

STUDY PLAN

MASTER IN (Civil Engineering/Structures) (Thesis Track)

Plan Number		2012	T
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I. GENERAL RULES CONDITIONS:

1. This plan conforms to the valid regulations of the programs of graduate studies.
2. Background requirements for Master program:
 - Bachelor Degree in Civil Engineering.& Bachelor Degree in Highway and Bridges Engineering

II. SPECIAL CONDITIONS:

The Teaching Language of the Program is English.

III. THE STUDY PLAN : Studying (33) Credit Hours as follows:

1. Core courses: (18) Credit Hours:

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
0901732	Advanced Mechanics of Materials	3	3	-	-
0901733	Matrix Structural Analysis	3	3	-	-
0901734	Structural Dynamics	3	3	-	-
0901736	Plastic Design of Steel Structures	3	3	-	-
0901737	Prestressed Concrete	3	3	-	-
0901747	Advanced Numerical Methods	2	2	-	-
0901748	Scientific Research Methodology	1	1	-	-

2. Elective Courses: Studying (6) Credit hours from the following:

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
0901735	Behavior of Reinforced Concrete Elements	3	3	-	-
0901739	Bridge Engineering	3	3	-	-
0901741	Earthquake-Resistant Structures	3	3	-	-
0901742	Composite Structures	3	3	-	-
0901744	Structural Stability	3	3	-	-
0901745	Finite Element Methods	3	3	-	-
0901746	Plates and Shells	3	3	-	-
0901791	Special Topics in Civil Engineering	3	3	-	-

3. Thesis: 9 Credit hours (0901799).

STUDY PLAN

**MASTER IN (Civil Engineering/Structures)
(None Thesis Track)**

Plan Number			2012	N
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IV. GENERAL RULES CONDITIONS:

1. These requirements shall conform with the regulations of the general frame of the program of Graduate Studies.
2. Background requirements for Master program:
 - Bachelor Degree in Civil Engineering.& Bachelor Degree in Highway and Bridges Engineering

- V. SPECIAL CONDITIONS:** None.
The Teaching Language of the Program is English.

VI. THE STUDY PLAN : Studying (33) Credit Hours as follows:

1. Core courses: (21) Credit Hours:

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
0901732	Advanced Mechanics of Materials	3	3	-	-
0901733	Matrix Structural Analysis	3	3	-	-
0901734	Structural Dynamics	3	3	-	-
0901736	Plastic Design of Steel Structures	3	3	-	-
0901737	Prestressed Concrete	3	3	-	-
0901744	Structural Stability	3	3	-	-
0901747	Advanced Numerical Methods	2	2	-	-
0901748	Scientific Research Methodology	1	1	-	-

2. Elective Courses: Studying (12) Credit hours from the following:

Course No.	Course Title	Credit hrs.	Theory	Prac.	Pre-request
0901735	Behavior of Reinforced Concrete Elements	3	3	-	-
0901739	Bridge Engineering	3	3	-	-
0901741	Earthquake-Resistant Structures	3	3	-	-
0901742	Composite Structures	3	3	-	-
0901745	Finite Element Methods	3	3	-	-
0901746	Plates and Shells	3	3	-	-
0901791	Special Topics in Civil Engineering	3	3	-	-

