CIVE 549
Drainage and Wetlands Engineering

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

Prerequisite: CIVE 425 or CIVE 322/ENVE 322.

Note: the preferred prerequisite is CIVE 425 – Soil and Water Engineering, or its equivalent. However, due to the previously limited availability of this course, a background in hydrology (such as CIVE 322), soil and crop sciences and/or watershed science is appropriate. Please contact Dr. Chávez for further information.

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.

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%

Course Outline:

TOPIC

1. Introduction to water table control in natural and agricultural environments. Benefits and problems of drainage.

2. Plant requirements. Aeration. Salinity effects. Plant response.
3. Soil-water relationships. Soil-water statics and dynamics.
4. Steady state approach. Derivation of steady state equation. Crop and soil parameters. Applications.
5. Un-steady state approach. Falling water table methods.
6. Sub-surface drainage design. Drain capacity, slope and size. Layout of systems. Interceptor drains.
7. Surface drainage design.
8. Salinity control.
9. Water table control.
10. Wetland processes.
11. Pollutant removal in wetlands.
12. Creation of artificial wetlands.

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.

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.