Design of Reinforced Concrete Structures (I)
ECIV 3316

Instructor’s Name: Prof. Samir M. Shihada
E-Mail: sshihada@mail.iugaza.edu
Office: Administration Building, Room B241
Office Phone: 2860700 - Ext. No. 2819
Office Hours: 11:00-12:00, Saturdays, Mondays and Wednesdays.

Course Description:
Strength of reinforced concrete; beam in flexure and shear; development of reinforcing bars; short columns; one-way slabs and isolated footings.

Objectives:
1. Students will gain a basic understanding of the integration of analysis and design.
2. Students will learn how to design reinforced concrete members, including beams, short columns, one-way slabs, and isolated footings for applicable strength and serviceability limit states according to ACI 318-2008.
3. Students will ultimately learn how to design reinforced concrete building frame systems.

Instructional Methods:
1. Three lecture hours per week covering theoretical background and solution of numerical examples.
2. One discussion hour per week focusing mainly on a comprehensive design project. This design project will be completed throughout the semester. Design groups will be assigned to work on the project.

References:
1. Building Code Requirements for Reinforced Concrete, ACI 318-08, Farmington Hills, MI, USA.

Course Outline:
1- Introduction:

2- Materials and Properties:
   • Concrete
   • Steel reinforcement

3- Design Requirements:

4- Design of Columns:
   • Axially Loaded Short Columns
5- Design for Flexure:
   • Singly Reinforced Rectangular Sections
   • T-Shaped Sections
   • Irregular Sections

6- Design for Shear:

7- Design of One-way Slabs:
   • Solid
   • Ribbed

8- Development of Reinforcement:
   • Development lengths
   • Lap Splices
   • Bar Cutoffs

9- Design of Isolated Footings (Concentrically Loaded):
   • Square
   • Rectangular

10- Applications
   • Comprehensive Design Project

Attendance:
   • Regular attendance strongly recommended for maintaining pace with the lectures and the progress of the class.

Grading Policy:
The students will be evaluated by a mid-term exam, a final exam examinations and assigned comprehensive project. The final grades for this course will be based on the following percentages:

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<tr>
<td>Midterm Exam.</td>
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<tr>
<td>Final Comprehensive Exam.</td>
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<tr>
<td>Comprehensive Design Project</td>
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<td>Total</td>
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