# Computational Procedures for Water/Wastewater Treatment Technologies

**Mondays 06:30p.m.-09:40p.m., Technology Room 3200**
**WT 220**
**CRN: 10558**

## Course Syllabus

**Instructor Manuel M. Sanchez**

College of Technology and Applied Sciences

Department of Water and Wastewater Treatment Technology

Imperial Valley College
P.O. Box 158
Imperial, CA 92251

Fall 2012

# WT 220-Advanced Computational Procedures for Water/Wastewater Treatment Technologies

3.0 Credit Units

**Course Prerequisite:** WT 120

**Course Description and Objectives:**

Advanced principles used in the treatment of water and wastewater form the basis for many approaches to the remediation of contaminated soils and water. In addition, these principles can be used in designing, developing and tailoring industrial processes to minimize detrimental environmental effects. This course presents the student with a basic understanding of the hydrologic cycle and how the human interface alters this process and creates an artificial cycle. The chemical and biological elements of treatment will be presented as well as theory of hydrology and treatment technologies. Design engineering of processes will be stressed. Finally, federal and state regulations will be covered which directly impact various treatment technologies.

**Instructor Information:**

**Mr. Manuel M. Sanchez**
Cell phone: (760) 259-3834
Email: manuel.sanchez@imperial.edu

**Textbook:**

- "**Applied Math for Wastewater Operators" by Joanne Kirkpatrick Price. CRC Press**

**Workbook:**

- "**Applied Math for Wastewater Operators" by Joanne Kirkpatrick Price. CRC Press**

**Course Evaluation:**

**Grading Criteria*:**

| | |
|---|---|
| Class Participation and assignments: | 40% |
| Online Participation | 10% |
| Quizzes | 40% |
| Final Exam: | 10% |
| | 100% |

*Note: Grading criteria are guides only. Instructor retains the right to lower these criteria, i.e., award higher grades to lower scores.

**Course Requirements:**

***Readings and exercises projects:*** Students are required to complete the necessary reading and exercises assignments prior to the session as reflected in the schedule and are encouraged to bring the textbook(s) to class. Homework assignments shall be delivered to the Instructor's desk at the beginning of the class and will not be accepted late. Assignments may be both individual and group work, and may include presentations.

***Attendance:*** Class attendance is strongly encouraged. "Excessive absences" is defined as a student whose continuous, unexcused absences exceed the number of hours the class is scheduled to meet per week. Instructor may drop a student after census and up until the final drop deadline (75% of the course) if the student has excessive absences and is no longer participating in the class; however, there is no responsibility on the part of the Instructor to do so. Imperial Valley College's policy will be strictly adhered to regarding absenteeism (General Catalog, page 28).

***Drop Classes:*** Students will not be dropped from the class. Students are responsible for dropping classes. Failure to drop the class will result in an "F" for the semester.

***Term Paper:*** Each student will be expected to complete a five page term paper. Topics must be approved by the instructor. Students must use an approved form and style manual such as APA (Publication Manual of the American Psychological Association).

***Exams:*** All exams will be given during lecture times and or via Blackboard, and will generally consist of multiple choice and calculations. Exam dates are indicated on the course outline. No make-up exams will be given. If an exam is missed, all of the other exam scores will be averaged and that average minus ten percent will be used in lieu of the missed exam. Any additional missed exams will receive a score of zero.

***Laboratory Work:*** Some assignments and projects will be laboratory based. Any of the local Water/Wastewater Treatment Plants' labs may be used. Lab time will occur during normal class hours.

***Field Trips:*** If any, they will be scheduled as needed. These will, for the most part, use existing classroom hours. Great efforts by the Institution and instructors are involved and your attendance is expected.

***Academic Conduct and Responsibility*:** Students are encouraged and expected to behave at a College level, cell phones or any other communication devices should be turned off during class as these devices are considered disruptive. No headphones are allowed. No drinks or food is allowed in class. Bottled water is accepted. Students are expected to execute all course assignments and activities in accordance with the Imperial Valley College's standard (see General Catalog page 27).

***Instructor's Conduct*:** Instructor will adhere to Imperial Valley College's standards. Instructor will not accept any kind of contributions, gifts or donations regardless of intentions, no exceptions. The greatest gift to any instructor is your effort and positive outcomes of the actual class.

**This *syllabus may be modified* at the instructor's discretion as necessary to meet the needs of the course.**

Following are the schedules for licensing programs examinations by the state:

## WATER TREATMENT
### 2008-2010 EXAMINATION SCHEDULE

| Grade | Application Deadline Dates | Test Dates |
|---|---|---|
| 1-4 | September 1, 2012 | November 17th, 2011 |

To confirm Water Operator examination schedules and requirements visit:
http://www.dhs.ca.gov/ps/ddwem/opcert/default.HTM

To apply for Water Treatment Examination:
http://www.cdph.ca.gov/certlic/occupations/Documents/Opcert/CDPH%208629%20T%20Exam%20Appl%205-2011.pdf

## WASTEWATER TREATMENT PLANT OPERATOR CERTIFICATION

### Examination Information and Schedule

Written examinations for each of the five grades of certifications will be conducted at selected sites on the following dates:

| **Date of Examination** | **Final Date for Filing Applications (Postmarked)** |
|---|---|
| April 6, 2013 | Feb 1, 2013 |

To confirm Wastewater Operator examination schedules and requirements visit: http://www.swrcb.ca.gov/water_issues/programs/operator_certification/docs/exam_info.pdf

All students are highly encouraged to attend any of the state examinations at a proper level while attending IVC's Water and Wastewater Treatment programs.

