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

MASTER SYLLABUS

CIVL 404 – Advanced 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: Advanced Reinforced Concrete Design

B. COURSE NUMBER: CIVL 404

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	x
Spring	
Fall and Spring	

G. COURSE DESCRIPTION:

Students will gain advanced knowledge in the design of footings, retaining walls, two-way floor slabs, slender columns, and shear friction. They will also develop expertise in the concepts of anchorage and development length, equipping them with the skills necessary to handle a variety of structural design challenges.

H. PRE-REQUISITES:

CIVL 304 Reinforced Concrete Design, or permission of 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 of Footing	SO 2, SO1		ISLO 2 (PS) and ISLO 5
b. Analyze and design of Retaining walls	SO 2, SO1		ISLO 2 (PS) and ISLO 5
c. Detail splices and anchorages for reinforcement	SO 2, SO1		ISLO 2 (PS) and ISLO 5
d. Analyze and design of two-way slab	SO 2, SO1		ISLO 5
e. Analyze and design of slender 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. Two-way slab
- A. Slab nomenclature
- B. ACI Criteria for Two-way slabs
- C. Slab analysis
- D. Slab design

II. Slender Column Design
- A. Introduction
- B. Calculate interaction diagrams for compression and bending in concrete columns

III. Development Length - Introduction
- A. Development Length - Tension Bars
- B. Development Length - Standard Hooks in Tension
- C. Development of Web Reinforcement
- D. Splices
- E. Cutoff of tension bars

IV. Footings
- A. Introduction
- B. Design of Square Reinforced Concrete Footings

IV. Retaining Walls
- A. Introduction
- B. Design of cantilever retaining wall

V. Shear Friction
   A. Introduction
   B. Shear capacity of interfaces between precast members and cast-in-place concrete

Q. LABORATORY OUTLINE:

1.Two-way slab Design

2. Slender Column Design

3.Bonding Design

4. Footing Design

5.Retaining Wall Design

6.Shear Friction Design