

**Course title: Irrigation principles and management, Fall Semester**

**Instructor: Dr. Haimanote Bayabil, Agricultural and Biological Engineering, Tropical Research and Education Center**

**AOM6735**

**IRRIGATION PRINCIPLES AND MANAGEMENT**

3 credits, Distance Education with chat sessions

- 1. Catalog Description:** This course is designed to teach graduate students about irrigation such that they would have the skills to evaluate an irrigation system, identify parts of a system, and develop an irrigation schedule based on system characteristics. This course is designed for non-engineers although quantitative ability will be required for calculations and analysis.
- 2. Pre-requisites and Co-requisites:** Students must be proficient in Microsoft Excel and Word. Students should be able to use equation functions and graphing functions in Excel. It is recommended that students have basic understanding of hydrology, unit conversions, and algebra.

**3. Course Objectives:**

Those successfully completing this course will be able to:

1. Develop and describe the use of a soil moisture retention curve.
2. Define basic components of the hydrologic cycle and how they can be measured or estimated.
3. Identify evapotranspiration calculation process and use available models to estimate.
4. Describe movement of water in soils.
5. Identify key components of an irrigation system and their function.
6. Calculate irrigation rates, irrigation efficiency, and plant water use efficiency.
7. Identify different types of irrigation delivery systems and the strengths and weaknesses of each.
8. Determine an irrigation schedule for a system.

**4. Instructor:**

Dr. Haimanote Bayabil, Agricultural and Biological Engineering,  
Tropical Research and Education Center, Office: 786-217-9253;  
[hbayabil@ufl.edu](mailto:hbayabil@ufl.edu)

Dr. Bayabil returns email messages within 48 hours. Do not expect messages to be returned over the weekend.

**5. Training Location:** Canvas (<http://elearning.ufl.edu/>)

This course is offered through Canvas and therefore requires internet access. Internet speeds vary, wireless and DSL will likely result in slow video downloads.

**Be aware that participation is part of each student's grade. Participation will consist of scheduled chat sessions. The time and day of the week for the chat session will be established on the first week of class based on a doodle poll. Chat will be scheduled between the hours of 9am and 5pm Eastern Time zone.** If you know that you cannot participate in a chat during this time, you should not take this class. Chats may be replaced with discussions at the instructor's preference. Chat session make ups will be provided for missed chats. Chats will be recorded and available for viewing.

**6. Material and Supply Fees:** None.

**7. Textbooks and Software Required:**

No textbooks are required. All required reading material is available through websites or the UF library. A dominant source of readings are from UF IFAS Extension Electronic Data Information Source (EDIS; <http://edis.ifas.ufl.edu/>)

**8. Recommended Reading:**

Irrigation Association, 2011. Irrigation. 6<sup>th</sup> edition. Irrigation Association Falls Church, VA. Hoffman, G.J., R.G. Evans, M.E. Jensen, D.L. Martin, and R.L. Elliott. 2007. Design and Operation of Farm Irrigation Systems. 2<sup>nd</sup> Edition. American Society of Agricultural and Biological Engineers. St. Joseph, MI.

**9. Attendance and Expectations:** Students are expected to complete materials provided in the modules and course assignments using Canvas. All late assignments will receive a letter grade (10%) deduction. Assignments should be submitted in Canvas. Graded assignments will be returned using the Canvas system. **It is the student's responsibility to check for assignments each week. Weekly assignments are provided in the syllabus and also in Canvas and are typically released on Mondays at 8 am. Any changes will be noted in announcements.**

**Chat sessions will be scheduled weekly and all students are expected to participate.** Chat sessions occur using Adobe Connect or a similar service. **Thus, students will need access to a computer with audio (web camera is optional).** A chat session will be scheduled after course registration to best accommodate everyone's schedule. **Chat sessions may be replaced with discussions in Canvas at the instructors' discretion. Students will be notified in advance of any such change. Chats will be graded by attendance and participation. Students are required to respond to at least one question, ask a question, or provide other input during the chat. Chats are recorded.**

**The class project will include four graded components: proposal (20 pts), draft project outline (50 pts), part 1 of project (100 pts) and final project (150 pts). The project will consist of applying the skills learned from this class to a specific irrigation system. The system can be from the student's research or interest area. The instructor will also have an example system option that can be used.**

Any work that is submitted should be the product of the student. Any assignments that are not the individual student's work will be given a 0 grade and further disciplinary action per UF policy.

While this course is a distance education course, it should be treated and considered as a regularly offered course and will require the same amount of time that any other 3 credit graduate course would require. Chat sessions are expected to be 1 to 1.5 hours in length each week. Assignments range in difficulty but will require several hours of work to complete each week. The class project should be given due attention as it represents 15% of the course grade.

**The preferred methods for private communication regarding the course is via email or a scheduled meeting with the instructor. The preferred public communication regarding the course is in the weekly chat sessions. The primary means of day-to-day communication between the instructor and the class is the Canvas platform. Students should visit the online canvas course daily or at minimum every 2 days for updates and to keep current with course materials and assignments.**

**10. Grading:** Participation in chats 15%, assignments 70%, irrigation class project 15%

**11. Grading Scale:** A = 95-100%, A- = 90-94%, B+ = 87-89, B = 83-86, B- = 80-82, C+ = 77-79%, C = 73-76, C- = 70-72, D+ = 67-69, D = 63-66, D- = 60-62%, E < 60%

