



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

**COLLEGE OF ENGINEERING
AND TECHNOLOGY**

(GRADUATE STUDIES)

Master of Science Programs

STATUS REPORT

ALEXANDRIA

2012

**CONSTRUCTION AND
BUILDING ENGINEERING**

M.Sc. PROGRAMS

M.Sc. in Construction and Building Engineering

OVERVIEW

Construction is one of the largest nation's industries, encompassing an incredibly wide range of activities, from high-rise buildings construction to homes, from highways to power plants. Indeed modern construction projects have become so large, complex, expensive and time-consuming that special educational programs now are being offered to prepare students for entry into this important and challenging industry.

The mission of the Construction and Building Engineering Department at the AASTMT is to provide the educational, research, and training programs that serve both the needs of our students and those of the construction industry. The curriculum objective is to prepare individuals for a professional career in construction engineering and management and for continued learning through post-graduate education or self study.

The department offers a B.Sc., a diploma, and a Master's degree in Construction Engineering. As a student in construction engineering, you will learn to identify the best methods and techniques of construction, to determine construction costs and set schedules, to apply methods of quality control and to supervise construction projects.

The program is designed to prepare our students to become outstanding construction engineers, whose job is to devise and design construction facilities, coordinate and direct the efforts of labor and equipment, and control the time and cost demands of field operations.

As they gain experience, construction engineers become construction managers who combine engineering, management, and field construction skills in the administration and management of field construction.

Graduates of the Construction and Building Engineering degree program design and manage construction processes that create living and working environments such as office buildings, industrial buildings, airports, housing, roads, bridges, utilities, and dams. Graduates fill positions in construction companies, engineering consulting firms, government agencies, and large construction corporations. The positions usually involve either the planning, design, and management of the construction process for a general, specialty, or mechanical contractor, or the coordination, inspection, and management of design, contracts, or facilities for a business, industry or government owner.

When you ask top managers in construction and engineering firms why they selected this career, you can hear the excitement of the construction industry in their responses. Some say they like to conceive an idea and then engineer and manage it through to reality. Others say that they like the combination of computerized planning, process design, cost engineering, and scheduling with the gratification of seeing a job well done.

Graduates of this degree program enjoy a wide range of opportunities to apply their technical knowledge with tremendous variety in the day-to-day work. Some choose design, planning, or financial management positions working in an office environment, while others prefer to direct field operations or some combination of the above.

Program Detailed Structure

M.Sc. PROGRAM

(D) STRUCTURAL ENGINEERING

M.Sc. in Construction and Building Engineering

Program Structure

(D) Structural Engineering

M.Sc. in Construction and Building Engineering

(D) Structural Engineering

CORE COURSES:

Course Code	Course Title	Credit Hours
CB 740	Advanced Structural Analysis	3
CB 741	Experimental Methods in Civil Engineering	3
CB 742	Concrete Durability	3
CB 743	Fiber Reinforced Cementitious Composites	3
CB 744	Advanced Strength of Materials	3
CB 745	Advanced design of Reinforced Concrete Structures	3
CB 746	Advanced Prestressed Concrete	3
CB 747	Repair of Concrete Structures	3
CB 748	Bridge Structures	3
CB 749	Finite Element Method	3
CB 740-S	Theory of Elasticity	3
CB 741-S	Plastic Analysis and Design of Structures	3
CB 742-S	Earthquake Engineering	3
CB 743-S	Design of Special Metallic Structures	3
CB 744-S	Composite Structures	3
CB 745-S	Reliability in Civil Engineering	3
CB 746-S	Advanced Concrete Technology	3
Subtotal	8 Courses * 3 Credit Hours	24

RESEARCH THESIS:

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

Total	36
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Courses

DETAILED STRUCTURE

Course Code : CB 740

Course Title : Advanced Structural Analysis

Credit Hours : 3

Course Description

Matrix analysis of two-dimensional frames by the stiffness method. Force and displacement methods; formulation of different types of element flexibility, stiffness matrices. Temperature effects. Shear deformation in beams. Non-linear structural analysis. Computer applications.

Course Objectives

To present the methods of matrix analysis to the students with emphasis on application to determinate and indeterminate problems.

