affecting the selection of construction equipment. Fundamentals of construction equipment. Construction equipment costs, sizing operation and maintenance. Construction equipment productivity. Evaluation and selection of appropriate construction technology.

### **Course Objectives**

To provide students with the fundamentals of equipment in the construction industry, and to acquaint students with the productivity of the major equipment used in construction.

### **Course Topics**

- Factors affecting the selection of construction equipment.
- Fundamentals of construction equipment
- Construction equipment costs, sizing, operation and maintenance
- Construction equipment productivity
- Applications on excavation, concrete and road pavement equipment
- Evaluation and selection of appropriate construction technology

### **References**

- Peurifoy, R. L. and Schexnayder, G. J., "*Construction Planning, Equipment, and Methods*," McGraw Hill Co., New York, 2002.
- Edwards, D. G., Harris, F. C. and McCaffer, R., "*Management of Off-Highway Plant and Equipment*", Spon Press, 2003.
- Harris, F., "*Modern Construction and Ground Engineering Equipment and Methods*", Prentice Hall, 1994.
- Nunnally, S. W., "*Managing Construction Equipment*", 1999.



**Course Code :** CB 714

**Course Title :** Advanced Systems Analysis for Construction Engineers

**Credit Hours :** 3

### **Course Description**

Modeling and analysis of systems for decision making in construction. Optimization using mathematical programming and sensitivity analysis. Decision-making under uncertainty and multi-criteria decision-making. NP-Hard Problems and applications in resource allocations. Heuristics and near-optimal solutions. Queuing theory and simulation. Transportation and assignment problems.

### **Course Objectives**

To provide students with an understanding of optimizing quantitative models and decision-making.

### **Course Topics**

- Modeling and analysis of systems for decision making in construction
- Mathematical programming and sensitivity analysis
- Decision making under uncertainty
- Multi-criteria decision-making
- NP-Hard problems and applications in resource allocations
- Heuristics and near-optimal solutions
- Queuing theory and simulation
- Transportation and assignment problems

### **References**

- Tang, S. L., Ahmad, I. U., Ahmed, S. M., and Lu, M., "*Quantitative Techniques for Decision Making in Construction*", Hong Kong University Press, Hong Kong, 2004.
- Oseenbruggen, P. J., "*Systems Analysis for Civil Engineers*", Wiley, New York 1984.
- Anderson, D. R., Sweeney, D. J. and Williams, T. A., "*An Introduction to Management Science – Quantitative Approaches to Decision Making*", Thomson - South-Western College Publishing, Kentucky, 2002.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 715

**Course Title :** Special Topics in Concrete Construction

**Credit Hours :** 3

### **Course Description**

Design of form work for concrete structures: horizontal formwork and vertical formwork; Causes of failure; Analysis of loads, deflections and stresses of formwork systems. Assessment of removal times. Shoring and unshoring systems. Health and safety in concrete construction. Concreting under water; Concrete in marine environment. Special concretes: Hot weather concrete, Mass concrete, ready mix concrete, self compacting concrete, high performance concrete.

### **Course Objectives**

To provide knowledge of the construction and design of different formwork systems, and to be acquainted with the construction systems in building construction.

### **Course Topics**

- Design of form work for concrete structures
- horizontal formwork
- vertical formwork
- Analysis of loads, deflections and stresses of formwork systems
- Health and safety in concrete construction.
- Concrete in marine environment
- Hot weather concrete
- Mass concrete
- Ready mix concrete
- Self compacting concrete

### **References**

- Peurifoy, R. L. and Oberlender, G. D., "*Formwork for Concrete Structures*", McGraw Hill Co., New York, 1996.
- Dobrowolski, J. A., "*Concrete Construction Handbook*", McGraw Hill Co., New York, 1998.
- Hurd, M. and Hurd, M. K., "*Formwork for Concrete*", American Concrete Institute, Detroit, 1995.
- Nawy, E. G., "*Concrete Construction Engineering Handbook*", CRC Press, 1997.

**Course Code :** CB 716

**Course Title :** Estimating, Tendering and Contracting in Construction

**Credit Hours :** 3

### **Course Description**

Construction quantity and cost estimation by various contractual parties. Procurement paths and apportionment of risks. The tendering process and documentation. Contractor selection and pre-qualification. Contract law and construction forms of contracts. Sub-contractors and nominated suppliers. Managing variations in construction contracts - change orders and claims. Dispute resolution and arbitration.

