1. **Department, number, and title of course**

   Department of Civil Engineering, CENG 5344, Water Engineering for International Development

2. **Graduate Course**

3. **Course (catalog) description**

   This course addresses the design of small-scale, low cost systems for drinking water supply and wastewater disposal. Topics include surface water intakes, wells, storage tanks, water distribution systems, water quality testing, septic tanks, leach fields, and oxidation ponds. The course emphasizes on-site data collection methods, practical issues of design, and project sustainability.

4. **Prerequisite(s)**

   MENG 3310, Fluid Mechanics

5. **Textbook(s) and/or other required material**

   None

6. **Course Objectives**

   - Outline the water quantity and quality requirements for drinking water sources.
   - Calculate the water requirements for rural, peri-urban, and urban communities.
   - Design water collection, storage, treatment, and distribution components for gravity and well-fed water systems.
   - Apply international guidelines in designing septic tank, oxidation pond, and leach field sanitation systems.
   - Explain how financial and technical limitations, as well as cultural values, can be incorporated into water and sanitation systems design.

7. **Topics Covered**

   - Development Needs and Approaches
   - Drinking Water Source and Health Requirements
   - Water Demand Forecasting
   - Surface Water Intake Structures
   - Well Selection and Construction
   - Transmission and Distribution lines
   - Water Distribution system Design and Analysis
   - Water Tank Sizing and Design
   - Disinfection systems
   - Wastewater System Demands
   - Wastewater Collection Systems
   - Wastewater Treatment Technologies
   - Gray Water Disposal

8. **Class/laboratory schedule, i.e., number of sessions each week and duration of each session**

   LESSONS: 30 @ 75 min (2 att/wk)
   
   LABS: None
9. **Contribution of course to meeting the professional component**

3.0 Credit Hours (ES=1.5, ED=1.5)

This course complements the topics covered in previous fluid mechanics, hydraulics, and hydrology courses by illustrating how these courses apply to real-world design applications in developing countries where these projects are heavily constrained by funding limitations and technical constraints. This course prepares students to develop unique, creative, and sustainable solutions to water and sanitation problems common throughout the developing world.

10. **Relationship of course to program outcomes**

The course director’s assessment of how this course contributes to the civil engineering program outcomes is listed below. The following scale is used:

1=No Contribution; 2=Small Contribution; 3=Average Contribution; 4=Large Contribution; 5=Very Large Contribution

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>Course Director Assessment</th>
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<tbody>
<tr>
<td>Students who qualify for graduation with a civil engineering masters will demonstrate:</td>
<td></td>
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<tr>
<td>Have specialized knowledge in an area of civil engineering beyond that normally expected at the undergraduate level.</td>
<td>5</td>
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<tr>
<td>Are adequately prepared for advanced professional practice.</td>
<td>4</td>
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<tr>
<td>Completing a thesis or design project address a civil engineering problem using sound engineering principles and techniques.</td>
<td>3</td>
</tr>
<tr>
<td>Solve an engineering problem of importance to the State, the Nation, or the Global community.</td>
<td>5</td>
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<tr>
<td>Demonstrate the ability for independent life-long learning.</td>
<td>4</td>
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<tr>
<td>Have effective oral, written, and graphical communication skills.</td>
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11. **Person(s) who prepared this description and date of preparation**

Dr. Peter D. Rogers, PE, Assistant Professor, 9 June 2008.