Course Topics

- Force and displacement methods.
- Formulation of two dimensional truss elements.
- Coordinate transformation of truss elements.
- Formulation of global stiffness matrices for truss elements and worked examples
- Formulation of two dimensional beam elements.
- Formulation of global stiffness matrices for beam elements and worked examples.
- Formulation of two dimensional frame elements.
- Formulation of global stiffness matrices for beam elements and worked examples.
- Temperature effects.
- Shear deformations in beams.
- Nonlinear structural analysis.
- Computer applications

References

- Fundamental of Structural Analysis by WEST, HARRY H. Publisher: John Wiley & Sons, Inc., New York, USA, Latest Edition.
- Wang, C.K., "Indeterminate Structural Analysis," Prentice-Hall, Englewood Cliffs, USA, 1984.
- Charles, A., "Structural Analysis," Second Edition, Prentice-Hall, Englewood Cliffs, USA, 1990.
- Ghali, A., and A.M. Neville, "Structural Analysis," McGraw-Hill, New York, USA, 1986.
- Wang, C.K., "Matrix Methods of Structural Analysis," International Text Book Company, PA, USA, 1970.
- Arbabi, F., "Structural Analysis and Behavior," McGraw-Hill, New York, USA, 1991.
- Nelson, J.K., and J.C. McCormack, "Structural Analysis: Using Classical and Matrix Methods," Third Edition, John Wiley and Sons, 2003.

Course Code : CB 741

Course Title : Experimental Methods in Civil Engineering

Credit Hours : 3

Course Description

Probability distribution of random variables, data analysis, sampling distribution of means and variances, influence about one mean, difference between two means, comparison of more than two means (ANOVA), randomization block design, factorial design, fractional factorial design.

Course Objectives

To understand the concepts of statistical analysis of data, design experimental programs, and learn the different methods of analyzing data.

Course Topics

- Probability distribution of random variables
- Data analysis and sampling distribution of means and variances
- Influence about one mean, difference between two means, comparison of more than two means (ANOVA)
- Randomization block design, factorial design
- Fractional factorial design

References

- Crandall, K.C., and R.W. Seabloom, "*Engineering Fundamentals; in Measurements, Probability, Statistics, and Dimensions*," McGraw-Hill, New York, 1970.
- Mason, R.F., J. Gunst, and L. Hess, "*Statistical Design and Analysis of Experiments: with Applications to Engineering and Science*," Wiley, New York, 1989.
- Wayne, L., "*Accelerated Testing: Statistical Models, Test Plans and Data Analyses*," New York, Wiley, 1990.
- Shelemyahu, Z., "*Introduction to Reliability Analysis: Probability Models and Statistical Methods*," Springer-Verlag, New York, USA, 1992.
- Montgomery, D.C., G.R. Runger, and N.F. Hubele, "*Engineering Statistics*," Wiley, New York, 1998.

Course Code : CB 742

Course Title : Concrete Durability

Credit Hours : 3

Course Description

Design of concrete mixtures for durability, permeability of concrete and factors affecting it, organic and inorganic acid attack of concrete, effect on sulfates on concrete, effect of chlorides on the durability of concrete, effect of sea water on concrete, corrosion of steel reinforcement and its protection.

Course Objectives

To introduce the students with the long-term properties of concrete materials, prevention of deterioration, and sustainability for long term.

Course Topics

- Design of concrete mixtures for durability
- Permeability of concrete and factors affecting it
- Organic and inorganic acid attack of concrete
- Effect of sulfates on concrete
- Effect of chlorides on the durability of concrete
- Effect of sea water on concrete
- Corrosion of steel reinforcement and its protection

References

- Mehta, P.K., and Monterio, P.J.M., "Concrete: Structure, Properties, and Materials," Second Edition, Prentice-Hall, Englewood Cliffs, USA, 1994.
- Neville, A.M., "Properties of Concrete," Third Edition, Longman Scientific and Technical, England, 1983.
- Illston, J.M., "Construction Materials: Their Nature and Behavior," E. and F.N. Spon, 1994.
- American Concrete Institute, "Manual of Concrete Practice," Parts 1-5, Detroit, USA, 1995.
- ASTM standards, 2004.
- Ulm, F.J., "Creep, Shrinkage, and Durability Mechanics of Concrete and Other Quasi Brittle Materials," Pergamon Press Inc., 2001.

