STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

CIVL 304 – Reinforced Concrete Design

CIP Code: 14.0803

Created by: Saeid Haji Ghasemali
Updated by:

School: Canino School of Engineering Technology
Department: Civil and Construction Technology
Implementation Semester/Year: Fall 2026

A. TITLE: Reinforced Concrete

B. COURSE NUMBER: CIVL 304

C. CREDIT HOURS (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity):

# Credit Hours per Week	**3**
# Lecture Hours per Week	**2**
# Lab Hours per Week	**2**
Other per Week	

D. WRITING INTENSIVE COURSE:

Yes	
No	x

E. GER CATEGORY:

Does course satisfy a GER category(ies)? If so, please select all that apply.

[1-2] Communication	
[3] Diversity: Equity, Inclusion & Social Justice	
[4] Mathematics & Quantitative Reasoning	
[5] Natural Science & Scientific Reasoning	
[6] Humanities	
[7] Social Sciences	
[8] Arts	
[9] US History & Civic Engagement	
[10] World History & Global Awareness	
[11] World Languages	

F. SEMESTER(S) OFFERED:

Fall	
Spring	x
Fall and Spring	

G. COURSE DESCRIPTION:

Students will gain a foundational understanding of analysis and design procedures in accordance with ACI code standards for reinforced concrete members subjected to bending, shear, and axial loads. They will develop the ability to design rectangular and T-beams for flexure and shear, as well as slabs for flexure and short columns for axial loads. Students will also acquire knowledge of strength design concepts and learn to assess serviceability conditions, including cracking and deflections, for reinforced concrete beams and one-way slabs.

H. PRE-REQUISITES:

CIVL 303 Structural Analysis, and CIVL 213 Civil Engineering Materials, or permission from the instructor.

CO-REQUISITES:

I. STUDENT LEARNING OUTCOMES:

Course Student Learning Outcome [SLO]	Program Student Learning Outcome [PSLO]	GER	ISLO & Subsets
a. Analyze and design a reinforced concrete slab	SO 2, SO1		ISLO 2 (PS) and ISLO 5
b. Analyze and flexural design of beam (rectangular and T-beam)	SO 2, SO1		ISLO 2 (PS) and ISLO 5
c. Analyze and check the serviceability conditions	SO 2, SO1		ISLO 2 (PS) and ISLO 5
d. Analyze and shear design of beam (rectangular and T-beam)	SO 2, SO1		ISLO 5
e. Analyze and design of short Column	SO 2, SO1		ISLO 5

KEY	Institutional Student Learning Outcomes [ISLO 1 – 5]
ISLO #	ISLO & Subsets
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA], Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit, /Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL],* *Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

J. APPLIED LEARNING COMPONENT:

Yes	x
No	

If yes, select [X] one or more of the following categories:

Classroom / Lab	x	Community Service	
Internship		Civic Engagement	
Clinical Practicum		Creative Works/Senior Project	
Practicum		Research	
Service Learning		Entrepreneurship [program, class, project]	

K. TEXTS:

Darwin, D., Dolan, C., Design of Concrete Structures, 16th Edition. New York, NY: McGraw Hill Education. ISBN: 978-1-264-07114-2.

L. REFERENCES:

Current Building Code Requirements for Structural Concrete and Commentary. American Concrete Institute.

M. EQUIPMENT: None

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Exams
Quizzes
Homework
Laboratory Projects

P. DETAILED COURSE OUTLINE:

I. Introduction
- A. Concrete and Reinforced Concrete as a material
- B. Advantages and Disadvantages of Structural Concrete
- C. ACI Code
- D. Reinforcing Bar
- E. Concrete Mix Materials
- F. Dead and Live Loads

II. Fundamental Principles of Bending
- A. Behavior of a concrete beam in flexure
- B. Analysis of unreinforced beam by the flexure formula
- C. The internal couple method of analysis
- D. The strength design method for composite material

III. Analysis and Design of Rectangular Reinforced Concrete Beams
- A. Balanced, Over-reinforced, and Under-reinforced Beams
- B. Criteria for a tension controlled section
- C. Detailing requirements
- D. Load Factors
- E. Strength reduction factors and the maximum practical moment
- F. Rectangular Beam Analysis for Moment (Tension Reinforcement only)
- G. Rectangular Beam Design for Moment (Tension Reinforcement only)

IV. Slabs
- A. Slab nomenclature
- B. ACI Criteria for one-way slabs
- C. Slab analysis
- D. Slab design

V. Tee Beams
- A. Tee Beam Analysis for Moment (Tension Reinforcement only)
- B. Tee Beam Design for Moment (Tension Reinforcement only)
- C. Design of compression bar

VI. Design of Shear Reinforcement in Beams
- A. Introduction
- B. Analysis of beams with no shear reinforcement
- C. ACI Code requirements for shear Stirrups
- D. Shear Reinforcement Design Procedure
- E. Design for torsion

VIII. Column Design
- A. Introduction
- B. Strength of Reinforced Concrete Columns - Small Eccentricity
- C. Code Requirements Concerning Column Details
- D. Analysis of Short Columns - Small Eccentricity
- E. Design of Short Columns - Small Eccentricity
- F. Eccentrically loaded columns

Q. LABORATORY OUTLINE:

1. Rectangular Beam flexural design, Tension Control
2. Rectangular Beam flexural design, Compression Control
3. T Beam flexural design, Tension Control
4. T Beam flexural design, Compression Control
5. Beam flexural design, Tension Control
6. Slab design
7. Beam Shear design
8. Short Column Design