January 16, 2007

Meeting Time: T Th 11:15-12:30
Meeting Place: 111 Sackett

Instructor: Fred S. Cannon
Office Hours: T Th 12:30-2:00
(please make appointment first)


Prerequisite(s): CE 472 or CE 475, CE 371

Course Grades:
11% Homework
5% Oral Review of Standards, Process Selection. Also (qualitatively) hydraulics, reactor design and kinetics
23% First Exam (Through Sedimentation)
23% Second Exam (Through Adsorption)
14% Term Report/Presentation
24% Final Exam
5% Class Participation and Personal Evaluation
105%

Final Exam: ------------ Emphasizes topics after adsorption

TERM PROJECT Each student must do a term paper with the following components:

1. A suitable topic dealing with the physical-chemical treatment of drinking water, industrial water or wastewater, or hazardous waste. Biological treatment of drinking water may also be satisfactory. The physical-chemical aspects of the biological treatment of wastewater is also acceptable. The topic you select must be approved by Prof. Cannon.

2. The paper should focus on some realistic problem, either actual or hypothetical. It should include a description of the problem, a thorough discussion of applicable theory and the experience of others, and an in-depth development of a proposed solution. I am willing to help you develop a description of a realistic problem if you wish assistance.

3. The paper text length (excluding references, tables, or figures) should be 10 to 12 pages, #12 font, double spaced, 1-inch margins, plus 10 to 12 tables and/or figures combined, plus 10 to 15 references. Refereed journal papers should be emphasized. If more than 12 pages of text is submitted, only the first 12 pages will be read and graded. You should follow a research article in J American Water Works Association or Water Research as a guide for use of headings, format for references, etc. Use the word processor and spell checker software. You will be graded on the quality of your writing as well as content, and sub-par papers will not be accepted. Please turn in two copies of your paper, and one (graded) will be returned to you.
# Course Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Subject</th>
<th>Homework (due date)</th>
<th>Text (Chapter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tu 1/16</td>
<td>Intro, Water Quality Standards and Goals, Contaminants</td>
<td></td>
<td>1,2 (focus on contaminants we cover)</td>
</tr>
<tr>
<td>Th 1/18</td>
<td>Contaminants, Plant Layout, Selection of Processes</td>
<td></td>
<td>3,4 (read like newspaper)</td>
</tr>
<tr>
<td>Tu 1/23</td>
<td>Reactor Design, Chemical Kinetics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 1/25</td>
<td>Reactor Design, Chemical Kinetics</td>
<td>#1 Hydr. (term paper Topic due)</td>
<td></td>
</tr>
<tr>
<td>Tu 1/30</td>
<td>Coagulation and Flocculation</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Th 2/1</td>
<td>Coagulation and Flocculation</td>
<td>#2 arsenic, Reactor</td>
<td></td>
</tr>
<tr>
<td>Tu 2/6</td>
<td>Coagulation and Flocculation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 2/8</td>
<td>Sedimentation</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>F 2/9</td>
<td>ORAL REVIEWS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 2/13</td>
<td>Filtration</td>
<td>#3 Coag Floccul.</td>
<td>(Term paper outline &amp; 7 ref’s due)</td>
</tr>
<tr>
<td>Th 2/15</td>
<td>Filtration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 2/20</td>
<td>Filtration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 2/22</td>
<td>EXAM: Covers Reactor Design, Chemical Kinetics, Coag/Floc, Sedimentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 2/27</td>
<td>Filtration</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Th 3/1</td>
<td>Filtration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 3/6</td>
<td>Adsorption of Organics, Activated Carbon</td>
<td>#4 Filtration</td>
<td>13</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 3/8</td>
<td>Activated Carbon (In March, visit water plant)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/12-3/16</td>
<td>NO CLASS SPRING BREAK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 3/20</td>
<td>Activated Carbon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 3/22</td>
<td>Activated Carbon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 3/27</td>
<td>Activated Carbon/ Chem Oxidation  #5 Adsorption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 3/29</td>
<td>Chemical Oxidation and Disinfection  12,14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 4/3</td>
<td>Chemical Oxidation &amp; Disinfection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 4/5</td>
<td>EXAM : Covers Filtration, Activated Carbon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 4/10</td>
<td>Chemical Oxidation and Disinfection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 4/12</td>
<td>Membranes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 4/17</td>
<td>Membranes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 4/19</td>
<td>Student Presentations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 4/24</td>
<td>Membranes  #6 Membranes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 4/26</td>
<td>NO CLASS: FRED IN HERSHEY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu 5/1</td>
<td>Ion Exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Th 5/3</td>
<td>Ion Exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/7-5/11</td>
<td>FINAL EXAM  Chemical Oxidation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBA</td>
<td>Disinfection, Membranes, Ion Exchange</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>