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| **CE 477 – EARTHQUAKE RESISTANT DESIGN OF STRUCTURES** |
| **Department:** Civil Engineering  |
| **Program Name:** Civil Engineering  | **Program Code:** 22  |
| **Course Number:** CE 477  | **Credits:** 4 Cr  |
| [ ]  Required Course [x]  Elective Course (click on and check the appropriate box)  |
| **Prerequisite(s):** MENG233, CIVL372 | **Semester:** 2019-20 Spring |
| **Catalog Description:** Earthquakes. Magnitude and Intensity measurements of earthquakes. Ground motions. Seismic response analysis of structures. Response spectra and earthquake design spectra. Design criteria. Vibration analysis of structures under ground motion. Modal spectral analysis. Equivalent static load method. Behavior of elements of reinforced concrete structure. Design codes. Seismic vulnerability assessment of existing structures. Design applications. |
| **Course Instructors:** Assist. Prof. Dr. Umut Yıldırım umut.yildirim@emu.edu.tr **Office No:** CE 239**Course Assistant :**  ……………. **Office No:** CE …  |
| **Course Web Page:** http://civil.emu.edu.tr/umut.yildirim |
| **Textbook(s):** H. Sucuoğlu, S. Akkar, Basic Earthquake Engineering, From Seismology to Analysis and Design, Springer, 2012 |
| **References:** A. Chopra, Dynamics of Structures, Prentice Hall, Second Edition 2001D.J. Dowrick, Earthquake Resistant Design, John Chichester 1987. B. Bolt, From earthquake acceleration to seismic displacement, John Wiley and Sons, 1996. |
| **Course Outline:**  |
| Week 1: | Earthquakes and nature of Earthquakes |
| Week 2:  | Magnitude of Earthquakes, intensity of earthquakes |
| Week 3: | Characteristics of earthquake ground motions |
| Week 4: | Response of simple structures to earthquakes  |
| Week 5: | Response spectra |
| Week 6: | Response of multi degree of freedom systems, modal analysis |
| Week 7:  | Seismic design concepts  |
| Week 8:  | **Mid-Term Examination**  |
| Week 9:Week 10: | Building systems and earthquake resistanceDesign spectrum  |
| Week 11:  | Behavior of elements of reinforced concrete structures |
| Week 12: | Equivalent static load method |
| Week 13:  | Design codes |
| Week 14:  | Introduction to seismic vulnerability assessment of existing buildings |
| Week 15:  | **Final Examination**  |
| **Course Learning Outcomes:**  |
| 1. Understand the type of the earthquakes and the potential of damages can be created by the earthquakes
2. Understand the characteristics of the earthquakes
3. Understand the response of the simple structures to earthquakes
4. Understanding the definition of the response spectra and determination of response spectrum of an Earthquake
5. Understand the response of multi degrees of freedom structures, and modal analysis
6. Understand the seismic design concepts
7. Understand the earthquake resistant building systems
8. Understand the design spectrum
9. Understand the behavior of RC elements under earthquake loads
10. Understand the Equivalent static load method for earthquake analysis
11. Learn the concepts of the different Earthquake Codes
12. Understand the methods are used for seismic vulnerability assessment of existing buildings
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| **Class Schedule:** 4 hrs of lectures per week  | **Laboratory Schedule:** 1 hr of tutorial per week  |
|  | **Method** | **No** | **Percentage** |
| Assessment | **Quiz1** | **1** | 5% |
| **Quiz2** | 1 | 5% |
| Project | 1 | 20% |
| Midterm Exam(s)  | 1  | 30% |
| Final Examination  | 1  | 40% |
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| **NG Policy:** Attendance will be taken by the instructor during each lecture hour. Any student who has poor interest in the course, with poor attendance (less than 60%), with lack of exams (more than one) or does not submit Project, or the total end of semester mark less than 25% will be given NG grade (nil grade). **This rule will be followed strictly.**  |
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