3. A comprehensive exam (0901798).

Course Description

- 0901732 Advanced Mechanics of Materials (3 credit hours)**
Tensor algebra, theory of elasticity, stress functions, stress-strain relationships, the torsion problem, non-symmetric bending, curved beams, elastically supported beams, failure theories.
- 0901733 Matrix Structural Analysis (3 credit hours)**
Matrix formulation of the force and displacement methods, direct stiffness method, special considerations in formulation including non-prismatic members, rigid offsets and flexible ends.
- 0901734 Structural Dynamics (3 credit hours)**
Differential equation of motion of SDFS subjected to different excitations, modal analysis of MDFS, numerical methods in dynamic analysis, deterministic analysis of MDFS subjected to earthquakes, response spectra.
- 0901735 Behavior of Reinforced Concrete Elements (3 credit hours)**
Material properties, beam behavior, requirements of equilibrium, compatibility and stress-strain relationships, code assumptions, ductility of rectangular and flanged sections, shear, beam-columns, load-moment-curvature curves, triaxial stresses in concrete, influence of cyclic loading, time-dependent deflections at service-loads, torsion.
- 0901736 Plastic Design of Steel Structures (3 credit hours)**
Introduction to Theory of Plasticity. Failure criteria. Limit analysis theorems; lower bound, upper bound, and uniqueness. Application in one-dimensional steel elements, trusses, beams, beam-columns, and frames. Extension to two-dimensional elements (plates). Mechanisms, deflection, and second-order effect at ultimate state.
- 0901737 Prestressed Concrete (3 credit hours)**
Materials, prestressing systems and methods, loss of prestress, analysis and design of sections for flexure, and axial tension. ultimate strength, camber, deflections, cable layout of pre-tensioned beams, shear, design of composite sections, bonded and unbonded beams, end anchorages.
- 0901739 Bridge Engineering (3 credit hours)**
Classification of bridges superstructures and substructures, AASHTO standards, highway loads and other bridge loading, transverse and longitudinal distribution, R/C and prestressed concrete design requirements, steel bridges, bearing systems.
- 0901741 Earthquake-Resistant Structures (3 credit hours)**
Characteristics of earthquakes. Linear and nonlinear dynamic response to earthquakes. Hysteresis models. Behavior of structures under earthquake excitation; force reduction, ductility demand and capacity, energy dissipation. Seismic isolation. Design of earthquake-resistant structures. Buildings; structural systems, diaphragms, codes (UBC,ACI). Bridges, structural systems, codes (AASHTO).
- 0901742 Composite Structures (3 credit hours)**
Design and behavior of steel members under tension and compression, bending and lateral buckling of beams, torsion in beams, beam-columns, buckling of plates, composite construction, design and analysis of composite beams, columns and beam columns.
- 0901744 Structural Stability (3 credit hours)**
Equilibrium paths and critical points, bifurcation and energy approach. Elastic and inelastic buckling of columns, stability functions, coupled buckling modes. stability of structural systems by matrix formulation, 3D analysis of line elements, flexural torsional buckling, lateral torsional buckling, plate buckling, post buckling behavior.
- 0901745 Finite Element Methods (3 credit hours)**
Theory of finite element, formulation for frame, plane stress, plane strain, axi-symmetric and solid elastic elements, isoparametric formulation and implementation, plate and shell elements, application of the method using ready software packages.
- 0901746 Plates and Shells (3 credit hours)**
Bending theory of rectangular and circular thin plates, plates on elastic subgrade, contact pressure. Introduction to shell theories, membrane theory of shells of revolution, bending theory

of shells of revolution loaded axi-symmetrically, membrane theory of cylindrical shells, analysis of shallow spherical shells.

0901747 Advanced Numerical Methods (2 credit hours)

Mathematical preliminaries, computer precision, loss of significance, error propagation, interpolating polynomials, numerical differentiation and integration, numerical solution of differential equations (ODE), initial and boundary values, linear and nonlinear systems, approximation theory, direct methods, iterative techniques (Eigenvalues), characteristics and boundary integral equation methods, curve fitting, least squares, Spline, Fourier approximation, discrete and fast Fourier transforms, numerical algorithms for advanced engineering problems.

0901748 Scientific Research Methodology (1 credit hour)

Skills required to conduct scientific research Data collection, resource survey, analysis and discussion of information and formulation of conclusions. Styles of technical writing with application to research papers and reports.

0901791 Special Topics in Civil Eng. (3 credit hours)

Structured presentation of new and developing areas of knowledge in civil engineering offered by the faculty in their specialized areas of expertise to augment the formal courses available.