Spring 2018 – Course Syllabus
Class title: **CIVE 549 Drainage and Wetlands Engineering**

Credits: 3
Instructor: Dr. José L. Chávez
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Office Hours: T and F, 2:30 – 4:00 pm

Course Description: Drainage and wetlands design for agricultural and natural resources applications. Water table modification for nonpoint sources pollution control.

Prerequisite: Hydrology (such as CIVE 322), soil physics and/or watershed science would be appropriate. Please contact Dr. Chávez for further information.

Texts: Smedema, L.K., W.F. Vlotman and D.W. Rycroft. (2004). Modern land drainage: planning and design of agricultural drainage systems. A.A. Balkema Publishers, Leiden, The Netherlands. pp. 446.

References: Reed, S.C. (Chairs, Eds.). (2001). Natural Systems for Wastewater Treatment (2nd Edition). WEF Manual of Practice FD-16. Water Environment Federation, Alexandria, VA. pp. 326.

Luthin, James N. (1978). Drainage Engineering. Krieger Publishing Company, Huntington, N.Y., 281 p.

U.S. Bureau of Reclamation. (1993). Drainage Manual. U.S. Government Printing Office. 321 p.

Course Objective:
1.   To gain an understanding of soil water movement, drainage and water table control, the underlying theory and its applications.
2.   To be able to use the above information to investigate, analyze and solve drainage and wetlands problems.
3.   To design drainage and wetlands systems for agricultural and natural resource applications, including surface, subsurface and water table control systems, and removal of pollutants from nonpoint sources.

Course Outline:

TOPIC	LECTURES
1. Introduction to water table control in natural and agricultural environments. Benefits and problems of drainage.	2
2. Plant requirements. Aeration. Salinity effects. Plant response.	1
3. Soil-water relationships. Soil-water statics and dynamics.	3
4. Steady state approach. Derivation of steady state equation. Crop and soil parameters. Applications.	3

5.	Un-steady state approach. Falling water table methods.	2
6.	Sub-surface drainage design. Drain capacity, slope and size. Layout of systems. Interceptor drains.	3
7.	Surface drainage design.	1
8.	Salinity control.	2
9.	Water table control.	2
10.	Wetland processes.	2
11.	Pollutant removal in wetlands.	2
12.	Creation of artificial wetlands.	4
13.	Miscellaneous – review, examinations .	3
	TOTAL	30

Instructional Methodology: The class will meet two days a week (T R) for lectures and discussion.

Mode of Delivery: Classroom instruction

Methods of Evaluation: Students will be evaluated on the basis of examinations and homework. There will be two mid-term exams and a final exam. The course grade will be determined based upon the following percentages:

- ➤ *Exams (2)* = *40% (20 ea.)*
- ➤ *Final examination* = *30%*
- ➤ *Homework* = *30%*

Total =100%

Term grades for this course will use the +/- grading system as described in the CSU catalog. The following scale will be used: A $\geq$ 93; A- $\geq$ 90; B+ $\geq$ 87; B $\geq$ 83; B- $\geq$ 80; C+ $\geq$ 77; C $\geq$ 70; D $\geq$ 60; F < 60.

Policies: Attendance and participation are an important part of the class and unexcused absence can result in a reduction in your grade (see grading). Participation in official University activities, sickness, or special religious observances may provide a legitimate reason for an excused absence. The student is responsible for discussing this with the instructor at the beginning of the semester or as earlier as possible before the absence occurs.

I will accept late homework submissions up to five days after the due date or before solutions are distributed, whichever comes first. A penalty of 20% per day late will be assessed on these assignments. Make-up exams will be given only for university-approved excuses or when you have a note from a medical professional. Please *turn off* cell phones in the classroom. Please keep your email correspondence written in a professional style. Students are encouraged to discuss and collaborate however the final work you submit should be distinctly your own. CSU policies on academic integrity will be rigorously enforced in this course.

The course will adhere to the Academic Integrity Policy of the Colorado State University General Catalog (Page 7) and the Student Conduct Code."

Please refer to:

http://www.ssw.chhs.colostate.edu/field/files/Field%20Manuals/Policies/CSU%20Policy%20on%20Academic%20Dishonesty.pdf

http://learning.colostate.edu/integrity/index.cfm