

CE 480 INTRODUCTION TO ARCHITECTURAL ENGINEERING

Elective Course

Spring 2009

Instructor: Erhan Karaesmen

Course Data: Hours: FFF234
Room: M3180, M3180, M3180

Course Description (Elective – Not in catalog):

CE 480 Introduction to Architectural Engineering

(3+0+0)3

Nature of Structuring and Basic Concepts; Classification of Structures; Architecture-Structure Alliance in Buildings; Structural Mechanics Applied in Structural Design of Bearing Systems for Large Indoor Spaces in Buildings Having Components with Straight Lined and/or Curvilinear Forms; Description of the Basic Distinction Between Forms Through the Evolution of the Art of Structural Systems; Introduction to Tall Buildings; Brief Introduction to Transportation Structures.

Course Objectives:

To motivate the students for new knowledge interrelating the theoretical background provided throughout the first six semesters with engineering products, at least in the realm of structural engineering. Through this context, the inquiries of the students on how the basic theoretical information would be linked to engineering achievements could be mostly answered.

To provide some introductory but fundamental concepts on how structures would complement the spatial arrangements of the architectural imagination. Architectural approaches are directed mostly to indoor spaces, and therefore case studies of buildings will be given priority. Open spaces, however, will also be discussed in relation to classical architecture and landscape architecture. Few cases of large bridges will be investigated.

To provide a historical perspective on the development of architecture and civil engineering.

Textbook: Lecture notes & handouts are the primary sources for the class.

Reference Books

M. Salvadori, "Why Buildings Stand Up". TH845 .S33 2002.

M. Salvadori, "Why Buildings Fall Down". TH441 .L48 2002.

R. J. Mainstone, "Developments in Structural Form". 721-M28D.

Lepik, A., "Skyscrapers".

Class Policies: With contribution of guest lecturers, a course of straight three hours are foreseen; field trips, one including a visit to Selimiye Mosque, Edirne, will take place on Saturdays.

Midterm: Take-home exam, Final: In class. homework assignments and a project are mandatory.

Contribution of the Course to Program Outcomes:

This course is intended to contribute to the following program outcomes:

- (c) An ability to design a system, component, or process to meet desired needs
- (d) An ability to function on multi-disciplinary teams
- (f) An understanding of professional and ethical responsibility
- (g) An ability to communicate effectively
- (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) A recognition of the need for, and ability to engage in life-long learning

Course Assessment: Course will be assessed on the basis of the accomplishments regarding the course objectives and the contributions to the program outcomes. The evaluation will consist mainly of the responses from the students, who will provide their comments to various course related questions in the final week of the semester.

Week	Topics	Homework Assignment	Objectives
1	Nature of Structuring and Basic Concepts.		How, when and where are structures needed by the mankind? How was the transformation from natural structures to manmade structures possible, including the long run from historic domes, vaults and trees, ivies etc. to structural facilities fully man imagined and made?
2	Classification of Structures Structure, Architecture, & Building		Size and functionality. Main materials taken as the basic parameters in grouping structures. The concept of special structures. Development of structures starting from imitation of natural forms.
3	Structure, Architecture, & Building		Development of structures starting from imitation of natural forms and its evolution in parallel to improvements in architectural imagination and realization. A discussion on the architectural-structural alliance including over- and under-designing concepts.
4	Straight Line vs. Curved Line: A Basic Distinction Through the Evolution of the Art of Structuring.		Developments in art and science as reflected in Structuring. Behavior of framed skeletons and curved lined systems. A particular study on long walk from arch to dome. Dome as the supreme curvilinear form. Sinan insight in Domical Art - the great Sinan's contribution to development of domical art. Contemporary approaches in the use of vaults and domes.
5		1 st Homework	
6		Field Trip 1	
7	Structural Mechanics Applied in Structural Design		Discussion on the structural design process. Loads and actions. The flow of inner action from the roof to the foundations. Soil mechanics in service of foundation design. Gaudi's achievements on complex curves.
8	Structuring for Large Indoor Spaces in Buildings		Public assembly places: Sporting event halls, intellectual and recreational event places, worship places, etc. Permanent and frequent use for urban crowds: Train stations, metro stations, airports, etc. Industrial production, maintenance and repair halls. Historic monuments and contemporary achievements.
9		2 nd Homework	
10	Introduction to Tall Buildings		"Tallness" as a desire and a source of self-satisfaction. Historic developments. The needs of modern life. The use of steel skeletons vs. concrete skeletons. Effect of wind and earthquake actions.
11	Spring Break		
12	Introduction to Tall Buildings Field Trip 2		"Tallness" as a desire and a source of self-satisfaction. Historic developments. The needs of modern life. The use of steel skeletons vs. concrete skeletons. Effect of wind and earthquake actions.
13	Introduction to Transportation Structures		Historic and modern bridges and metro stations.
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