Department: Civil & Environmental Engineering **Division: Civil engineering**
Level and Major: Graduate - Earthquake Engineering

Course Title: performance based design of structures **Number of Credits: 3**

Prerequisite (Corequisite): Structural analysis (I), Concrete Technology **Lecturer:** -

Course Topic

- Familiarity with the design based on performance and its differences with design based on force
- Familiarity with structure performance levels and earthquake risk surfaces
- Familiarity with the basics of non-linear theory for structures including: non-linear geometry and materials, non-linear behavior of concrete and steel, the effects of p-delta and big deformations ,Yielding and energy absorption ,brittle and formable behavior, formability limit and resistance drop, elastic and plastic energy ,cyclic hardness and resistance drop, design based on resistance and design based on deformation, capacity design, failure mechanism ,permanent and silicon loads
- Non- linear modeling includes :material models, bending joints ,axial and shear joints in regulation, anchor interaction and axial force ,fiber models for complex shapes, elastic and plastic multi-line behavior, viscose dampers ,models of energy absorbing seismic isolators ,types of hysteresis loops (isotropic , kinetic, pivot, Takeda),special issues in tall structures
- Non-linear analysis technics including :FNA time analysis method and Ritze vectors , step-by-step time history analysis, big deformations and the effects of P-Delta, Modal and Riley dampling, non-linear events and elements status determination, analysis requirements of pushover in ASCE41 and its restrictions ,power control method and control with displacement ,adverse deformations (snap-back & snap-through)pushover curve of acceleration displacement response spectrum(ADRS)and deformation of the purpose and methods of correction of displacement , performance evaluation and performance levels, power-to-demand ratio and acceptance criteria
- How to evaluate structures after analysis
- Principles and methods of analysing structures (static and dynamic,linear and non linear(
- New design systems based on performance including :buckling restrained braces ,out_ of_ center bracing systems ,seismic isolation systems ,reduced section beams, how to consider the plasticity of the zone panel ,uplift in foundation ,creep and shrinkage ,loading effects during construction ,non-linear dampers and deformation control

Course Description:
Reading Sources:
Course Goals and objectives:
Evaluation:
Course topics:
The course aims to: