AOM 4643 - Principles & Issues in Environmental Hydrology

Fall 2025

Fall 2025: 3 credits

Instructor: Dr. Greg Kiker, Professor
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Office Hours: By Appointment

Class Meeting Times: This course is asynchronous through the Canvas course management system with no official meeting time unless set by the instructor for specific events.

Online Guest Lecturer Steve Leitman, Adjunct Prof. Urban and Regional Planning, Florida State University, Email: leitman@tds.net

Meeting Place: The class is delivered online via Canvas (https://elearning.ufl.edu/). Students are welcome to contact Dr Kiker through CANVAS email, his office phone (during business hours) or via cell (352)-281-1195. If I am not available, please leave a message with a phone number that I can use to call you. If you wish to text me, then please put your name into the text and the class so that I can prioritize the message. As a policy, I try to return calls/texts in 24 hours or less.

Catalog Description: This is a basic course in environmental hydrology intended for agricultural and natural resource managers. The first half of the course covers scientific principles of the hydrologic cycle while the second half investigates case studies of current water quality and water management issues.

Course Materials: There is no formal textbook for this course, but all required readings will be posted on the online through Canvas. Additional course notes, web links, text and diagrams are also provided on this site. Additional materials may be provided at the discretion of the instructor.

Prerequisites: This course will use algebraic equations and trigonometry to estimate water and energy flows in the hydrological cycle. Sophomore level chemistry and physics as well as mathematics through Pre-Calculus are recommended, but not required. ***Significant experience with Microsoft Excel or similar spreadsheets is required in this class for several homework assignments and for elements of the class project. Students will be expected to use and develop spreadsheet pages to calculate hydrological flows, performance measures and simulated water demands for different water users in selected watersheds. Students are welcome to phone the instructor to get more details on the types of calculations and spreadsheets required.***

General Description: This is a course in Environmental Hydrology intended for upper-division and graduate students in agriculture, environmental science and management.

This course offers an introduction to river basin management and planning by providing a foundation of understanding of river basins as a system from biological, hydrological and geopolitical viewpoints. Special emphasis will be focused on basic hydrology as well on the planning and management of transboundary basins (interstate and among countries). The class will have a special emphasis on ongoing management issues in the Apalachicola-Chattahoochee-Flint basin, a local river basin in the southeast USA. The class is designed to introduce students to technical tools and concepts used to understand and manage river basins from a system wide context including negotiation and math simulation tools. In addition, a basic hydrology section covers scientific principles of the hydrologic cycle including precipitation, evapotranspiration, infiltration, groundwater flow and surface runoff.

Through the Course Management System (E-Learning/Canvas), students will be required to respond to questions on reading assignments posted by the instructor and to sometimes comment on the responses of other students. In addition, students are expected to participate in online discussions with both other students and with the instructor as are scheduled by the instructor. Specified times for online, live or phone discussions with instructor which are mutually acceptable to both the students and the instructor can be provided with the mutual agreement of the instructor and the student.

CLASS OBJECTIVES: At the close of this course, the student will be able to:

1. Analyze and calculate the basic flows within the hydrological cycle in terms of the quantities of water and energy that move within various states.
    a. Complete simple hydrological calculations concerning general water cycle including energy, storage, precipitation, evaporation, surface and sub-surface flows.
    b. Explain the hydrological cycle as it relates to Florida's unique water resources
2. Describe the basic legal principles and conflict resolution alternatives that are relevant to transboundary river basin management
3. Integrate hydrological principles and river management objectives to negotiate and formulate water basin management contracts among opposing viewpoints
    a. Demonstrate how reservoir systems can be used to manage water flows and consumptive uses within a complex watershed
    b. Define and calculate environmental performance metrics for establishing tradeoffs between human uses and ecosystem protection.
    c. Assume a specific, stakeholder role and negotiate water management alternatives within a role play setting.

Course Outline and Schedule: The course is divided into 12 modules. Most modules are designed to take one week to complete. Modules have varying content with recorded lectures, readings, case study assignments and a short, open book quiz. Case studies are calculational in nature and similar to homework assignments. As case studies are automatically graded by CANVAS, students are allowed several attempts to calculate the correct answer, but each new attempt has altered number inputs so that all calculations must be redone. *Each module's case study is usually due on Sunday midnight before the next module (unless otherwise noted)*. If students require more than four attempts at a case study, they will need to contact the instructor via email. *Each module will have an online Quiz (open from Friday 8 am until Sunday midnight)*.

The course will follow this **general** schedule (dates are subject to some small changes as needed for course continuity).

Module 0: Start Here: Introductions and Course Management System Basics (Week 1)

SECTION: 1 Principles of Hydrology and Water Resources Management
Module 1: Introduction to the Hydrological Cycle and Water Budgets (Week 1)
Module 2: Solar Radiation as a fundamental input to the hydrological cycle (Week 2)
Module 3: Precipitation and Atmospheric Water- Expanded analysis of the hydrological cycle (Week 3)
Module 4: Evaporation and Transpiration- Expanded analysis of the hydrological cycle (Week 4)
Module 5: Infiltration and Runoff - Expanded analysis of the hydrological cycle (Week 5) (***Note – this is a large module with a higher work load than most***)
Module 6: Subsurface and Groundwater - Expanded analysis of the hydrological cycle (Week 6)
Module 7: Challenges in Florida Hydrology (Week 7)

