Course Change Proposal
Form A

Academic Group (College): Engineering and Computer Science
Academic Organization (Department): Civil Engineering
Date: September 19, 2007

Type of Course Proposal:
New X Change ___ Deletion ___

Department Chair:
Ramzi Mahmood Ph.D., PE
Submitted by:
Kurt Ohlinger Ph.D., PE

Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes ___ No X
For Catalog Copy: Yes ___ No X
CCE: Yes X No ___

Semester Effective:
Fall ___ Spring X, 200__

New course:

Subject Area (prefix) & Catalog No. (course no.): CE 39
Title: Advanced Waste Treatment
Units: 6.0

JUSTIFICATION:
This course has been developed as a required component of the new Wastewater Treatment Plant Operation Specialist Certificate Program. The new certificate program is designed to provide students with the knowledge, skills, and abilities to competently operate wastewater treatment facilities.

NEW COURSE DESCRIPTION: (Not to exceed 80 words, and language should conform to catalog copy. See http://www.csus.edu/acaf/univmanual/crspsl.htm - Guidelines for Catalog Course Description)

This advanced course is a continuation of the Operation of Wastewater Treatment Plants I and II courses, and is designed to train operators in the safe and effective operation and maintenance of wastewater treatment plants. This course provides information to operators of advanced wastewater treatment plants covering enhanced biological nutrient removal treatment processes as well as physical-chemical tertiary treatment processes and wastewater reclamation.

Prerequisite: None
Enforced at Registration: Yes ___ No ___
Corequisite: None
Enforced at Registration: Yes ___ No ___

CAN (California Articulation Number):
Graded: Letter ___ Credit/No Credit X ___
Instructor Approval Required? Yes ___ No X ___

Course Classification (e.g., lecture, lab, seminar, discussion):
Lecture (Distance Education) Title for SIS+/CMS (not more than 30 characters)
Advanced Waste Treatment

Cross Listed?
Yes ___ No X ___
If yes, do they meet together and fulfill the same requirement, and what is the other course?

How Many Times Can This Course be Taken for Credit? 1 ___

Can the course be taken for Credit more than once during the same term? Yes ___ No X ___

Form A – CE 39
FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:

Description of the Expected Learning Outcomes: Describe outcomes using the following format: “Students will be able to: 1), 2), etc.” See the example at http://www.csus.edu/acaf/example.htm

Upon completion of this course, students will be able to:
1. Demonstrate understanding of advanced wastewater treatment and laboratory analysis processes, including enhanced biological nutrient removal and physical-chemical tertiary treatment processes.
2. Articulate the skills and knowledge necessary to operate and to administer operation of advanced treatment processes at wastewater treatment plants to produce and deliver a clean, safe plant effluent suitable for reuse or for safe discharge to the environment.
3. Understand safe operation practices for working in an advanced wastewater treatment facility.
4. Demonstrate understanding and knowledge of instrumentation and control systems used for automated and remote control of advanced treatment processes.

**Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.

Assessment Strategies: A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

Student assessment will be based on:
1. Passing unit examinations for each training unit comprising the course.
2. Passing a comprehensive final exam covering all aspects of wastewater treatment plant operation covered during the course.

For whom is this course being developed?

<table>
<thead>
<tr>
<th>Majors in the Dept</th>
<th>Majors of other Depts</th>
<th>Minors in the Dept</th>
<th>General Education</th>
<th>Other</th>
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Is this course required in a degree program (major, minor, graduate degree, certificate? Yes X No __

If yes, identify program(s): Wastewater Treatment Plant Operation Specialist Certificate Program – Certificate of Academic Achievement

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes ___ No X__

If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). ____________________

The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.

Approvals: If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

Signatures: ___________________________________________ Date: _________________

Department Chair: ________________ Date: 7/19/07

College Dean or Associate Dean: ________________ Date: 9/24/07

CPSP (for school personnel courses ONLY)

Associate Vice President and Dean for Academic Programs

Distribution: Academic Affairs (original), Department Chair and College Dean. Dean's office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.