Course Code : CB 743

Course Title : Fiber Reinforced Cementitious Composites

Credit Hours : 3

Course Description

Fiber reinforcement of cement based matrices; continuous and discontinuous fibers and meshes. Fiber reinforced concrete and Ferro-cement. Behavior and mechanical properties. Mechanics of fiber reinforcement. High strength, high performance fiber composites. Fiber reinforced plastic reinforcement.

Course Objectives

To introduce the students to different properties of FRC, their behavior and application. New Developments of FRP are to be targeted.

Course Topics

- Fiber reinforcement of cement-based matrices
- Continuous and discontinuous fibers and meshes
- Fiber reinforced concrete and ferro-cement
- Behavior and mechanical properties
- Mechanics of fiber reinforcement
- High strength high performance fiber composites
- Fiber reinforced plastic reinforcement

References

- Nanni, A., "Fiber Reinforced Plastic Reinforcement for Concrete Structures: Properties and Applications," Elsevier Publishers, New York, 1993.
- Concrete Shah, S.P., and G.B. Batson, "Fiber Reinforced Concrete, Properties and Applications," American Concrete Institute, Detroit, USA, 1987.
- Banthia, N., C. Macdonald, and P. Tatnall, "Structural Applications of Fiber Reinforced Concrete," American Concrete Institute, Farmington Hills, MI, 1999.
- Stevens, D.J., "Testing of Fiber Reinforced Concrete," American Concrete Institute, Farmington Hills, MI, 1995.
- Manual of Concrete Practice, American Concrete Institute, Farmington Hills, MI, 1995.
- Stang, H., "Mechanics of Fiber Reinforced Concrete: Materials Design for Structural Applications," Research Studies Press, 2005.

Course Code : CB 744

Course Title : Advanced Strength of Materials

Credit Hours : 3

Course Description

General theory of torsion, nonsymmetrical bending, transverse shear, thin-walled beams, beams on elastic foundations, thick-walled cylinders. Basic contact mechanics. Failure criteria of solids.

Course Objectives

The course aims to give students the basic understanding of stress analysis of structural elements. It also covers the subjects of calculation of rotations and deflections of such elements and the stability of columns.

Course Topics

- Properties of Areas.
- Normal stresses - Axial stresses.
- Normal stresses - Bending stresses.
- Normal stresses - Thermal stresses
- Direct shear stresses.
- Shear stresses.
- Torsional stresses.
- Principal stresses and strains.
- Elastic deflection of beams – Double integration.
- Elastic deflection of beams – Conjugate beam.
- Buckling of columns

References

- Mechanics of Materials by BEER, F. and JOHNSTON, E.R., Publisher: McGraw-Hill, New York, USA, Latest Edition.
- Mechanics of Engineering Materials by BENHAM, P. and CRAWFORD,Z.R. Publisher: Longman Group, Latest Edition.
- Mechanics of Materials by POPOR, E.P. Publisher: Prentice-Hall Englewood cliffs due to different condition loading.
- Mechanics of Materials by R.C. HIBBELER , Publisher: McMillan, New York, Latest Edition.
- Strength of Materials by R.S.KHURMI, Publisher: S.Chand & Company, NewDelhi, Latest Edition.
- Mechanics of Materials by GERE & TIMOSHENKO, Publisher: PWS-KENT Publisher, Latest Edition.

Course Code : CB 745

Course Title : Advanced Design of Reinforced Concrete Structures

Credit Hours : 3

Course Description

Inelastic behavior of reinforced concrete beams and columns. Combined bending, shear and torsion in beams. Behavior of beams, columns, and walls under seismically induced load reversals. Analysis and design of connections.

Course Objectives

To introduce the students to the advanced design concepts of the reinforced concrete structures.

