COURSE OUTLINE

CONS 487 – Water Resources Analysis, Management, and Design

Prepared By: Adrienne C. Rygel, Ph.D.
A. **TITLE:** Water Resources Analysis, Management, and Design

B. **COURSE NUMBER:** CONS 487

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 Weeks

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   Lecture: 3 hours

H. **CATALOG 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.

I. **PRE-REQUISITES/CO-COURSES:**
   a. Pre-requisites: CONS 122 (Hydraulics), CONS 385 (Hydrology and Hydrogeology), CONS 350 (Introduction to Geographic Information Systems)

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
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<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>1. Analyze analytical data collected from watersheds to determine water budgets</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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<td>2. Design basic water distribution systems</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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<td>3. Design basic sewer systems</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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<td>5. Manage water and wastewater treatment facilities with fluctuating water quality conditions and use</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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<td>6. Use GIS software to analyze watershed resources</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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<td>7. Conduct advanced hydrotechnical analyses related to open-channel hydraulics, groundwater systems, and wells</td>
<td>2. Critical Thinking 3. Professional Competence</td>
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K. **TEXTS:**

L. **REFERENCES:**

M. **EQUIPMENT:** Technology Enhanced Classroom

N. **GRADING METHOD:**
   A-F

O. **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