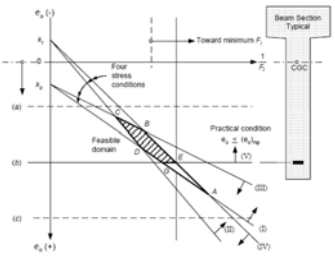
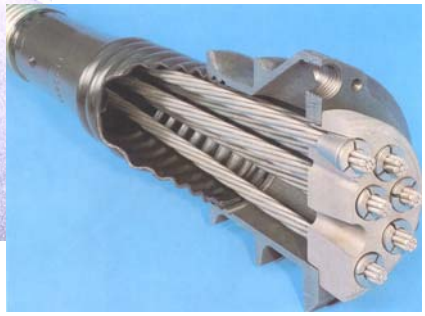
CE543 – PRESTRESSED CONCRETE DESIGN AND BEHAVIOR

Spring 2007

M-W 2:30-3:45 pm, 110 Sackett Building





This course explores the design and behavior of prestressed concrete structures: materials and systems (including specifics for pre-tensioned and post-tensioned members), losses, flexure, shear, bond, deflections, continuous beams. Prerequisite: C E 341 , A E 402 , or approved equivalent.

Instructor:

Dr. María López de Murphy
231E Sackett Building, 865-9423
mmlopez@engr.psu.edu

Office Hours:

Monday 1-2 PM
Wednesday 9-11 AM
or by appointment (please e-mail to set-up meeting time)

Course Goals:

I intend to assist you in developing your understanding of the principles governing the behavior of prestressed concrete members.

After this course you will be able to:
- Understand the mechanics of prestressed concrete (PC) beams.
- Check the state of stresses on a beam cross section at different loading stages.

- Design a PC beam based on allowable strength design (ASD), ultimate strength design (USD), and serviceability requirements.
- Estimate prestressed losses on a PC beam.
- Calculate deflections on a PC beam
- Explore advanced topics in the area of PC structures.

Textbooks: Antoine E. Naaman. *Prestressed Concrete, Analysis and Design*. Techno Press 3000, second edition. 2004. (available at PSU bookstore)

ACI 318-05 Building Code and Commentary (Available at Engineering copy center).

References: *PCI Design Handbook, Prestressed and Precast Concrete,6th Edition,* Prestressed Concrete Institute (I will provide to you at no cost)

Prestressed Concrete- a fundamental approach by Edward G Nawy, fifth edition

AASHTO LRFD Bridge Design Specifications, 2nd Edition, American Assoc. of State Highway and Transport. Officials

Field trip: A field trip to a precast /prestressed facility will be scheduled during the semester. Attendance is highly encouraged.

Written Assignments: The instructor will define the due date for assignments which are to be handled by the students at the beginning of the respective class. Late assignments will be penalized at *20% off per day*. Topic and deadlines will be defined during class. A research assignment will be assigned the second week of class.

Exams: Two hourly exams will be held during the class period. Dates are indicated below; please plan your schedule accordingly. Make-up exams will NOT be given. Prior consent must be given for any missed exam, and will only be allowed in extreme cases.

Exam Schedule:

Exam 1. February 21, 2:30 PM, *110 Sackett*
Exam 2. April 11, 2:30 PM, *110 Sackett*
Final Exam. May 7-11 (see schedule online)

Evaluation Methods:	1. First exam	25%
	2. Second exam	25%
	3. Assignments	25%
	4. Final exam	25%

Academic Integrity: This course will follow the University Faculty Senate Policy 49-20 on academic integrity. I encourage you to read it at **http://www.psu.edu/ufs/policies/**

ANGEL: General course information will be posted on Angel (https://cms.psu.edu/frameIndex.htm) along with homework and reading assignments, handouts, and announcements. Make a habit of checking your Angel account daily. I occasionally send announcements, reminders, and homework hints via email.

COURSE OUTLINE

This course outline is subjected to minor changes throughout the semester.

1. Introduction. Principles and Methods of Prestressing (*Chapter 1*, week 1)
2. Prestressing Materials, Steel, Concrete, FRP (*Chapter 2*, week 2)
3. Design philosophy, Introduction. (*Chapter 3*, weeks 3-4)
4. Flexure: Working Stress Analysis and Design (*Chapter 4*, weeks 5-7)
5. Flexure: Ultimate Strength Analysis and Design (*Chapter 5*, week 8)
6. Deflection Computation and Control (*Chapter 7*, week 9)
7. Design for Shear and Torsion (*Chapter 6*, weeks 10-11)
8. Postensioning Systems (*Chapter 10*, week 12)
9. Prestressed Losses (*Chapter 8*, week 13)
10. Composite Beams (*Chapter 9*, weeks 14-15)