Course Topics

- Analysis and design of beams and columns subjected to bi-axial bending.
- Inelastic behavior of reinforced concrete beams and columns.
- Combined bending, shear and torsion in beams
- Behavior of beams, columns, and walls under seismically induced load reversals.
- Analysis and design of connections.

References

- Kong, F.K., and R.H. Evans, "*Reinforced and Prestressed Concrete*," Chapman and Hall, London, 1987.
- Wang, C.K., and C.G. Salmon, "*Reinforced Concrete Design*," Fourth Edition, Harpor and Row Publishers, NY, 1998.
- Park, R., and T. Paulay, "*Reinforced Concrete Structures*," Wiley, 1990.
- *Building Code Requirements for Reinforced Concrete*, ACI 318-04.
- *Egyptian Code of Practice for Reinforced Concrete*, 2004.
- McCormack, J.C., and J.K. Nelson, "*Design of Reinforced Concrete*," Sixth Edition, John Wiley and Sons, 2004.

Course Code : CB 746

Course Title : Advanced Pre-stressed Concrete

Credit Hours : 3

Course Description

Prestressing in statically indeterminate structures; design of prestressed concrete slabs; analysis and design of partially prestressed concrete beams; nonlinear analysis; analysis of members prestressed with unbonded tendons; prestressed compression members; special research and/or application related topics.

Course Objectives

To familiarize the students to concepts of analysis and design of indeterminate prestressed concrete structures.

Course Topics

- Prestressing in statically indeterminate structures
- Design of prestressed concrete slabs
- Analysis and design of partially prestressed concrete beams
- Nonlinear analysis
- Analysis of members prestressed with unbonded tendons
- Prestressed compression members
- Special research and/or application related topics

References

- Lin, T.Y., and N.H. Burns, "*Design of Prestressed Concrete Structures*," Wiley, NY, USA, 1981.
- *PCI Design Handbook*, Precast and Prestressed concrete, Precast-Prestressed Institute, Chicago, 1999.
- Naaman, A.E., "*Prestressed Concrete Analysis and Design: Fundamentals*," McGraw Hill Publishers, NY, 1982.
- *Building Code Requirements for Reinforced Concrete*, ACI 318-83.
- Kong, F.K., and R.H. Evans, "*Reinforced and Prestressed Concrete*," Chapman and Hall, London, 1987.
- Hilal, M., "*Fundamentals of Reinforced and Prestressed Concrete*," J. Macro Publishers, Cairo, 1971.
- Gerwick, B., "*Construction of Prestressed Concrete Structures*," Second Edition, Wiley, NY, 1993.
- Nawy, E.G., "*Prestressed Concrete: A Fundamental Approach*," Fourth Edition, Prentice Hall, 2002.

Course Code : CB 747

Course Title : Repair of Concrete Structures

Credit Hours : 3

Course Description

Concrete behavior: embedded metal corrosion, disintegration mechanics, moisture effects, load effects, concrete evaluation, surface repair, strengthening and stabilization, protection.

Course Objectives

To introduce the students to different causes and methods of repair in reinforced concrete structures, and Concrete behavior: embedded metal corrosion, disintegration mechanics, moisture effects, load effects, concrete evaluation, surface repair, strengthening and stabilization, protection

Course Topics

- Concrete behavior
- Embedded metal corrosion
- Disintegration mechanics
- Moisture effects and load effects
- Concrete evaluation
- Surface repair
- Strengthening and stabilization
- Protection

References

- Son, L.H., and G.C.S. Yuen, "*Building Maintenance Technology*," MacMillan Press, London, 1993.
- Mailvaganam, N.P., "*Repair and Protection of Concrete Structures*," CRC Press, Florida, USA, 1991.
- Krstulovic-Opara, N., "*SP-185 High Performance Fiber Reinforced Concrete in Infrastructure Repair and Retrofit*," American Concrete Institute, Farmington Hills, MI, USA, 2000.

Course Code : CB 748

Course Title : Bridge Structures

Credit Hours : 3

Course Description

Advanced concepts and modern trends in design of bridges. Rehabilitation, repair, and retrofit of existing bridges. Use of relevant codes. Study of Alternative structural forms and materials for efficiency and economy. Design problems and reports.