***Student Outcomes*:** To build and strengthen a student's math ability to complete the Water and Wastewater Treatment Technology science programs at IVC and to successfully pass various mandated licensing examinations. To assist the student in analyzing word problems, to communicate the various aspects of the California Department of Health Services licensing programs, and to provide a strong mathematical base for concepts encountered in the Water Utility Science program.

**After accomplishing this course, it is expected that students will...**

1. Retain some foundational knowledge: remember basic terms associated with Water and Wastewater Treatment Technologies, environmental issues, recognize potential cross-media impacts, acknowledge linkages between technology and environmental and human health impacts, identify sources of uncertainty in environmental problems, estimate costs and benefits (even qualitatively) of technology and associated environmental impacts.

2. Apply knowledge to other areas: enhance critical thinking in relation to complex problems, find appropriate data sources and use and cite them correctly, assess statistics and scientific information objectively, evaluate options from various viewpoints (e.g., technological feasibility, environmental impact, policy implications, everyday operations' strategy, etc.)

3. Integrate knowledge: combine knowledge of everyday consumer choices with basic engineering principles and environmental impacts, see the connectedness of human activities with environmental impacts on a global scale.

4. Reflect on the human dimension: remain conscious of their personal impact on the environment via their choices, educate others on the impact of decisions, realize that decision making is difficult and often doesn't have one right answer.

5. Remain motivated: feel that environmental issues are accessible to their general comprehension; be knowledgeable, not intimidated, by statistics, estimations, calculations, and general scientific information

6. Learn how to learn: ask questions to develop a more robust understanding, collaborate with others with different backgrounds, find good data and identify weak data

***Collaboration, Cheating and Plagiarism:*** Collaboration is encouraged in the course for discussing topics outside class and in completing homework assignments. Collaboration in the latter sense means working together to frame problems, devise approaches, and comparing results. (As a student, this was invaluable for me - as minor errors using a calculator could be caught.) The final work however must be the work of the individual student, indicating that you alone prepared the work and understand the material. Cheating is copying someone else's work and turning it in as your own work and is unacceptable. Plagiarism is a serious offense. All material originally the work of others should be cited properly. Refer to any common writing style manual for guidelines in citing material and writing source references. Published references are more static and permanent than internet sources and are preferred when available. Cheating and plagiarism will be dealt with according to IVC's policies (General Catalog, page 27).

**Course Outline**

| Date | Chapter | Topic | Workbook Assignment Due |
|---|---|---|---|
| Aug. 20 | 1 | Introduction and Overview of Treatment Technologies, applied volume calculations | None. |
| Aug. 27 | 2 | Flow and velocity calculations | Pages 3- 9 |
| Sept. 3 | --- | Labor Day | Study for Quiz #1 |
| Sept. 10 | 3,4 | Milligrams per liter and Loading rate calculations **Quiz #1** | Pages 15-23 Pages 29-39 |
| Sept. 17 | 4,5 | Loading rate calculations and detention and time calculations | Pages 45-57 |
| Sept. 24 | 6 | Efficiency and percent calculations | Pages 59-69 and 77-83 |
| Oct. 1 | 7 | Pumping calculations | Pages 89-105 Study for Quiz #2 |
| Oct. 8 | 8 | Water sources and storage **Quiz #2** | Pages 111-123 |
| Oct. 15 | 9 | Coagulation and flocculation | Pages 129-145 |
| Oct. 22 | 9,10 | Sedimentation **Midterm** | Pages 153-161 Study for Quiz #3 |
| Oct. 29 | 10, 11 | Filtration **Quiz #3** | Pages 163-175 And 183-201 |
| Nov. 5 | 12 | Chlorination **Water Science Project Due** | Pages 209-227 |
| Nov. 12 | --- | Veteran's Day | Pages 235-249 |
| Nov. 19 | 13,14 | Fluoridation, Softening **Term Paper Due** | Pages 257-273 |
| Nov. 26 | 15 | Laboratory **Quiz #4** | Pages 283-311 Pages 323-333 Study for Final Exam |
| Dec. 3 | All | **Final Examination** | Good luck on your State Exam! |

***Disability Policy*:** Any student with a documented disability who may need educational accommodations should notify the instructor of the Instruction Student Programs (DSP&S) Office as soon as possible.

**DSP&S**
**Room 2117**
**Health Services Building**
**(760) 355-6212**

**Approval of Syllabus:**

| | | |
|---|---|---|
| Course Instructor | Signature | Date |
| Department Chair | Signature | Date |