

**Course title: Irrigation principles and management, Fall Semester**  
**Instructor: Kati Migliaccio, Haimanote Bayabil, Sandra Guzman, and**  
**Vivek Sharma - Agricultural and Biological Engineering**

**AOM6735**

**IRRIGATION PRINCIPLES AND MANAGEMENT**

3 credits, Distance Education with  
weekly zoom 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. Kati Migliaccio, Frazier Rogers Hall 120A, [klwhite@ufl.edu](mailto:klwhite@ufl.edu),  
352-294-6743

Dr. Haimanote Bayabil, Tropical REC, [hbayabil@ufl.edu](mailto:hbayabil@ufl.edu),  
Homestead, FL, 786-217-9253

Dr. Sandra Guzman, Indian River REC,  
[sandra.guzmangut@ufl.edu](mailto:sandra.guzmangut@ufl.edu), 772-577-7342

Dr. Vivek Sharma, Frazier Rogers Hall 237, [vsharma1@ufl.edu](mailto:vsharma1@ufl.edu),  
352-294-6725

The fastest way to reach an instructor is via email. Instructors return email messages within

48 hours. Do not expect messages to be returned over the weekend. Office hours can be made by scheduling an appointment. There is no TA for this course.

**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. To check the speed of your connection, try speedtest.net or a similar service.

**Be aware that participation is part of each student's grade. Participation will consist of scheduled online video (zoom) sessions. The time and day of the week for the zoom session will be established on the first week of class based on a doodle poll. Zoom will be scheduled between the hours of 9am and 5pm Eastern Time zone.**

If you know that you cannot participate in a live video session during this time, you should not take this class or you should discuss alternatives with Dr. Migliaccio before the class starts. Zoom sessions may be replaced with discussions at the instructor's preference. Zoom session make-ups will be provided for missed zoom events.

**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 no later than on Mondays at 8 am. Any changes will be noted in announcements.**

**Live video conference sessions will be scheduled weekly and all students are expected to participate.** Live video conference sessions occur using Zoom or a similar service. **Thus, students will need access to a computer with audio (web camera is optional).** A zoom session will be scheduled after course registration to best accommodate everyone's schedule. **Zoom sessions may be replaced with discussions in Canvas at the instructors'**

**discretion. Students will be notified in advance of any such change. Zooms 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 zoom session.**

**The class project will include four graded components: proposal (30 pts), draft project outline (50 pts), part 1 of project (100 pts) and final project (180 pts). The project will consist of applying the knowledge and 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. Zoom 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 method 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 zoom 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.**

**Course attendance policies follow UF guidelines <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies>. Students are encouraged to contact the instructor prior to absences if possible. Students are responsible for following up with instructors to make-up missed work.**

**10. Grading:** Participation in zoom sessions 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. Students are expected to provide professional and respectful feedback on the quality of instruction in this

course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at: <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at: <https://gatorevals.aa.ufl.edu/public-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
Intro Aug 23	<b>Reading:</b> None <b>Lecture:</b> Introduction to course and Canvas <b>Assignment test:</b> Introduction using the discussions option in Canvas (50 pts) <b>Instructor:</b> Migliaccio
1 Aug 28	<b>Required reading:</b> Ch 1 History of Irrigation in American, American Irrigation Farming by WH Olin published in 1913 & Estimated Use of Water in the United States in 2015 USGS (pdfs provided in module) <b>Lecture:</b> Introduction to irrigation (history of irrigation, how irrigation changed agriculture, water conflict) <b>Assignment:</b> Water conflict review (75 pts) <b>Zoom session 1 topic:</b> Discuss irrigation worldwide with FAO documents <b>Instructor:</b> Migliaccio

2 Sep 5	<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>Zoom session 2 topic:</b> Discuss EDIS AE460</p> <p><b>Instructor:</b> Bayabil</p>
3 Sep 11	<p><b>Required reading:</b> UF IFAS EDIS AE266 and EDIS 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>Zoom session 3 topic:</b> Discuss EDIS AE266 and EDIS TR015</p> <p><b>Instructor:</b> Bayabil</p>
4 Sep 18	<p><b>Required reading:</b> Konikow and Kendy 2005 Groundwater depletion: a global problem; Florida Statewide Agriculture Irrigation Demand Estimated Agricultural Water Demand (pdfs provided in module)</p> <p><b>Lecture:</b> Water source for irrigation</p> <p><b>Class project:</b> Deadline for class project proposal submittal (30 pts).</p> <p><b>Assignment:</b> Review on irrigation topic (100 pts)</p> <p><b>Zoom session 4 topic:</b> Discuss required reading</p> <p><b>Instructor:</b> Migliaccio</p>
5 Sep 25	<p><b>Required reading:</b> Several documents are provided in the module. Review the vegetable production guide, the Shuttleworth handout, and the two Allen papers. Others review depending on your interest.</p> <p><b>Lecture:</b> Evapotranspiration (basics of evapotranspiration, different ET estimation techniques, reference ET, online tools/resources) (Migliaccio)</p> <p><b>Assignment:</b> ET calculations (100 pts)</p> <p><b>Zoom session 5 topic:</b> Discuss Shuttleworth handout and IFAS vegetable production guide.</p> <p><b>Instructor:</b> Migliaccio</p>