Course Objectives

The course covers the subjects of planning, bracing of metal structures and the design of its elements and their connections. The course deals with also the subject of the construction of metal structures in addition to the safety precautions, durability and sustainability.

Course Topics

- Introduction to metallic structures.
- Planning and bracing of steel structures, Applications.
- Design of steel tension members, Worked examples
- Design of axially loaded compression steel members, Worked examples
- Design of steel beams and its supports, Worked examples.
- Design of steel beam-columns, Worked examples
- Design of bolted steel connections, Worked examples
- Design of welded steel connections, Worked examples
- Design of special steel connections, Worked examples.
- Design of steel frames
- Design of steel bridges
- Construction of steel structures

References

- Behavior, Analysis and design of Structural Steel Elements by MACHALY, EL-SAYED BAHAA Publisher: Vol. 1, Cairo university, Egypt, Latest Edition.
- Behavior, Analysis and design of Steelwork Connections by MACHALY, EL-SAYED BAHAA Publisher: Vol. 3, Cairo university, Egypt, Latest Edition.
- Egyptian Code of Practice for Steel Constructions and Bridges, Code No. 205/ Latest Edition.
- Egyptian Code of Practice for Loads in Buildings, Code No. 45, Latest Edition.
- Basic Steel Design by JONSTAN, B.G., Lin, F.J. and GALAMOS, T.V., Publisher: Prentice Hall, Englewood, Cliffs, USA, Latest Edition.

Course Code : CB 749

Course Title : Finite Element Method

Credit Hours : 3

Course Description

Introduction to the finite element method; Formulation of various finite element stiffness in one, two, and three dimensions; presentation of the principles of modeling and analysis of civil engineering problems using linear, planar, plate, and solid elements; application of the finite element principles to practical problems; introduction to a typical finite element software package.

Course Objectives

To introduce the students to the concepts and methods of finite element analysis of structures.

Course Topics

- Introduction to the finite element method
- Formulation of various finite element stiffness in one, two, and three dimensions
- Presentation of the principles of modeling and analysis of civil structures
- Application to practical problems
- Introduction to a typical finite element software package

References

- Dynamics of Structures by CHOPRA, ANIL K., Publisher: Theory and Applications to Earthquake Engineering, Prentice-Hall, Englewood Cliffs, USA., Latest Edition.
- Structural Dynamics: Theory and Computation by PAZ, M Publisher: Van Nostrand Reinhold Company, New York, Latest Edition.
- Probabilistic Theory of Structural Dynamics by LIN, Y Publisher: McGraw-Hill Inc., Latest Edition.

Course Code : CB 740-S

Course Title : Theory of Elasticity

Credit Hours : 3

Course Description

Fundamentals of isotropic linear elasticity. Solution of plane elasticity problems. St. Venant bending and torsion. Basic three-dimensional solutions.

Course Objectives

The aim of this course is to give the students the basic understanding of structural and stress analyses of structures.

Course Topics

- Introduction, Reactions, Loads.
- Internal forces in beams subjected to concentrated loads.
- Structural Analysis of beams subjected to distributed loads.
- Structural Analysis of inclined members.
- Structural Analysis of frames
- Structural Analysis of Trusses.
- Properties of areas.
- Normal stress distribution
- Shear stress distribution.
- Deflection of beams.

References

- Structures (SI Units) by Schodek, Daniel Publisher: Prentice Hall.
- Mechanics of Materials by BEER, F.P. & JOHNSTON, E.R Publisher: McGraw Hill Book Company, New York
- Analysis and Behavior of Structures by ROSSOW, EDWIN C Publisher: Prentice Hall, New Jersey, USA, Latest Edition.
- Structural Analysis by TARTAGLIONE, LOUIS C. Publisher: McGraw Hill, New York, USA, Latest Edition.
- Analysis of Structures by WEST, HARRY H. Publisher: John Wiley & Sons, New York, USA, Latest Edition.
- Fundamental of Structural Analysis by WEST, HARRY H. Publisher: John Wiley & Sons, Inc., New York, USA, Latest Edition.

