

Indiana University – Purdue University Fort Wayne (IPFW)

CE 376

Design of Concrete Structures

Fall 2009

Course Info	Course # & Title: CE 376 “Design of Concrete Structures” Time & Room: TR (09:00-10:15 a.m.), ET 320 CRN: 13423
Instructor	Name: Dr. Mohammad Alhassan, Office: ET 327A, Phone #: (260) 481-6389 Email: alhassan@enr.ipfw.edu Office Hours: MW: 02:00-04:00 pm or by appointment
Catalogue Course Description	Flexural analysis and design of reinforced concrete beams (singly and doubly reinforced rectangular beams and T-beams), shear and diagonal tension, serviceability, bond, anchorage, and development length, short and slender columns, slabs, and footings and foundations (including computer applications).
Prerequisite	CE 315 “Civil Engineering Materials” and CE 375 “Structural Analysis”
Textbook	H. Nilson, D. Darwin, and C. Dolan, <i>Design of Concrete Structures, 13th Edition</i> , McGraw Hill Publishing Company, 2004.
Code	<i>ACI 318-05 Building Code Requirements for Structural Concrete and Commentary, 2005.</i>
Reference	J.G. MacGregor, and J.K. Wight, <i>Reinforced Concrete: Mechanics and Design, 4th Edition</i> , Prentice Hall Publishing Company, 2004.
Quizzes	Pop Quizzes will be given to help you follow consistently with the course materials. There will be no make-up quizzes. In each lecture; each student is expected to know the basic information about the lecture’s topic and the previous lecture.
Homework	You are expected to work the assigned homework problems individually, although you are encouraged to discuss the problems with the other students. Homework is due at the beginning of class on the assigned date (usually one week from the assigned date). Late homework will not be accepted for credit, except as approved by the instructor.
Project	Use of SAP2000/ETABS to model, analyze, and design of concrete structure. Students will be given a typical reinforced concrete building and asked to calculate the loads and apply them to the structure in addition to its self weight. Students will then run the analysis and design all types of structural members within the structure to resist the loads according to the ACI code requirements. Each student is required to submit the design project in a professional form including all the design details generated from the software supported with hand calculations for typical members.

Exams & Averages will be calculated using the following point distribution:

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- Grades**
- Four Hourly Exams.....80%
 - Homework assignments..... 10%
 - Quizzes..... 5%
 - Term Project..... 5%

Grade	GPW (set by IPFW)
$A^+ \geq 95$	4.0
$95 > A \geq 90$	4.0
$90 > A^- \geq 87$	3.7
$87 > B^+ \geq 85$	3.3
$85 > B \geq 80$	3.0
$80 > B^- \geq 77$	2.7
$77 > C^+ \geq 75$	2.3
$75 > C \geq 70$	2.0
$70 > C^- \geq 67$	1.7
$67 > D^+ \geq 65$	1.3
$65 > D \geq 60$	1.0
$60 > D^- \geq 50$	0.7
$F < 50$	0

Course Objectives To introduce the students to the fundamentals of reinforced concrete design with emphasis on the design of rectangular and T beams, short and slender columns, slabs, and footings and foundations. In addition, student will learn how to analyze and design reinforced concrete structural members under bending, shear, and/or axial loads according to the ACI building code requirements(including computer applications).

- Course Outlines**
- 1. Introduction to Engineering Design, Loads, and Design Codes (2 lectures)**
 - 2. Flexural Analysis and Design of Beams (6 lectures)**
**** 1st Hourly Exam around Tuesday September 22, 09: Topics 1 & 2.*
 - 3. Shear and Diagonal Tension in Beams (2 lectures)**
 - 4. Bond, Anchorage, and Development Length (2 lectures)**
 - 5. Serviceability (2 lectures)**
**** 2nd Hourly Exam around Tuesday October 20, 09: Topics 3, 4, and 5.*
 - 6. Short Columns (3 lectures)**
 - 7. Slender Columns (2 lectures)**
**** 3rd Hourly Exam around Tuesday November 17, 08: Topics 6 & 7.*
 - 8. Analysis and Design of One and Two Way Slabs (4 lectures)**
 - 9. Footings and Foundations (3 lectures)**
**** 4th Hourly Exam will be on the same date of the final exam date as announced by the university: Topics 8 & 9.*

Course Learning Outcomes

- Upon successful completion of the Statics course, students should be able to:
1. Identify and compute the main mechanical properties of concrete and steel. [a (1)]
 2. Identify and calculate the design loads and distribution. [a (1), e (2)]
 3. Apply the strength method to design R.C. structural members. [a (1), c (4), e (2)]
 4. Analyze and design R.C. beams for flexure and shear. [a (1), c (4), e (2)]
 5. Analyze and design short and slender R.C. columns. [a (1), c (4), e (2)]
 6. Analyze and design R.C. slabs. [a (1), c (4), e (2)]
 7. Analyze and design R.C. footings. [a (1), c (4), e (2)]
 8. Apply relevant ACI Code provisions to ensure safety and serviceability of structural elements. [a (1), c (4), e (2), f (7), i (9)]
 9. Utilize advanced computer software packages (SAP2000 and/or ETABS) for the analysis and design of steel structures. [a (1), c(4), e (2), g (8), k (6)]

Letters and numbers in parentheses refer to ABET outcomes and their correspondence BSCE/BSME program Outcomes.