6 Oct 2	<p><b>Required reading:</b> Irrigation Association, 2011. Irrigation. 6th edition: Chapter 8</p> <p><b>Lecture:</b> Irrigation system components – part 1</p> <p><b>Assignment:</b> None.</p> <p><b>Zoom session 6 topic:</b> Discuss Irrigation Pumps</p> <p><b>Instructor:</b> Sharma</p>
7 Oct 9	<p><b>Required reading:</b> Irrigation Association, 2011. Irrigation. 6th edition: Chapters 19, 20, 21</p> <p><b>Lecture:</b> Irrigation system components – part 2</p> <p><b>Class project:</b> Deadline for draft outline of project components; 50 pts</p> <p><b>Assignment:</b> Irrigation system photos (75 pts)</p> <p><b>Zoom session 7 topic:</b> Discuss different systems; their benefits and limitations; EDIS document</p> <p><b>Instructor:</b> Sharma</p>
8 Oct 16	<p><b>Required reading:</b> None</p> <p><b>Lecture:</b> Irrigation calculations</p> <p><b>Assignment:</b> Irrigation calculations (100 pts)</p> <p><b>Zoom session 8 topic:</b> Practice example irrigation calculations</p> <p><b>Instructor:</b> Migliaccio</p>
9 Oct 23	<p><b>Required reading:</b> UF IFAS EDIS CH156</p> <p><b>Lecture:</b> Irrigation hydraulics</p> <p><b>Assignment:</b> Hydraulic calculations (100 pts)</p> <p><b>Zoom session 9 topic:</b> Discuss friction and pressure in irrigation systems and EDIS document</p> <p><b>Instructor:</b> Migliaccio</p>
10 Oct 30	<p><b>Required reading:</b> Five papers are provided. Review the Water Resource Program document and the article by Reinders for zoom discussions. Others review depending on your interest.</p> <p><b>Lecture:</b> Irrigation efficiency</p> <p><b>Assignment:</b> Evaluating irrigation efficiency for a specific irrigation system (100 pts)</p> <p><b>Zoom session 10 topic:</b> Discuss on the Water Resource Program document and the Reinders article.</p> <p><b>Instructor:</b> Migliaccio</p>
11 Nov 6	<p><b>Required reading:</b> None</p> <p><b>Lecture:</b> Irrigation uniformity</p> <p><b>Assignment:</b> Irrigation uniformity (100 pts)</p> <p><b>Zoom session 11 topic:</b> Discuss uniformity and impacts on efficiency; discussion of Florida Water Star and EPA WaterSense</p> <p><b>Instructor:</b> Migliaccio</p>

12 Nov 13	<p><b>Required reading:</b> Dukes, M.D. 2012. Water conservation potential of landscape irrigation smart controllers. Transactions of the ASABE 55(2): 563-569; UF IFAS EDIS AE551  <a href="https://citrusindustry.net/2020/05/18/irrigation-scheduling-methods-affect-water-use/">https://citrusindustry.net/2020/05/18/irrigation-scheduling-methods-affect-water-use/</a></p> <p><b>Lecture:</b> Irrigation scheduling tools – part 1</p> <p><b>Class project:</b> Deadline for part 1 of class project (100 pts)</p> <p><b>Assignment:</b> FAWN irrigation schedule (100 pts)</p> <p><b>Zoom session 12 topic:</b> Discuss tools – benefits and limitations; discuss assigned readings</p> <p><b>Instructor:</b> Guzmán</p>
13 Nov 20	<p><b>Required reading:</b> none</p> <p><b>Lecture:</b> none</p> <p><b>Class project:</b> Identify two irrigation related references that support your class project and provide information requested in the discussion (40 pts)</p>
14 Nov 27	<p><b>Required reading:</b> UF IFAS EDIS AE499</p> <p><b>Lecture:</b> Irrigation scheduling tools – part 2</p> <p><b>Assignment:</b> Apply an irrigation scheduling web or app tool (100 pts)</p> <p><b>Zoom Session 13 topic:</b> Discuss good tools available outside of UF and EDIS document</p> <p><b>Instructor:</b> Migliaccio</p>
15 Dec 4	<p><b>Class project:</b> Final project presentations and reports (180 pts)</p> <p><b>Instructor:</b> Migliaccio</p>

### 15. Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation0001 Reid Hall, 352-392-8565, <https://disability.ufl.edu/>

### 16. Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu](http://www.counseling.ufl.edu)
  - Counseling Services

- Groups and Workshops
- Outreach and Consultation
- Self-Help Library
- Wellness Coaching
- U Matter We Care, [www.umatter.ufl.edu/](http://www.umatter.ufl.edu/)
- Career Connections Center, First Floor JWRU, 392-1601, <https://career.ufl.edu/>
- Student Success Initiative, <http://studentsuccess.ufl.edu>

Student Complaints:

- Residential Course: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>
- Online Course: <https://distance.ufl.edu/state-authorization-status/#student-complaint>

**17. Software Use** – All faculty, staff and students 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.