Form A – CE 39
Course Title: Advance Waste Treatment – CE 39
6.0 Academic Credits

Course Description
This advanced course is a continuation of the Operation of Wastewater Treatment Plants I and II courses, and is designed to train operators in the safe and effective operation and maintenance of wastewater treatment plants. This course provides information to operators of advanced wastewater treatment plants covering enhanced biological nutrient removal treatment processes as well as physical-chemical tertiary treatment processes and wastewater reclamation.

Course outline

I. Odor Control
   A. Need for Odor Control
   B. Odor Generation
   C. Odor Identification and Measurement
   D. Odor Complaints
   E. Solutions to Odor Problems
   F. Troubleshooting Odor Problems
   G. Review of Plans and Specifications
   H. Additional Reading

II. Activated Sludge (Pure Oxygen Plants and Operational Control Options)
   A. The Activated Sludge Process
   B. Pure Oxygen
   C. Return Activated Sludge
   D. Waste Activated Sludge
   E. Treatment of Both Municipal and Industrial Wastes
   F. Industrial Waste Treatment
   G. Effluent Nitrification
   H. Review of Plans and Specifications

III. Residual Solids Management
    A. Need for Solids Handling and Disposal
    B. Thickening
    C. Stabilization
    D. Conditioning
    E. Dewatering
    F. Volume Reduction
    G. Solids Disposal
    H. Review of Plans and Specifications

IV. Solids Removal from Secondary Effluents
    A. Need to Remove Solids from Secondary Effluents
B. Solids Removal from Wastestreams Using Chemicals
C. Gravity Filters
D. Inert-Media Pressure Filters
E. Continuous Backwash, Upflow, Deep-Bed Silica Sand Media Filters
F. Cross Flow Membrane Filtration
G. Basic Elements of a Membrane Filtration Process
H. Operation of a Cross Flow Membrane System
I. Safety Precautions with Membrane Systems

V. Phosphorus Removal
   A. Why is Phosphorus Removed from Wastewater?
   B. Types of Phosphorus Removal Systems
   C. Biological Phosphorus Removal
   D. Lime Precipitation
   E. Phosphorus Removal by Alum Flocculation

VI. Nitrogen Removal
   A. Why is Nitrogen Removed from Wastewater?
   B. Types of Nitrogen Removal Systems
   C. Biological Nitrogen Removal
   D. Ammonia Stripping
   E. Breakpoint Chlorination
   F. Lemna Duckweed System

VII. Enhanced Biological (Nutrient) Control
   A. What is Enhanced Biological (Nutrient) Control?
   B. Achieving Multiple Processing Objectives
   C. Enhanced Nitrogen and Phosphorus Removal
   D. Enhanced SVI Control to Prevent Sludge Bulking
   E. Review of Plans and Specifications

VIII. Wastewater Reclamation
   A. Uses of Reclaimed Wastewater
   B. Operating Procedures
   C. Monitoring Program
   D. Safety
   E. Maintenance
   F. Review of Plans and Specifications
   G. Land Treatment Systems
   H. Operating Procedures
   I. Monitoring Program
   J. Safety
   K. Maintenance
   L. Review of Plans and Specifications
   M. References and Additional Reading
IX. Instrumentation and Control Systems
    A. Instrumentation and Control Systems
    B. Safety Hazards of Instrumentation and Control Systems
    C. Measured Variables and Types of Sensors
    D. Categories of Instrumentation
    E. Operation and Preventive Maintenance
    F. Additional Reading

Required text

*Advanced Waste Treatment, 5th Ed.* (2006), Prepared by the CSU Sacramento Office of Water Programs.

Recommended Reference


Expected Learning Knowledge, Behavior, and Attitude Outcomes and Competencies

1. Demonstrate understanding of advanced wastewater treatment and laboratory analysis processes, including enhanced biological nutrient removal and physical-chemical tertiary treatment processes.
2. Articulate the skills and knowledge necessary to operate and to administer operation of advanced treatment processes at wastewater treatment plants to produce and deliver a clean, safe plant effluent suitable for reuse or for safe discharge to the environment.
3. Understand safe operation practices for working in an advanced wastewater treatment facility.
4. Demonstrate understanding and knowledge of instrumentation and control systems used for automated and remote control of advanced treatment processes.

Assessment Strategies and Evidence of Competency

1. Pass unit examinations for each training unit comprising the course.
2. Pass a comprehensive final exam covering all aspects of wastewater treatment plant operation covered during the course.