

CE 484**Water Treatment Design****3 Units**

USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

ABET Course Syllabus

Course Information, Textbook and Supplementary Materials

Design Kernel**Course Description:**

Fundamentals of water treatment design, including feasibility, predesign studies, bench and pilot testing, detailed design, flow instrumentation and control, cost estimation, water regulations, conventional and advanced water treatment process design, coagulation/flocculation/sedimentation, media filtration, disinfection (chlorine, ozone, UV, chloramines), activated carbon, ion exchange, advanced oxidation processes.

Design Kernel for: BSCE and BSCE Environmental
Required for: BSENE

Prerequisites: CE 451 Water Resources Engineering
 CE 463 Water Chemistry and Analysis
 CE 473 Engineering Law, Finance and Ethics

Co-Requisites: None

Required Textbook: Kawamura, Susumu. Integrated design and Operation of Water Treatment Facilities, Second Edition, John Wiley and Sons, New York, 2000.

Reference: Supplementary class notes, design documents and other materials will be provided during the course.

Topics Covered	Learning Outcomes
Plant hydraulics and the pre-design processes	Students will understand the systems and procedures of water treatment processes:
The principle and design of water treatment	1. Water treatment objectives and the design process
The scientific basis of precipitation softening	2. Pre-design studies, bench and pilot testing
	3. Water Regulations
	4. Chemical feeding systems
	5. Coagulation, Flocculation and Sedimentation
	6. Filtration (media)
	7. Membrane Processes
	8. Disinfection (chlorine, ozone, UV)
	9. Activated Carbon and Ion Exchange
	10. Advanced Oxidation Processes
	11. Basic Design Considerations – Hydraulic, Layouts, Process Diagrams

12. Conceptual Cost Estimation
13. Water-related Issues and sustainability considerations

CE 484	Water Treatment Design	3 Units
USC SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING		

Lecture and Lab Schedule			
Lecture		Lab	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
1	3 hours	n/a	

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course contributes to the program outcomes as outlined in the adjacent table.

Course Contribution to Program Outcomes (a-k)	✓ Key
a. An ability to apply knowledge of mathematics, science, and engineering.	✓
c. An ability to design a system component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	✓
d. An ability to function on multi-disciplinary teams.	✓
e. An ability to identify, formulate and solve engineering problems.	✓
g. An ability to communicate effectively.	✓
h. The broad education necessary to understand the impact of engineering solutions in a global economic and environmental and societal context.	✓
i. Recognition of the need for, and an ability to engage in life-long learning.	✓
j. Knowledge of contemporary issues.	✓
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	✓

Prepared by: Dr. Arturo Burbano, Professor of Environmental Engineering
Date: Fall 2014