### **12. Online Course Evaluation Process**

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

### **13. Honesty Policy – Academic Honesty**

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the

Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

#### 14. Course Outline: Course outline

Lesson	Activities
Aug 21	<p><b>Reading:</b> None</p> <p><b>Lecture:</b> Introduction to course and Canvas</p> <p><b>Assignment test:</b> Introduction using the discussions option in Canvas (50 pts)</p>
Aug 28	<p><b>Required reading:</b> Ch 1 History of Irrigation in American, Irrigation Farming by WH Olin published in 1913 (available as an ebook)</p> <p><b>Lecture:</b> Introduction to irrigation (history of irrigation, how irrigation changed agriculture, water conflict)</p> <p><b>Assignment:</b> Water conflict review (75 pts)</p> <p><b>Chat topic:</b> Discuss irrigation worldwide with FAO documents</p>
Sep 4	<p><b>Required reading:</b> UF IFAS EDIS AE460</p> <p><b>Lecture:</b> Soils and water – part 1 (properties/characteristics, terminology)</p> <p><b>Class project:</b> Discussion of class projects and grading</p> <p><b>Assignment:</b> Soil water characteristics (75 pts)</p> <p><b>Chat topic:</b> Discuss EDIS AE460</p>
Sep 11	<p><b>Required reading:</b> UF IFAS EDIS AE266, TR015</p> <p><b>Lecture:</b> Soils and water - part 2 (laboratory measurements and field measurements)</p> <p><b>Assignment:</b> Soil moisture curve (100 pts)</p> <p><b>Chat topic:</b> Discuss field equipment used to measure and monitor soil water content; EDIS documents</p>
Sep 18	<p><b>Required reading:</b> UF IFAS EDIS AE449, AE171; Konikow, L.F. Long-term Groundwater Depletion in the United States Vol. 53, No. 1–Groundwater–January-February 2015 (pages 2–9)</p> <p><b>Lecture:</b> Water source for irrigation</p> <p><b>Class project:</b> Deadline for class project idea/proposal submittal (20 pts).</p> <p><b>Assignment:</b> Review on irrigation topic (100 pts)</p> <p><b>Chat topic:</b> Discuss groundwater depletion (Konikow article in Groundwater) and EDIS documents</p>
Sep 25	<p><b>Required reading:</b> UF IFAS EDIS AE459, AE256; Shuttleworth handout (provided by instructor)</p> <p><b>Lecture:</b> Evapotranspiration (basics of evapotranspiration, different ET estimation techniques, reference ET, online tools/resources)</p> <p><b>Assignment:</b> ET calculations (100 pts)</p>

	<b>Chat topic:</b> Discuss Shuttleworth handout and EDIS documents
Oct 2	<b>Required reading:</b> UF IFAS EDIS CH171 <b>Lecture:</b> Irrigation system components – part 1 <b>Assignment:</b> None. <b>Chat topic:</b> Discuss component ID and function and EDIS document
Oct 9	<b>Required reading:</b> UF IFAS EDIS HS1217 <b>Lecture:</b> Irrigation system components – part 2 <b>Class project:</b> Deadline for draft outline of project components; 50 pts <b>Assignment:</b> Irrigation system photos (75 pts) <b>Chat topic:</b> Discuss different systems; their benefits and limitations; EDIS document
Oct 16	<b>Required reading:</b> None. <b>Lecture:</b> Irrigation calculations <b>Assignment:</b> Irrigation calculations (100 pts) <b>Chat topic:</b> Practice example irrigation calculations
Oct 23	<b>Required reading:</b> UF IFAS EDIS CH156 <b>Lecture:</b> Irrigation hydraulics <b>Assignment:</b> Hydraulic calculations (100 pts) <b>Chat topic:</b> Discuss friction and pressure in irrigation systems and EDIS document
Oct 30	<b>Required reading:</b> None <b>Lecture:</b> Irrigation efficiency <b>Assignment:</b> Evaluating irrigation efficiency for a specific irrigation system (100 pts) <b>Chat topic:</b> Discuss different irrigation system characteristics and scheduling methods, and how they influence irrigation efficiency
Nov 6	<b>Required reading:</b> None <b>Lecture:</b> Irrigation uniformity <b>Assignment:</b> Irrigation uniformity (100 pts) <b>Chat topic:</b> Discuss uniformity and impacts on efficiency; discussion of Florida Water Star and EPA WaterSense
Nov 13	<b>Required reading:</b> Dukes, M.D. 2012. Water conservation potential of landscape irrigation smart controllers. Transactions of the ASABE 55(2): 563-569 (see link on Dukes' website); UF IFAS EDIS AE460 <b>Lecture:</b> Irrigation scheduling tools – part 1 <b>Class project:</b> Deadline for part 1 of class project (100 pts) <b>Assignment:</b> FAWN irrigation schedule (100 pts) <b>Chat topic:</b> Discuss tools – benefits and limitations and readings
Nov 20	<b>Required reading:</b> UF IFAS EDIS AE499 <b>Lecture:</b> Irrigation scheduling tools – part 2 <b>Assignment:</b> Apply an irrigation scheduling web or app tool (100 pts) <b>Chat topic:</b> Discuss good tools available outside of UF and EDIS document
Dec 4	<b>Class project:</b> Final class project submitted (150 pts)

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### **15. Services for Students with Disabilities**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)

### **16. UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

### **17. Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### **18. Your well-being is important to the University of Florida.** The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies. Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.

University Police Department, 392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>  
Academic Resources E-learning technical support, 352-392-4357 (select option 2) or e-mail to [Learningsupport@ufl.edu](mailto:Learningsupport@ufl.edu). <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling.  
<http://www.crc.ufl.edu/>

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<http://teachingcenter.ufl.edu/>

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.  
<http://writing.ufl.edu/writing-studio/>

Student Complaints Campus: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaintprocess>

18. Information on filing a complaint about this course can be found

at: <http://www.distance.ufl.edu/student-complaint-process>