ABET Program Outcomes

- Engineering programs must demonstrate that their graduates have:
- (a) an ability to apply knowledge of mathematics, science, and engineering
 - (b) an ability to design and conduct experiments, and to analyze and interpret data
 - (c) an ability to design a system, component, or process to meet desired needs
 - (d) an ability to function on multi-disciplinary teams
 - (e) an ability to identify, formulate, and solve engineering problems
 - (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 an ability to engage in life-long learning
 - (j) a knowledge of contemporary issues
 - (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Policies

- I expect that you will receive any emails I send to your IPFW email account. Check this account daily or forward the messages to another account you do check daily.
- As a courtesy to the instructor and other students, do not be late for class and turn off your cell phone.
- You are expected to attend all classes. If you miss a class for any reason you are responsible for determining what material was covered, what assignments were made, and what announcements were made. You may be dropped from the course or have your grade penalized for lateness or absence exceeding 3 hours of class time without acceptable reason such as illness or emergencies.
- No make-up exams or quizzes are allowed. However, documented special circumstances such as illness or emergencies will be considered. Please notify me by email or by phone as early as possible.
- Use 8½ x 11 paper size for the homework. Provide a title page on your homework and show your name, course and assignment number. Staple all pages together.

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Final answers shall be clearly identified by an arrow-head, circle, underline, etc. If the numerical answer has units, such as feet, pounds, etc., show these units. Points may be lost for unspecified units and for units specified wrong.

- Homework is due at the beginning of class on the date specified (usually one week from the assigned date). Late homework will not be accepted for credit, except as approved by the instructor.
- Pop quizzes may be given at any time during the semester. Each pop quiz counts as one homework. A grade of zero will be given for quizzes missed due to unexcused absence.
- As engineering students, you are expected to give attention to the presentation of your work so that it will be neat and concise and adequately demonstrate your knowledge of the subject. Sloppy or carelessly presented work may be penalized by the loss of grade points or may be returned to you to be done over again.
- Do not give 8 and 10 place readouts. Do not make unnecessary subtotal computations. Round off final answer to 3 significant figures.
- When data used in homework or tests is obtained from reference material, show the reference page number in parentheses beside the data.
- Instructor reserves the right to raise the resultant grade when, in his opinion it is proper to do so. Factors being considered will be attendance, lateness, class participation, and attentiveness.
- Many students have found an advantage in studying together in small groups. In this way, the resources of each student are used to benefit all members of the group. Each homework problem can be discussed and solved in principle by the group. Each individual, however, is expected to actually do his own work, using his preference as a format and detail.
- Tests are either "open book" or "closed book". If the test is "closed book", this means that each student may prepare one 4 x 6 in. card of information to be used. The ACI Code can also be used during the test. No other books or information, such as homework, class notes, handouts, or data sheets are admissible. The instructor will inform the students of the exam policy one week in advance prior to the examination date.
- Students with a disability should contact the SSD office at Walb 113 (481-6657) or visit the SSD website at www.ipfw.edu/ssd for a description of services available.
- Students are expected to above reproach in all scholastic activities. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course. Scholastic dishonesty included but not limited to submission for credit of any work or materials that are attributable in whole or in part to another person. For more information about academic honesty rules and regulations, you may visit IPFW regulations at:
<http://www.ipfw.edu/academics/regulations/honesty.shtml>

The place to go for concentrated study time!

The SPOT Learning Center: Make your study time not only more effective, but also more efficient by signing up for free tutoring available in the SPOT in Kettler G21 (next door to the Writing Center). You are entitled to 2 free hours per week of one-to-one, course-specific help in understanding concepts, practicing the application or explanation of material being learned, and developing effective test-taking strategies. Make all appointments online through TutorTrac at www.ipfw.edu/casa. If you don't see a tutor available for your class, contact us in Kettler G21!

Drop-in tutoring is also available for math (schedule on Web site) and a few other subjects. If you need help with study skills in general, drop by the SPOT to view our self-paced tutorials or make a one-to-one appointment. Information about STEPS (Student Technology Education ProgramS) classes can be found on the CASA Web site, too. Also, check with your instructor about whether Supplemental Instruction (group study) is available for this class. Questions? Call 481-5419.

SPOT Learning Center Hours Fall 2009: Monday-Thursday 8 a.m. to 8 p.m.; Friday 8 a.m. to 4 p.m.

The WRITING CENTER: Save time and write better papers or presentations for any class through free one-to-one or small group consultations in The Writing Center, Kettler G19 (next door to the SPOT Learning Center). Bring assignments, questions, ideas, and a draft (if you have one). Consultants can help you get started, write more clearly, revise, edit, and cite sources responsibly. Come as you begin writing and as you revise. Drop-ins are welcome if time is available, but appointments, made online through TutorTrac, receive preference. For TutorTrac, online consulting, and resources to make your writing process easier, go to www.ipfw.edu/casa/writing. Questions? Call 481-5740.

Writing Center Hours Fall 2009: M-Th 10 a.m. to 6 p.m.; F 10 a.m. to 2 p.m.; Su 1 to 5 p.m.