Catalog Description: Surface and ground water quality and resource management; water pollution in aquatic environment; water/wastewater infrastructure systems; storm water management; water reclamation and reuse.

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Office Hours: Tuesday, Thursday, and Friday between 2:00 to 4:00 PM, and also by appointment

Class Hours: Monday 6:30 to 9:10 PM, KAP 203

Grading Criteria:
- Midterm Exams 20% (10% each)
- Final Exam 25%
- Homework 10%
- Reports 10%
- Term paper and presentation 30%
- Class participation 5%

Prerequisite: Department approval

Textbooks:
- “Water and Wastewater Technology” by Hammer and Hammer, 5\textsuperscript{th} ed., Prentice Hall, 2004
- “Class Notes”, M. Pirbazari, 2006

Videos:
- Storm Water Pollution Prevention
- Ground Water
- The Estrogen Effect (Endocrine Disrupters)
- Rivers, Erosion and Deposition
- Landform Evolution
- Down to the Last Drop
- We All Live Downstream
- Water Desalination
- Water Recycling
- Clean Water: What Is It Worth?
- Groundwater Replenishment in Orange County
ENE 510
Water Quality Management and Practice
Fall 2006

Course Syllabus

1. **BACKGROUND: WATER CHEMISTRY** (1 week)
   - Chemical water analysis
   - Gas Solubility
   - Alkalinity
   - Colloids and coagulation
   - Organic compounds
   - Organic matter in wastewater
   - Laboratory chemical analysis

2. **BACKGROUND: WATER MICROBIOLOGY** (1 week)
   - Bacteria, fungi, algae, protozoa, and viruses
   - Waterborne diseases
   - Coliform bacteria as indicator organisms
   - Sewer corrosion by sulfur bacteria
   - Bacteria re-growth in water distribution network

3. **WATER QUALITY and POLLUTION** (1 week)
   - Quality of surface waters
   - Water quality in flowing waters
   - Water quality in impounded waters
   - Groundwater quality
   - Water quality standards
   - Microbiological quality of drinking water
   - Chemical quality of drinking water

4. **Advanced DRINKING WATER TREATMENT** (2 weeks)
   - Synthetic organic chemical removal
   - Disinfection and disinfection byproducts
   - Advanced oxidation processes
   - Membrane Processes
   - Removal of endocrine disrupter chemicals (EDCs)

5. **WASTEWATER COLLECTION, and TREATMENT** (1 week)
   - Wastewater collection infrastructure
     - sewer corrosion
     - damage prevention
     - damage control
     - retrofitting
   - Biological wastewater treatment
     - conventional treatment
     - advanced treatment
Biofiltration for odor causing chemicals
Sludge Treatment
  - anaerobic
  - aerobic
Sludge dewatering and disposal
Natural and constructed wetlands for wastewater treatment

5. **ADVANCED WASTEWATER TREATMENT (2 1/2 weeks)**
   Limitation of conventional treatment
   Suspended solids removal
   Chemical-biological phosphorus removal
   Biological nitrification-denitrification
   Activated carbon adsorption
   Membrane processes
   Wastewater reclamation and reuse

6. **STORM WATER MANAGEMENT – BMPs and TREATMENT (2 1/2 weeks)**
   Overview of storm water discharge
   Pollutants in storm water discharges
   Goals of storm water best management practices (BMP)
   Flow control
   Pollutant removal
   Pollutant source reduction
   BMP selection
   Monitoring BMP effectiveness
   Effectiveness of BMPs in managing urban runoffs
   Costs and benefits of storm water BMPs
   Storm water treatment practices
   Wetlands for storm water treatment

7. **GROUNDWATER MANAGEMENT (1 week)**
   Watershed management
   Groundwater recharge
     - recharge with treated sewage
     - recharge with storm water
     - water quality issues

8. **INDUSTRIAL WASTEWATER TREATMENT (1 week)**
   Oil refinery wastewater
   Chemical industry wastewater
   Metal finishing wastewater
   Food industry wastewater
   Pharmaceutical wastewater
   Animal farm/husbandry wastewater