SCHOOL OF AGRICULTURE

COURSE NUMBER: AGR 674 CREDIT HOURS: 3

I. TITLE:

Agricultural Irrigation and Water Systems

II. CATALOG DESCRIPTION:

Includes determining water needs, water sources, pumps, fundamental pipeline hydraulics, and designing a complete irrigation and/or water system for the farm. (Spring, even years)

*To receive graduate credit for this course, a student must be admitted to graduate studies prior to registering for the course.*

III. PURPOSE:

To develop the basic understanding and skills to select and design agricultural irrigation systems.

IV. COURSE OBJECTIVES:

A. To familiarize students with various types of irrigation/water systems.
B. To develop an understanding of soil and water principles applicable to the study of irrigation.
C. To illustrate how these principles can be applied in analyzing and managing irrigation/water systems.
D. To develop an awareness of the factors involved in irrigation and water systems used by agriculturalists.

V. CONTENT OUTLINE:

A. Introduction
   1. Importance of Irrigation
   2. Terminology and Units of Measurement
B. Irrigation Water Supply
   1. Water Quality
   2. Surface Water Development
      a. Diversion and impoundment
      b. Steam Water Law
   3. Ground Water Development
a. Physical description of groundwater  
b. Well hydraulics  
c. Well drilling  
d. Test holes and sieve analysis  
e. Gravel pack and well screens  
f. Well development and testing  
g. Groundwater Law  

C. Soil Water Plant Relations  
   1. Soil Properties  
   2. Soil Water Content  
   3. Available Soil Moisture  
   4. Salinity  
   5. Soil Moisture Measurement  
   6. Infiltration  

D. Plant and Water Irrigation Requirements  
   1. Evapotranspiration  
   2. Crop Moisture Use Rates  
   3. Irrigation Efficiencies  
   4. Amount and Timing of Irrigations  
   5. Irrigation Scheduling Techniques  

E. Pipeline Hydraulics (Mainlines)  
   1. Bernoulli Equation  
   2. Friction Loss  
   3. Economic Pipe Size  

F. Measurement of Irrigation Water  
   1. Direct  
   2. Velocity Area  
   3. Weirs  
   4. Flumes  
   5. Orifices  

G. Water Systems and Irrigation Pumping Plants  
   1. Types of Pumps  
   2. Characteristics Curves  
   3. Maximum Suction Lift  
   4. Affinity Laws  
   5. Systems Head Curves  
   6. Pump Selection  
   7. Power Units  
   8. Economics  
   9. Pump Testing  

H. Sprinkler Irrigation Systems  
   1. System Components  
   2. Types of Systems  
      a. Solid set  
      b. Periodic lateral move  
      c. Center pivots  
      d. Traveling linear
e. Traveling guns

3. Water Distribution and Uniformity
   a. Single sprinkler pattern
   b. Overlapped sprinkler pattern
   c. Uniformity coefficient

4. Design Considerations
   a. Application rates and infiltrations limitations
   b. Sprinkler spacing and selection
   c. Friction loss in laterals
   d. Deviations in pressure and discharge
   e. System capacities

I. Surface Irrigation Systems
   1. Types of Systems
      a. Basin
      b. Border
      c. Furrow
   2. Ditch Structures
   3. Water Distribution and Uniformity
   4. Application Depths
   5. Design Considerations

J. Trickle (Drip) Irrigation Systems
   1. Types and Components
   2. Design Considerations

VI. INSTRUCTIONAL ACTIVITIES:

Problem solving of designing and developing irrigation systems.

VII. FIELD AND CLINICAL EXPERIENCES:

Field trips to area farms and businesses that use/sell irrigation systems.

VIII. RESOURCES:

A. ASAE papers
B. Various texts
C. Extensions Bulletins

IX. GRADING PROCEDURES:

90 - 100 = A
80 - 89 = B
70 - 79 = C
60 - 69 = D
Below 60 = E

All exams will be announced at least one week in advance of the test date. The final exam will be comprehensive. Anyone caught cheating on an exam will
automatically get a zero grade for that test. The grades will be based on homework assignments, hour exams, and the final exam.

X. **ATTENDANCE POLICY:**

Please refer to the most current copy of the *Murray State University’s Undergraduate Bulletin and Graduate Bulletin.*

XI. **ACADEMIC HONESTY POLICY:**

(Adopted by the MSU Board of Regents)

Cheating, plagiarism (submitting another person’s material as one’s own), or doing work for another person which will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help during an examination, the unauthorized copying of examinations, assignments, reports, term papers, or the presentation on unacknowledged material as if it were the student’s own work. Disciplinary action may be taken beyond the academic discipline administered by the faculty member who teaches the course in which the cheating took place.

NOTE: The School of Agriculture Faculty have adopted and implemented an Academic Honesty Policy in addition to the University Honesty Policy, which can be found in the current *Undergraduate Bulletin and Graduate Bulletin.* The policy sets guidelines regarding acts of dishonesty and the procedure to follow should an event occur. It is each Agriculture student’s responsibility to obtain and read a copy of this document. The School’s Academic Honesty Policy can be obtained by asking for a copy from any Agriculture Faculty member or the Secretary.

XII. **TEXT AND REFERENCES:**

Not required. Information will be provided by notes, handouts, etc.

XIII. **PREREQUISITES:**

None

XIV. **STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY:**

Murray State University endorses the intent of all federal and state laws created to prohibit discrimination. Murray State University does not discriminate on the basis of race, color, national origin, gender, sexual orientation, religion, age, veteran status, or disability in employment, admissions, or the provision of services and provides, upon request, reasonable accommodation including
auxiliary aids and services necessary to afford individuals with disabilities equal access to participate in all programs and activities. For more information, contact Sabrina Y. Dial, Director of Equal Opportunity, Murray State University, 103 Wells Hall, Murray, KY 42071-3318. Telephone: 270-809-3155 (voice), 270-809-3361 (TDD).

XV. **MSU SCHOOL OF AGRICULTURE CELL PHONE POLICY**

The School of Agriculture recognizes that in today’s world cell phones are a familiar and often necessary form of communication for students.

It shall be the policy of the School that no cell phone usage shall be allowed in class and/or labs without the prior consent of the course instructor. This shall include verbal calling, incoming calls, email, text messaging, and use of cell phone calculators on tests and quizzes.

Cell phones must be kept off and out of sight (i.e. secured to a person’s belt or kept in a bag or purse away from desks and lab counters).

Should a student’s cell phone be visible, ring, or other form of unauthorized usage that is interruptive to the class or lab, the student may be asked to leave class and not return for that class/lab period.

Upon prior consent of the instructor, a student may obtain permission to have their phone on in case of an emergency or in critical family situations.

This policy also includes pagers and other electronic equipment such as blackberries and/or computers/laptops.