Ministry of Science Research and Technology

DANESHPAJOOHAN PISHRO
Higher Education Institute

MSc in Civil Eng. Structure

DANESHPAJOOHAN PISHRO HIGHER EDUCATION INSTITUTE

- **COURSE CHART**
- **SYLLABUS**

MSc. Civil Eng. Earthquake Course Chart

Earthquake Eng. Courses

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033012	Dynamics of Structures	3	3	0	-----	-----
3031001	Seismology and Earthquake Engineering	3	3	0	-----	-----
3031002	Soil Dynamics	3	3	0	-----	-----
3031003	Seismic Design of Structures	3	3	0	-----	-----
3031004	Seminar	2	2	0	(from the third semester)	-----
3031005	Thesis	6	0	6	-----	Seminar
Total Credits		20				

Elective Courses (not complete)

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033011	Advanced Engineering Mathematics	3	3	0	-----	-----
3033013	Theory of Elasticity and Plasticity	3	3	0	-----	-----
3033014	Finite Element Method	3	3	0	-----	-----
	Continuum Mechanics	3	3	0	-----	-----
Total Credits		-	Note: students have to pass 12 credits from elective courses.			

Dynamics of Structures

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033012	Dynamics of Structures	3	3	0	-----	-----

Single Degree-of-Freedom Systems: Equations of Motion: System Properties: Mass, Spring, Damper, Force - Displacement Relation, Force -Velocity Relation, Force - Acceleration Relation, Force Excitation, Earthquake Excitation, Solution of Differential Equation : Free Vibration: Undamped Systems, Damped Systems, Force Vibration: Undamped Systems, Damped Systems, Response to Harmonic and Periodic Excitations, Response to Arbitrary, Step and Pulse Excitations, Numerical Evaluation of Dynamic Response: Time Stepping Methods, New marks Method, Generalized Single-Degree-of-Freedom Systems: Rigid Body Assemblage , Systems with Distributed Mass and Elasticity, Lumped Mass System: Shear Building, **Multi-Degree-of Freedom Systems:** Planar or Symmetric Plan Systems, Asymmetric Plan Buildings, Dynamic Analysis and Response to Linear Systems, Modal Analysis, **Introduction to Nonlinear Systems**

Seismology and Earthquake Engineering

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3031001	Seismology and Earthquake Engineering	3	3	0	-----	-----

This course provides the fundamental concepts, principles and application of earthquake engineering in seismic analysis and design of structures.

The course begins with the Seismology explaining the causes of occurrence of earthquake and its characterization. The seismic analysis of the structures under earthquake excitation is developed. The structural system modeled as discrete and continuous system.

The concept of response spectrum analysis procedure to determine structure response and design earthquake forces is explained.

Soil Dynamics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3031002	Soil Dynamics	3	3	0	-----	-----

Vibration of single & multi degree freedom systems, fundamentals of soil mechanics, wave propagation & wave velocities, liquefaction phenomena, landslide phenomena, dynamic tests of soils, soil-structure interaction.

Seismic Design of Structures

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3031003	Seismic Design of Structures	3	3	0	-----	-----

1. Providing a basic understanding of earthquakes.
2. Basic principles of structural dynamics with emphasis on applications to the earthquake resistant design of building structures.
3. Review and compare the static and dynamic seismic design forces.
4. Determining the role of architectural design on building's seismic performance.
5. Deals with the problems of drift and lateral stability of building structures.
6. Design for drift and lateral stability.
7. Seismic design of steel and concrete building structures.
8. Modern approach to earthquake resistant design "Performance based seismic engineering"

Seminar

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3031004	Seminar	2	2	0	(from the third semester)	-----

In this course students, with the help and supervision of their instructor, will choose a topic (usually the same as their thesis), and study and investigate all the previous and modern researches and facts about it. Subsequently they have to prepare and present their results and conclusions for the whole class, in the form of a seminar.

Thesis

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3031005	Thesis	6	0	6	-----	Seminar

In this project students will choose and study a specific subject or problem and find its answer or solution, through practical analyzing, experiencing, and experimenting. Eventually, students will compile their theses and present them as their final project.

Advanced Engineering Mathematics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033011	Advanced Engineering Mathematics	3	3	0	-----	-----

Vectorspaces, linear transformations. Canonical forms. Operators and inner product spaces. Functions of matrices. Linear difference equations. Analytic functions and Calculus of residues.

Theory of Elasticity and Plasticity

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033013	Theory of Elasticity and Plasticity	3	3	0	-----	-----

Theory of Stress, Theory of Strain, Constitutional Equations, ThreeDimensional Equations of Elasticity, Two-Dimensional Equations of Elasticity, Special Problems

This course also covers the main theories of materials plasticity, especially soils and the application of Mohr-coulomb, Von-Mises, and tresca plasticity theories to the practical problems of earthquake engineering.

Finite Element Method

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
3033014	Finite Element Method	3	3	0	-----	-----

Introduction to the Use of Finite Elements: Physical Problems and Mathematical Models, Formulation: Mathematical Fundamentals, Weighted Residual Approximations, Weak Formulation and Galerkin Method, Approximation in Solution of Differential Equations , Approximate Solution to Systems of Differential Equations, Differential Equations in Engineering Problems (Solid Mechanics, Heat Conduction), Virtual Work for Solid Problems, Variational Principles in FE Formulation, Continuity Requirements, Piecewise Trial Functions, The Concepts of Element and Shape-Function: One Dimensional Lagrange Shape-Functions (Linear and Higher Order Elements), Hermite Polynomials for Shape-Functions with Higher Continuity, Two Dimensional Quadrilateral Elements with Lagrange Polynomials, The Concept of Mapping, Isoparametric, Sub-Parametric and Super-Parametric 2D/3D Elements, Triangular an Tetrahedral Elements, Numerical Integration, Plate Formulation and Elements, Axisymmetric Solid/Shell Problems and the Associated Elements.

Continuum Mechanics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Co-requisite
	Continuum Mechanics	3	3	0	-----	-----

Basic concept, tensor algebra, tensor calculus, kinematics of deformation, the stress concept and the thermo-mechanical balance laws, selected topics in linear elasticity theory, selected topics in fluid mechanics, special theories of generalized continuum.