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

MASTER SYLLABUS

CIVL 305 – NON-Metallic Reinforced Concrete

CIP Code: 14.0803

Created by: Saeid Haji Ghasemali
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School: Canino School of Engineering Technology
Department: Civil and Construction Technology
Implementation Semester/Year: Fall 2025

A. TITLE: Non-Metallic Reinforced Concrete

B. COURSE NUMBER: CIVL 305

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:

The course on Concrete Structure with GLASS Fiber-Reinforced Polymers (GFRP) offers a comprehensive exploration of the utilization of FRP materials in engineering applications. Through a structured curriculum, students will explore the material properties, analysis techniques, and design principles associated with FRP-based structural elements. This course is designed to equip students with the knowledge and skills necessary to effectively incorporate FRP materials into the design and construction of resilient and efficient structures.

H. PRE-REQUISITES:

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

CO-REQUISITES: None

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

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:

Reinforced Concrete with FRP Bars Mechanics and Design, 1st Edition. By Antonio Nanni, Antonio De Luca, Hany Jawaheri Zadeh: Routledge, ISBN: 9780367864996

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 GFRP Structural Concrete
- C. ACI Code
- D. Reinforcing bars
- 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)

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

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