Course Code : CB 741-S

Course Title : Plastic Analysis and Design of Structures

Credit Hours : 3

Course Description

Plastic analysis of structural frames. Rules of practice for the plastic design of steel and reinforced concrete structures, Design problems and reports, shear stress distribution, and deflection of beams.

Course Objectives

The aim of this course is to give the students the basic understanding of structural and stress analyses of structures

Course Topics

- Introduction, Reactions, Loads.
- Plastic analysis of structural frames
- Rules of practice for the plastic design of steel and reinforced concrete structures
- Design problems and reports
- Shear stress distribution.
- Deflection of beams.

References

- *Structures (SI Units)* by Schodek, Daniel Publisher: Prentice Hall.
- *Mechanics of Materials* by BEER, F.P. & JOHNSTON, E.R Publisher: McGraw Hill Book Company, New York
- *Analysis and Behavior of Structures* by ROSSOW, EDWIN C Publisher: Prentice Hall, New Jersey, USA, Latest Edition.
- *Structural Analysis* by TARTAGLIONE, LOUIS C. Publisher: McGraw Hill, New York, USA, Latest Edition.
- *Analysis of Structures* by WEST, HARRY H. Publisher: John Wiley & Sons, New York, USA, Latest Edition.
- *Fundamental of Structural Analysis* by WEST, HARRY H. Publisher: John Wiley & Sons, Inc., New York, USA, Latest Edition.

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- Course Code :** CB 742-S
- Course Title :** Earthquake Engineering
- Credit Hours :** 3

Course Description

Development of a rational basis for design of earthquake resistant design. Engineering characterization of earthquakes; dynamics of inelastic systems; response of inelastic structures; structural system design considerations; modeling and analysis of buildings; performance-based design; an advanced seismic design topic of choice, time permitting. Application of relevant design specifications.

Course Objectives

To introduce the students to the design of structures that would sustain dynamic loading (earthquake forces).

Course Topics

- Engineering characterization of earthquakes
- Dynamics of inelastic systems; response of inelastic structures
- Structural system design considerations
- Modeling and analysis of buildings
- Performance-based design
- Application of relevant design specifications

References

- Chopra, A.K., "*Dynamics of Structures: Theory and Applications to Earthquake Engineering*," Prentice-Hall, USA, 2000.
- Paz, M., "*Structural Dynamics: Theory and Computation*," Second Edition, Van Nostrand Reinhold, NY, 1985.
- Ghosh, S., "*Earthquake-Resistant Concrete Structures*," American Concrete Institute, Detroit, USA, 1991.
- Ambrose, J., "*Simplified Building Design for Wind and Earthquake Forces*," Wiley, NY, 1995.
- Fanella, D., "*Design of Low-Rise Concrete buildings for Earthquake Forces*," Portland Cement Association, Illinois, USA, 1997.
- Naeim, F., "*The Seismic Design Handbook*," Kluwer Academic Publishers, Second Edition, 2001

Course Code : CB 743-S

Course Title : Design of Special Metallic Structures

Credit Hours : 3

Course Description

Design of special steel structures (towers, masts, tanks, etc), torsion of open and box members. Design of tall buildings. Behavior of steel and aluminum structural members is studied with reference to their code design procedures.

Course Objectives

To introduce the students to the design concepts of special steel structures (towers, masts, tanks, etc), torsion of open and box members. Design of tall buildings. Behavior of steel and aluminum structural members is studied with reference to their code design procedures.

Course Topics

- Design of special steel structures (towers, masts, tanks, etc)
- Torsion of open and box members
- Behavior of steel and aluminum structural members
- Code design procedure
- Design of special steel connections, Worked examples
- Design of steel frames
- Design of steel bridges
- Construction of steel structures