### **Course Objectives**

To provide students with the knowledge concerned with estimating quantities and costs, the construction tendering process and contractual issues in construction.

### **Course Topics**

- Construction quantity and cost estimation by different contractual parties
- Procurement paths and apportionment of risks
- Tendering process and documentation
- Contractor selection and pre-qualification
- Contract law and forms of contracts in construction
- Sub-contractors and nominated suppliers
- Managing variations in construction contracts – change orders and claims
- Dispute resolution and arbitration

### **References**

- Brook, M., “*Estimating and Tendering for Construction Contracts*”, Butterworth and Heinemann, Oxford, 2001.
- Clough, R. H. and Sears, A., “*Construction Contracting*”, John Wiley and Sons, New York, 1994.
- Halpin, D. W. and Woodhead, R. W., “*Construction Management*”, Wiley, New York, 1997.
- Broome, J. “*Procurement Routes for Partnering: A Practical Guide*”, Thomas Telford, London, 2002.
- Murdoch, J. and Hughes, W., “*Construction Contracts: Law and Management*”, Spon Press, London, 2000.

**Course Code :** CB 717

**Course Title :** Project Planning and Control

**Credit Hours :** 3

### **Course Description**

Advanced planning and scheduling methods in construction. Scheduling with resource constraints and under uncertainty, and line-of-balance. Cost planning in projects and design of costing systems. Acceleration of construction projects. Control of time and costs in construction projects. Forecasting and controlling cash flows of projects. Earned-value systems in controlling construction projects.

### **Course Objectives**

To provide students with advanced knowledge and skills concerned with planning and control of construction projects.

### **Course Topics**

- Advanced planning and scheduling methods in construction
- Resource constrained scheduling, probabilistic scheduling and line-of-balance.
- Cost planning and design of costing systems in construction projects
- Acceleration of construction projects
- Tracking project progress – time and costs
- Forecasting and controlling project cash flows
- Earned-value systems in controlling construction projects

### **References**

- Oberlender, G. D., "*Project Management for Engineering and Construction*", McGraw-Hill, New York, 2000.
- Hinze, J., "*Construction Planning and Scheduling*", Prentice Hall, New York, 2003.
- Cooke, B. and Williams, P. "*Construction Planning, Programming and Control*", Blackwell Publishing, Oxford, 2004.
- Halpin, D. W., Woodhead, R. W. "*Construction Management*", Wiley, New York, 1997.
- Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 718

**Course Title :** Financial Management in Construction

**Credit Hours :** 3

### **Course Description**

Basics of accounting: accounting terms; accounting systems and transactions; and compilation of financial statements. Reading and understanding financial statements. Basics of financial analysis for profitability, liquidity, leverage and efficiency. Company financial failure and bankruptcy analysis. Cash flow analysis of construction companies. Investor analysis of construction companies.

### **Course Objectives**

To introduce students to the basics of financial management in construction.

### **Course Topics**

- Basics of accounting: accounting terms; accounting systems and transactions; and compilation of financial statements.
- Reading and understanding financial statements.
- Financial analysis - basic financial ratios for profitability, liquidity, leverage and efficiency.
- Failure / bankruptcy analysis for construction firms.
- Cash flow analysis of construction companies.
- Investor analysis of construction companies.

### **References**

- Peterson, S. J. "*Construction Accounting and Financial Management*", Prentice Hall, New York, 2004.
- Palmer, W., Palmer, W. J., Coombs, W. E. and Smith, K. A., "*Construction Accounting and Financial Management*", McGraw Hill, New York, 1999.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.
- Gibson, C. H., "*Financial Statement Analysis*" International Thomson Publishing, 1998.
- Brigham, E. F., Gapenski, L. C. and Erhardt, M. C., "*Financial Management: Theory and Practice*", The Dryden Press, 1999.

**Course Code :** CB 719

**Course Title :** Construction Economics and Feasibility Studies

**Credit Hours :** 3

### **Course Description**

Introduction to economics of the construction industry: role of industry in the economy; and demand and supply in construction. Introduction to microeconomics of construction firms. Introduction to engineering economics and discounting principles. Economic comparisons and influences on economic analysis. Feasibility studies and construction projects appraisal: cost and benefits analyses; economic evaluation techniques and sensitivity analysis.

