Introduction to Engineering Seismology - Web course

COURSE OUTLINE

The main objective of this course is to introduce the basic knowledge on earthquake engineering.

The course covers the source mechanics of earthquake, hazards and its consequences and also covers earthquake measurement and instrumentation.

By participating in and understanding all facts of this course, a student will be able to quantify different earthquake hazards and its effects (e.g. site effects, liquefaction, landslides etc) using different methods, which facilitate in planning new structures/project and retrofit old buildings and infrastructures.

COURSE DETAIL

Module No.	Course Content	No. of hours
1	Introduction to earthquake hazards; strong ground motions and site effects; landslides; liquefaction and tsunami damages	2
2	Early Engineering seismology and understanding of earthquakes	1
3	Introduction to engineering seismology; Terminologies and definitions; Earthquake types	2
4	Overview of plate tectonics; Earthquake source mechanisms; Source models; Types of faults; Activity and fault studies	3
5	Concepts of seismic	

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Civil Engineering

Pre-requisites:

1. Basic Engineering subjects.

Additional Reading:

1. Recent Advances in Earthquake Geotechnical Engineering and Microzonation Edited by Ansai Kluwer Academic Publishers, Netherlands, 2004.
2. Assessing and Managing Earthquake Risk Edited by Oliveira, C.S. and Roca, A. and Goula, X., Springer, Netherlands 2006.

Hyperlinks:

1. http://nisee.berkeley.edu/
2. http://www.ethiopians.com/earthquake_engineering_resources.htm

Coordinators:

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	magnitudes and intensity, earthquake size, different magnitude scales and relations	2
6	Theory of wave propagation; Seismic waves, body and surface waves.	2
7	Earthquake recording instrumentations; Concept of seismograph, Seismic station: Sensors and data loggers; Mechanical and digital sensors; Build your own seismograph,	3
8	Interpretation of Seismic Records - acceleration, velocity and displacement; Frequency and Time Domain parameters: Response Spectra and Spectral parameters; Epicenter and magnitude determination	3
9	World great Earthquakes, Large and Damaging Earthquakes of India	1
10	Instruction to seismic zones and codes, Global and National seismic hazard assessment mapping programs	2
11	Safety of individual site; Concept of seismic microzonation; Need for Microzonation; Types and Scale; Methodology	2
12	Introduction to Seismic Hazard Analysis; Methods: Deterministic and Probabilistic; Suitable method for your project; Attenuation models and Simulation of Strong Ground Motion	4
13	Introduction to Site characterization; Different methods and experiments; Geotechnical properties; Site classification and worldwide code recommendation	3

14	Concept of site response; Local site effects and evaluation methods; Ground motion amplifications and estimation; Development of response /design spectrum,	3
15	Introduction to liquefaction; Mechanism and factors causing liquefaction; estimation methods and procedures; Mapping	3
16	Earthquake induced landslide; Landslide hazard mapping; Tsunami hazard, Consideration for Tsunami hazard mapping	3
17	Concept of Risk and Vulnerability Studies; Different methods; Different level of risk assessment;	3
18	Introduction to GIS, Integration of hazard parameters on GIS Platform; Final zonation map preparation for hazard and risk.	2
	TOTAL	**44**

References:

1. Earthquake Engineering - From Engineering Seismology to Performance - Based Engineering Edited by Bozorgnia, Y. and Bertero, V.V., CRC Press Washington 2004.
2. Earthquake hazard Analysis - Issues and Insights by Leon Reiter, Columbia University Press New York 1990.
3. Instrumentation in Earthquake Seismology by Havskov, J. and Alguacil, G. Springer, Netherlands, 2004.
4. Geotechnical Earthquake Engineering by Steven L Kramer, Pearson Education, 2003.