References

- Johnston, B.G., F.J. Lin, and T.V. Galambos, "*Basic Steel Design*," Third Edition, Prentice-Hall, Englewood Cliffs, USA, 1986.
- American Institute of Steel Construction, "*Manual of Steel Construction*," Ninth Edition, 2001.
- *Egyptian code requirements for steel structures.*
- Cooper, S.E., and A.C. Chen, "*Designing Steel Structures: Methods and Cases*," Prentice-Hall, Englewood Cliffs, USA, 1985.
- Salmon, C.G., and R.P. Johnson, "*Steel Structures: Design and Behavior*," Second Edition, Harper and Row, 1980.
- Behavior, Analysis and design of Structural Steel Elements by MACHALY, EL-SAYED BAHAA Publisher: Vol. 1, Cairo university, Egypt, Latest Edition.
- Behavior, Analysis and design of Steelwork Connections by MACHALY, EL-SAYED BAHAA Publisher: Vol. 3, Cairo university, Egypt, Latest Edition.
- Egyptian Code of Practice for Steel Constructions and Bridges, Code No. 205/ Latest Edition.

Course Code : CB 744-S

Course Title : Composite Structures

Credit Hours : 3

Course Description

Design load for steel bridges according to the Egyptian code requirements, Design of steel structural elements of bridges. Construction methods for steel bridges. Design of composite structural elements, columns beams and beam- columns. Design of and Constructions of structural elements made of cold-formed steel sections.

Course Objectives

To familiarize the students with the advanced concepts of design and analysis of composite structures. Also gives full interaction of simple and continuous composite beams, types of connections, partial interaction theory of simple and continuous beams, effect of slip and uplift at the interface concrete slab-steel beams, analysis of composite columns.

Course Topics

- Full interaction of simple and continuous composite beams
- Types of connections
- Partial interaction theory of simple and continuous beams
- Effect of slip and uplift at the interface concrete slab-steel beams
- Analysis of composite columns
- Design of composite steel-concrete structural elements (composite beams, composite columns & composite beam-columns).
- Design and construction of Structural Elements made of cold-formed steel sections

References

- Egyptian code of practice for steel construction and bridges code No.205/ Latest Edition.
- Johnson, R.P., "Composite Structures of Steel and Concrete, Volume 1: Beams, Slabs, Columns, and Frames for Buildings," Second Edition, Blackwell Scientific Publications, London, 1994.
- Johnson, R.P., "Composite Structures of Steel and Concrete, Volume 1: Beams, Slabs, Columns, and Frames for Buildings," Second Edition, Blackwell Scientific Publications, London, 1994.
- Narayanan, R., "Steel-Concrete Composite Structures," Elsevier Applied Science, NY, 1988.
- Kalamkarov, A., "Analysis, Design, and Optimization of Composite Structures," John Wiley and Sons, England, 1997.
- Wang, C.K., and C.G. Salmon, "Reinforced Concrete Design," Fourth Edition, Harpor and Row Publishers, NY, 1985.
- Kollár, L.P., and G.S. Springer, "Mechanics of Composite Structures," Cambridge University Press, 2003.

Course Code : CB 745-S

Course Title : Reliability in Civil Engineering

Credit Hours : 3

Course Description

The role of risk and probability in Civil Engineering is described and basic probability concepts are presented. Probability distribution functions commonly used to model and analyze Civil Engineering problems are discussed. Methods for estimating parameters and determining distribution models from observational data are introduced. Monte Carlo simulation methods are practiced. Detailed examples of the application of probabilistic methods to structural, transportation, hydrological, and environmental system design are presented throughout the course.

Course Objectives

This course aims to introduce civil engineers to studying reliability and its applications in different fields of civil engineering. A variety of related problems that may evolve in the site is studied and explained.

Course Topics

- Fundamental Concepts related to structural reliability
- Probabilistic treatment of civil engineering systems
- Sample statistics, parameter estimation, and confidence intervals
- Test if a distribution fits sampled data
- Regression analysis

References

- Ang, A.H-S., and W.H. Tang (1975), "*Probability Concepts in Engineering Planning and Design, Basic Principles*", Vol. I. Wiley, NY.
- Andrews J. D., and T. R. Moss (2000), "*Reliability and Risk Assessment*", Second Edition, Professional Engineering Publishing, London.
- Modarres, M. (1993), "*Reliability and Risk Analysis: What Every Engineer Should Know About Reliability and Risk Analysis*", Marcel Dekker, Inc., NY.
- Ushakov, A., and R. A. Harrison (1994), "*Handbook of Reliability Engineering*", Wiley, NY.

