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

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
CONS 487 – Water Resources Analysis, Management, and Design

Created by: Adrienne C. Rygel

Updated by: Adrienne C. Rygel

Canino School of Engineering Technology

Department: Civil and Construction Technology

Semester/Year: Fall 2018

A. **TITLE**: WAter Resources Analysis, Management, and Design

B. **COURSE NUMBER:** CONS 487

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

 # Credit Hours: 3
 # Lecture Hours: 3 **per week**
 # Lab Hours: **per week**
Other: **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☒ **Yes:** GER
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☐ **Spring** ☒ **Fall & Spring** ☐

G. **COURSE DESCRIPTION:**

This course includes advanced open channel hydraulics, advanced surface water hydrology and groundwater, and well hydraulics. Management of water resources including reuse and alternative supplies is discussed. Conveyance and distribution water, as well as wastewater and stormwater collection and engineering are discussed. Students perform calculations by hand or with spreadsheets and are introduced to public domain water resources software and the Arc-Hydro data model for Geographic Information Systems.

H. **PRE-REQUISITES: None** ☐ **Yes** ☒ **If yes, list below:**

a. Pre-requisites: CONS 122 (Hydraulics), CONS 385 (Hydrology and Hydrogeology), CONS 350 (Introduction to Geographic Information Systems)

CO-REQUISITES: None ☒ **Yes** ☐ **If yes, list below:**

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
1. Analyze analytical data collected from watersheds to determine water budgets	2488: 1a, 3abc		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
2. Design basic water distribution systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
3. Design basic sewer systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
4. Design basic stormwater collection systems	2488: 1a, 4b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
5. Manage water and wastewater treatment facilities with fluctuating water quality conditions and use	2488: 1a		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
6. Use GIS software to analyze watershed resources	2488: 1b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets

7. Conduct advanced hydrotechnical analyses related to open-channel hydraulics, groundwater systems, and wells	2488: 1a, 6b		5-Ind, Prof, Disc, Know Skills ISLO ISLO	Subsets Subsets Subsets Subsets
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			ISLO ISLO ISLO	Subsets Subsets Subsets Subsets

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**

*Include program objectives if applicable. Please consult with Program Coordinator

J. APPLIED LEARNING COMPONENT: Yes ☒ No ☐

If YES, select one or more of the following categories:

- ☒ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. TEXTS:

Viessman, Warren Jr., Hammer, Mark J., Perez, Elizabeth M., and Chadik, Paul A. (2009). Water Supply and Pollution Control, 8th edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.

L. REFERENCES:

Nathanson, Jerry A. (2008). Basic Environmental Technology: Water Supply, Waste Management, and Pollution Control, 5th edition. Upper Saddle River, New Jersey: Pearson Prentice Hall.
Qasim, Syed R., Motleer, Edward M., and Zhu, Guang (2000). Water Works Engineering: Planning, Design, and Operation. Upper Saddle River, New Jersey: Pearson Prentice Hall.
Tchobanoglous, George, Burton, Franklin L., and Stensel, H. David (2003). Wastewater Engineering Treatment and Reuse. New York, New York: McGraw Hill.
Kresic, Nevin (2009). Groundwater Resources: Sustainability, Management, and Restoration. New York, New York: McGraw Hill.

M. EQUIPMENT: None ☒ Needed:

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

- **Examinations**
- **Homework assignments**
- **In-class exercises**
- **Quizzes**

P. DETAILED COURSE OUTLINE:

I. Introduction
II. Principles of Water Resources Planning and Management
A. Applicable Regulations and Protection
B. Security of Water Resources Systems
C. Watershed Management
D. Role of Geographic Information Systems

III. - Water Budget and Natural Water Sources
A. - The Hydrologic Cycle and Water Budget
B. - Surface Water Systems
C. - Groundwater Systems
D. - Reservoirs
IV. - Alternative Sources of Water Supply
A. - Water Conservation
B. - Wastewater Reuse
C. - Stormwater Reuse
D. - Brackish and Saline Water Conservation
V. - Water Use Trends and Forecasting
VI. - Advanced topics of Hydrology and Hydrogeology
A. - Open Channel hydraulics
B. - Well Hydraulics
C. - Groundwater Modeling
D. - Fluvial Systems
VII. - Conveying and Distributing Water
A. - Types of Distribution Systems
B. - Design of Distribution Systems
C. - Pumping Water and Pump Design
VIII. Wastewater Collection and Stormwater Engineering
A. - Design of Sanitary Sewers
B. - Stormwater Collection and Conveyance Design
IX. - Municipal Water and Wastewater Treatment Facilities
A. - Selection of Treatment
B. - Managing Water Sources
C. - Managing Solid and Liquid Waste Streams Resulting from Treatment of Water and Wastewater

Q. <u>LABORATORY OUTLINE</u>: None ☒ Yes ☐