### **Course Objectives**

To provide an understanding of construction economics and feasibility studies.

### **Course Topics**

- Introduction to economics of the construction industry – role of construction in the economy and demand and supply in construction.
- Introduction to the theory of the firm and microeconomics of construction firms.
- Introduction to engineering economics and discounting principles.
- Economic comparisons and influences on economic analysis.
- Feasibility studies and construction projects appraisal – analyses of costs and benefits, economic evaluation techniques and sensitivity analysis.

### **References**

- Gruneberg, S. "*Construction Economics: An Introduction*", Palgrave McMillan, 1997.
- Rogers, M. "*Engineering Project Appraisal – The Evaluation of Alternative Development Schemes*", Blackwell Publishing, London, 2001.
- Flanagan, R. and Jewell, C. "*Whole Life Appraisal for Construction*", Blackwell Science, 2004.
- Gruneberg, S. L. and Weight, D. H. "*Feasibility Studies in Construction*", Mitchell, London, 1990.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 710-C

**Course Title :** Construction Productivity

**Credit Hours :** 3

### **Course Description**

Factors affecting productivity. Productivity engineering and management. Productivity measurement. Work study. Method study. The total productivity model. Optimum allocation of resources. Productivity improvement techniques, technology based, material based, employee based, product based, and task based.

### **Course Objectives**

To provide a knowledge of the productivity concepts and in the construction industry.

### **Course Topics**

- Productivity engineering and management
- Factors of productivity
- Productivity measurement methods
- Total productivity model
- Optimum allocation of resources
- Productivity improvement techniques

### **References**

- Adrian, J., "*Construction Productivity: Measurement and Improvement*", Stipes Pub., 2004.
- Olomolaiye, P., Jayawardane, A., and Harris, F. C., "*Construction Productivity Management*", Longman and Chartered Institute of Building, 1998.
- Oglesby, P. and Howell, G. "*Productivity Improvement in Construction*", McGraw Hill, 1994.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 711-C

**Course Title :** Artificial Intelligence in Construction Engineering

**Credit Hours :** 3

### **Course Description**

Introduction to Artificial Intelligence. Fuzzy set theory and mathematics. Fuzzy rule-based systems and applications. Evolutionary algorithms (EA) and basic EA operations. Expert Systems. Neural Networks. Application in Civil Engineering.

### **Course Objectives**

To provide an introduction to the basic principles, techniques, and applications of Artificial Intelligence (AI) in the field of construction engineering and management. Upon successful completion of the course, students will have an understanding of the basic areas of AI and their applications in design and implementation of AI for a variety of tasks in analysis, design, and problem solving.

### **Course Topics**

- Overview – Introduction to AI
- Fuzzy set theory and mathematics
- Fuzzy rule-based systems
- Applications
- Evolutionary Algorithms (EA): an Introduction
- Basic EA operations, Overview of different Algorithms
- Applications
- Expert Systems: an introduction
- Applications
- Neural Networks: an introduction
- Back-propagation
- Applications

### **References**

- Lin, C.T., and Lee, C.S.G., “*Neural Fuzzy Systems: A Neuro-Fuzzy Synergism to Intelligent Systems*,” Prentice Hall, Upper Saddle River, NJ, 1995.
- Haupt, R.L. and Haupt, S.E., “*Practical Genetic Algorithms*,” Wiley, 2004.
- Mitchell, M., “*An Introduction to Genetic Algorithms*,” MIT Press, London, 1999.
- Beale, R. and Jackson, T., “*Neural Computing: An Introduction*,” IOP Publishing, NY, 1990.
- Ross, T.J., “*Fuzzy Logic with Engineering Applications*,” McGraw-Hill, NY, 1995.



**Course Code :** CB 712-C

**Course Title :** Research Methods in Construction Engineering and Management

**Credit Hours :** 3

### **Course Description**

The nature of research methods in construction engineering and management are discussed. Formulation of the research problem. Reviewing literature and technical writing. Design of research methodology and overview of basic research methods. Qualitative and quantitative research methods of data collection and analysis. Overview of statistical methods, modeling techniques, optimization, simulation and IT applications. Methods of research validation and presenting / communicating the research methodology and outcomes.