Course Code : CB 746-S

Course Title : Advanced Concrete Technology

Credit Hours : 3

Course Description

Defining the raw materials of concrete and their properties, proportioning of concrete mixtures, durability of concrete, introducing different type of concrete.

Course Objectives

The aim of the course is to emphasize the importance of and introduce the advanced topics in concrete technology for construction Engineers.

Course Topics

- Introduction to concrete Manufacturing.
- Properties of raw materials of concrete.
- Fresh concrete Properties.
- Microstructure, strength and dimensional stability.
- Proportioning of concrete mixtures.
- Durability of concrete.
- Non-destructive testing.
- Special types of Concrete.
- Advances in concrete mechanics.

References

- Properties of concrete by M Neville Publisher: longman scientific and technical, England, Latest Edition
- Concrete: Structure, properties, and Materials by P.K.Mehta and P.J. Monerio Publisher: 2nd Edition, Prentice-Hall, Englewood Cliffs,USA, Latest Edition.
- Manual for concrete practice by American Concrete institute Publisher: Parts 1 5, detroit, USA, Latest Edition.
- Concrete by M.Sidney and Y.Francis Publisher: printice-Hall, Inc. Englewood cliffes, N.J.07632. Latest Edition.

Faculty Members

(in alphabetical order)

- **AHMED AWAD**
Ph.D. (2006) Nottingham University, UK
Construction Management
- **AHMED RAGHEB**
Ph.D. (1994) Rensselaer Polytechnic Institute, USA
Geotechnical Engineering
- **AKRAM SOLIMAN**
Ph.D. (2003) Nottingham University, UK
Coastal Engineering and Hydraulics
- **ALY I. EL-DARWISH**, Head of Department
Ph.D. (1994) Michigan State University, USA
Construction Materials and Reinforced Concrete Structures
- **EHAB EL-KASSAS**
Ph.D. (2001) Dundee University, UK.
Structural Engineering
- **HESHAM BASSIONI**
Ph.D. (2004) Loughborough University, UK
Construction Management
- **KARIM M. HELMY**
Ph.D. (2007) University of Manitoba, Canada
Structural Engineering
- **KHALED SHAWKI**
Ph.D. (2002) Alexandria University, Egypt
Construction Engineering
- **MOHAMED FODA**
Ph.D. (1988) McGill University, Canada
Transportation and Highway Engineering
- **MOHAMED IHAB EL-MASRY**
Ph.D. (2004) University of Southern California, USA
Structural Engineering
- **MOHAMED RASLAN**
Ph.D. (1987) Southampton University, UK
Structural Engineering and Metallic Structures
- **MORSY Alaa**
Ph.D. (2009) Alexandria University, Egypt
Structural Engineering

- **NABIL EL-ASHKAR**
Ph.D. (2002) Georgia Institute of Technology, USA
Construction Materials
- **NABIL ISMAIL**
Ph.D. (1981) University of California, Berkeley, USA
Coastal Engineering and Water Resources
- **TAREK M. ABDEL-AZIZ**
Ph.D. (2007) Alexandria University, Egypt
Geotechnical Engineering
- **USAMA ELSHAMY**
Ph.D. (2005) Rensselaer Polytechnic Institute, USA
Geotechnical Engineering.
- **WAEEL KAMEL**
Ph.D. (1994) University of Paul Sabatier, France
Environmental Engineering

General Rule for Graduation

For Graduation [M.Sc. in Construction & Building Engineering]

A student should complete (with satisfactory grades) a total of 8 courses (24 Credit Hours) and a thesis (12 Credit Hours) with a total of (36 Credit Hours).

A student can take into account a maximum of 7 courses (21 Credit Hours) from the same special division for the completion of the requirements of his graduation.

For Graduation [M.Sc. in Construction & Building Engineering (special division)]

A student should complete at least 5 courses (15 Credit Hours) at the special division and a thesis (12 Credit Hours) at the same special division.

Note:

- Each student must have a supervisor by the end of the first term.
- An advising committee, assigned by the department council, will be acting as the academic advisor for the student until he chooses a supervisor.
- The student after consulting with his supervisor chooses the courses.