



The Hashemite University
Faculty of Engineering
Civil Engineering Program
Course Syllabus



Course Title: Prestressed Concrete **Course Number:** 110401523
Designation: Elective **Prerequisite(s):** 110401231
Instructor: Dr. Hazim Dwairi **Instructor's Email:** hmdwairi@hu.edu.
Office Hours: 9:00 – 10:00: Sun., Tue. & Thurs., 8:30 – 9:30: Mon. & Wed.

Course Description: Introduction to prestressed concrete, types and concepts of prestressed concrete, prestressing methods, types of concrete and prestressing steel, flexural analysis using elastic stresses, flexural strength analysis, partial prestressing. Flexural design of beams, beams design with load balancing. Design based on strength requirements, flexural crack control, loss of prestress force, composite beams.

Textbook(s):

Edward W. Nawy: "Prestressed Concrete – A Fundamental Approach." Prentice-Hall, 5th edition, 2006..

Other supplemental materials

- Building Code Requirements for Structural Concrete (ACI 318-05) and Commentary (ACI 318R-05), American Concrete Institute, Farmington Hills, Michigan.
- Purifoy, R.; Schexnayder, C., and Aviad, S., Construction Planning, Equipment, and Methods, seventh edition, 2006. McGraw Hill.

Course objectives: By the end of this course, students will be able to

- 1- Identify the basic methods of fabricating prestressed concrete structures, and how the fabrication method affects the design procedure and the structural behavior;
- 2- Calculate losses in a prestressed concrete member;
- 3- Design a statically determinate prestressed concrete beam for stresses in serviceability limit state;
- 4- Check capacity of prestressed concrete beams to resist ultimate bending moments and shear forces;
- 5- Calculate stresses in a composite system with a precast prestressed concrete beam and a cast in place concrete slab at various stages of construction and service;
- 6- Calculate camber, deflections, and cracking of prestressed concrete beam;
- 7- Calculate "equivalent" lateral loads due to prestressing and use them in the analysis and design of statically indeterminate prestressed concrete beam.

Major Topics Covered:

Topics	No. of Weeks	Contact hours*
Basic Concepts	2	6
Materials	1	3
Prestress Losses	3	9
Flexure Design	4	12
Shear and Torsion	3	9
Deflections and camber	2	6
Total	15	45

*Contact hours include lectures and exams

Specific Outcomes of Instruction (Course Learning Outcomes):



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After completing the course, the student will be

able to:

- 1) Analyze a structural component in terms of loading, and computing stresses. (a, e)
- 2) Compute prestress force losses and design a prestressed concrete beam for flexure, shear and torsion.(e)
- 3) Compute deflection and camber. (a,e)

Student Outcomes (SO) Addressed by the Course:

#	Outcome Description	Contribution
General Engineering Student Outcomes		
(a)	an ability to apply knowledge of mathematics, science, and engineering	H(50)
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	H(50)
(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, economic, environmental, 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.	
H=High, M= Medium, L=Low		

General Notes:

First Exam: Wednesday, 8/11/ 2018

Second Exam: Wednesday, 13/12/ 2018

Prepared by:

Dr. Hazim Dwairi

Date: 9th May 2018