### **Course Objectives**

To provide an understanding of the main research methods used in construction engineering and management, and develop the necessary knowledge and skills for pursuing research projects, theses or dissertations.

### **Course Topics**

- Nature of construction engineering and management research
- Formulation of research problem
- Literature review and technical writing
- Research methods and research design
- Qualitative research methods
- Quantitative research methods
- Statistical analysis: parametric and non-parametric techniques, regression and factor analysis.
- Advanced statistical topics
- Modeling techniques, optimization, simulation, and IT applications in research
- Research validation
- Communicating research methodology and outcomes to a professional audience

### **References**

- Fellows, R. and Liu, A. "*Research Methods for Construction*", Blackwell Publishing, 2003.
- Coles, D. H. and Naoum, S. "*Dissertation Writing and Research for Construction Students*" Architectural Press, 1997.
- Tan, W. "*Practical Research Methods*" Pearson Prentice Hall, New York, 2004.
- Cramer, D. "*Advanced Quantitative Data Analysis*" Open University Press, McGraw-Hill Education, 2003.
- Bryman, A. and Cramer, D. "*Quantitative Data Analysis with SPSS Release 12.0*", Routledge, London, 2004.

**Course Code :** CB 713-C

**Course Title :** Quality Management in Construction

**Credit Hours :** 3

### **Course Description**

The history, role and definition of quality in construction leading to the differentiation of the basic quality concepts / approaches. The management of inspection and testing, in addition to process improvement techniques of statistical process control and six sigma. Quality assurance systems with application to ISO 9000:2000 in construction. The implementation of total quality management and the introduction of excellence models. The importance of continuous improvement through effective benchmarking and performance measurement.

### **Course Objectives**

To provide an understanding of the role of quality in construction projects and organizations and the main techniques associated with improving customer satisfaction and quality in construction.

### **Course Topics**

- The history, role and definition of quality in construction
- Differentiating inspection, quality control, quality assurance and total quality management
- Managing inspection and testing in construction
- Process improvement techniques in construction - Statistical process control and six sigma
- Quality assurance systems – ISO 9000:2000
- Total quality management in construction
- Excellence models in construction – EFQM and Baldrige
- Continuous improvement, benchmarking and performance measurement

### **References**

- Thorpe, B. and Sumner, P. “*Quality Management in Construction*” Gower Publishing Limited, 2005.
- ASCE, “*Quality in the Constructed Project: A Guide for Owners, Designers, and Constructors*”, American Society of Civil Engineers, 2004.
- McCabe, S. L. “*Benchmarking in Construction*”, Blackwell Science, 2001.
- McCabe, S. L. “*Quality Improvement Techniques in Construction: Principles and Methods*”, Harlow: Longman, co-published with The Chartered Institute of Building through Englemere Ltd., 1998.
- British Quality Foundation “*How to Use the Model. The EFQM Excellence Model*”, British Quality Foundation, 2002.

**Course Code :** CB 714-C

**Course Title :** Strategic Management in Construction

**Credit Hours :** 3

### **Course Description**

Introduction to strategic management concepts and process. Types of strategies in organizations. Strategic planning concepts and tools of strategic analysis. Strategic management in the construction context. Strategic performance measurement. Cascading of strategies and development of functional strategies in construction (e.g. human resources and marketing strategies).

### **Course Objectives**

To provide students with knowledge pertaining to strategic management in construction.

### **Course Topics**

- Strategic management concepts and process
- Types of strategies in organizations
- Strategic planning and formulation
- Strategic evaluation and analysis tools and techniques
- Strategic management in a construction context
- Strategic performance measurement
- Functional strategic management in construction

### **References**

- Langford, D. A. and Male, S., "*Strategic Management in Construction*", Blackwell Science, 2001.
- Wheelen, T. L. and Hunger, J. D., "*Strategic Management and Business Policy*", Prentice Hall, 2003.
- Saloner, G., Shepard, A., Podolny, J., "*Strategic Management*", Wiley, 2000.
- Hill, C., "*Strategic Management Theory: An Integrated Approach*", 2003.
- Porter, M. E., "*Competitive Strategy: Techniques for Analyzing Industries and Competitors*", Free Press, 1998.

**Course Code :** CB 715-C

**Course Title :** Risk Management in Construction

**Credit Hours :** 3

### **Course Description**

Principles of risk management and types of organizational and project risks in construction. Risk identification and risk analysis. Risk mitigation and insurance. Control and improvement of the risk management process. Differentiating risk in construction parties: clients, contractors and consultants. Practical aspects implementing risk management.

### **Course Objectives**

To provide students with the fundamentals of risk management in construction.

### **Course Topics**

- Principles of risk management: risk management theory; definitions and terms; and the risk management process
- Types of organizational and project risks in construction
- Risk identification, assessment, quantification and prioritization of risks
- Risk reduction and insurance
- Managing the risk management process
- Risks in different parties of the construction project: client; contractors; and consultants
- Practical aspects of implementing risk management (e.g. risk registers)

### **References**

- Smith, N. J. "*Managing Risk in Construction Projects*", Blackwell Publishing, 2003.
- Chapman, C. and Ward, S., "*Project Risk Management – Processes, Techniques and Insights*", John, Wiley and Sons, 2003.
- Edwards, L., "*Practical Risk Management in Construction*", Thomas Telford, 1995.
- Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.

**Course Code :** CB 716-C

**Course Title :** Human Resources Management in Construction

**Credit Hours :** 3

### **Course Description**

Human resources management theory and concepts. Strategic and operational human resources management. Work design and selection practices. Training and development. Performance appraisal. Workforce diversity. Work/life balance and employee welfare. Employee relations and empowerment. Health and safety issues in human resources. Employment laws.

### **Course Objectives**

To provide students to the basics of managing human resources in construction.

### **Course Topics**

- Human resources management theory and concepts
- Strategic and operational human resources management in construction
- Construction work design and selection practices
- Training and development
- Performance evaluation
- Workforce diversity
- Work/life balance and employee welfare
- Employee relations and employee empowerment
- Health and safety issues in human resources
- Employment laws.

### **References**

- Loosemore, M., Dainty, A. and Lingard, H. "*Human Resource Management in Construction Projects: Strategic and Operational Approaches*", Spon Press, 2003.
- Gratton, L., "*Strategic Human Resource Management: Corporate Rhetoric and Human Reality*", Oxford University Press, 1999.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.
- Dessler, G., "*Human Resources Management*", Prentice Hall, 2004.
- Fisher, C. D., Schoenfeldt, L. F. and Shaw, J. B., "*Human Resources Management*", Houghton Mifflin, 2002.

**Course Code :** CB 717-C

**Course Title :** Information Technology Applications in Construction

**Credit Hours :** 3

### **Course Description**

Construction and office management applications. Database management and information systems in construction. Internet based applications including E-Commerce in construction. Knowledge management in construction. Artificial intelligence and expert systems. Neural networks. Optimization packages including genetic algorithms. Introduction to software development including: programming principles, process, and testing; and principles of algorithm design and data structures.

### **Course Objectives**

To introduce students to the modern methods of information technology (IT) and its applications in construction.

### **Course Topics**

- Construction and office management applications
- Database management and information systems in construction
- Internet based applications in construction – use of web publishing, intranets and E-Commerce in construction
- Knowledge management in construction
- Artificial intelligence and expert systems
- Neural networks
- Optimization packages and genetic algorithms
- Software development – programming principles, programming phases and steps, verification and validation of software / programs, principles of algorithm design and data structures

### **References**

- Sun, M. and Howard, R., “*Understanding IT in Construction*”, F.N. Spon, 2001.
- Hegazy, T., “*Computer-based Construction Management*”, Prentice Hall, 2001.
- Anumba, C. J., Egbu, C. and Carrillo, P., “*Knowledge Management in Construction*”, Blackwell Publishing, London, 2004.
- Pressman, R. S. and Pressman, R., “*Software Engineering: A practitioners Approach*”, McGraw-Hill Science, 2004.
- Waterman, D. A., “*A Guide to Expert Systems*”, Addison Wesley, 1986.
- Russell, S. J., and Norvig, P., “*Artificial Intelligence: A Modern Approach*”, Prentice Hall, 2002.
- Finch, E. “*Net Gain in Construction, Using the Internet in Construction Management*”, Butterworth-Heinemann, 2000.