SECTION: 2 Issues in Hydrology and Water Resources Management
Module 8: Water Conflicts: real or imagined? Transboundary water resources and uses (Week 7)
Module 9: Introduction to the Apalachicola-Chattahoochee-Flint (ACF) River Basin (Week 8) ***ACF Negotiation Strategy Preparation***
Module 10 The Apalachicola-Chattahoochee-Flint (ACF) River Basin as a human-managed system (Week 9) ***ACF Negotiation Strategy Preparation***
Module 11: Simple Water Resource Management Simulation Models and their use in the ACF River Basin (Week 10) ***ACF Negotiation Strategy Due NOV 5, 2025***
Module 12: Negotiation as understanding: Role Play and Water Allocation trade-offs in the ACF Basin (Week 11-15) ***ACF Negotiation/Class Project NOV 12- DEC 1***

TERM PROJECT: A term project will consist of a case study negotiation focusing on multi-disciplinary aspects of water use in the Apalachicola/Chattahoochee/Flint Basin. Generally, the term project grade will be divided into three sections: (1) Preparation for the negotiation through a strategy document and related spreadsheet calculations, (2)

Actual performance in the negotiation period with other role players, and (3) Product of the negotiated settlement (or lack of one) along with an "after action review" survey/report.

This term project will have a spreadsheet tool developed for use in the negotiations. Students will use this spreadsheet to explore the ramifications of various flow and release scenarios to their associated constituencies. Additional lectures and educational opportunities may be available for interested/qualifying students. Each student will turn in individual written report (s) with referencing on each section. ***Grading rubrics are provided in CANVAS for each of the term project sections.***

COURSE GRADING:

- Case study calculation assignments (approximately 8) (**30% of course grade**)
- On-line Graded Discussions and surveys (**5% of course grade**)
- Module Quizzes (approximately 11) covering reading material/lectures (**25% of course grade**)
- Term Project on the Apalachicola/Flint/River (**40% of course grade**)
    - Written strategy document, performance metrics and spreadsheet calculations (35% of term project grade) **(DUE NOV 5, 2025)**
        - Performance in the negotiation role play (35% of term project grade) **Class negotiation will begin on NOV 12, 2025 and end on DEC 1, 2025**
        - Assessment from your role play peers (30%)
        - Quality of your flow negotiations as proposed, accepted or rejected (35%)
        - Instructors' assessment of your role play performance (35%)
    - Written survey/report on the overall role play/negotiation process (30% of term project) **(DUE DEC 3, 2025)**
    - *Note:* ***Additional lectures and Term Project guidance will be given on Canvas and Zoom meetings. Students are welcome to request additional sessions with Dr Kiker to prepare and negotiate their respective roles.***

For information on current UF policies for assigning grade points, see https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Class participation through discussion and interactions is strongly encouraged

- Case studies with calculations are assigned for selected modules. Students will have 6 days to complete the assignments.
- On-line discussions (graded and ungraded) will be assigned in selected modules.
- All module quizzes will be posted through the E-Learning/Canvas Course Management System.
- Late assignments will not be accepted without prior arrangement or medical documentation.
- There will be no make-up quizzes unless scheduled at least 48 hours in advance with the instructor.

- Additional class interaction events may be organized by the instructor
- 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 accommodation.

Readings: Specific journal articles and government documents are listed in the weekly modules.

1. USGS: Water Budgets: Foundations for Effective Water-Resources and Environmental Management By Richard W. Healy, Thomas C. Winter, James W. LaBaugh, and O. Lehn Franke.

2. Zeitoun, Mark, and Jeroen Warner. "Hydro-hegemony-a framework for analysis of trans-boundary water conflicts." Water policy 8.5 (2006): 435-460.

3. Barnaby, Wendy. "Do nations go to war over water?." Nature 458.7236 (2009): 282-283.

4. Postel, Sandra L., and Aaron T. Wolf "Dehydrating conflict." Foreign Policy 126.September/October (2001): 60-67.

5. P. C. D. Milly, Julio Betancourt, Malin Falkenmark, Robert M. Hirsch, Zbigniew W. Kundzewicz, Dennis P. Lettenmaier, and Ronald J. Stouffer. 2008 Stationarity Is Dead: Whither Water Management?

6. Kundzewicz, Z. W., et al. "The implications of projected climate change for freshwater resources and their management." (2008): 3-10.

7. Leitman, Steven. "Apalachicola-Chattahoochee-Flint Basin: Tri-state Negotiations of a Water Allocation Formula"." Adaptive Governance and Water Conflict: New Institutions for Collaborative Planning, Ed. JT Scholz and B. Stiftel, Resource for the Future, Washington DC (2005): P 74-88.

8. Ruhl, J. B. "Water Wars, Eastern Style: Divvying Up the Apalachicola-Chattahoochee-Flint River Basin." Journal of Contemporary Water Research & Education 131.1 (2005): 47-54.

9. Feldman, David Lewis. "Barriers to adaptive management: Lessons from the Apalachicola–Chattahoochee–Flint compact." Society and Natural Resources21.6 (2008): 512-525.

10. Postel, S. 2016. How Smarter Irrigation Might Save Rare Mussels and Ease a Water War.

11. How Much Water Is in the Apalachicola, Chattahoochee, and Flint Rivers, and How Much Is Used? USGS Fact Sheet 2007.

12. McMahon, George F. "Models and realities of reservoir operation." Journal of Water Resources Planning and Management 135.2 (2009): 57-59.

13. Reservoir Management in the Apalachicola-Chattahoochee-Flint Basin. By Steve Leitman (2004)

14. Richter, Brian D., et al. "A collaborative and adaptive process for developing environmental flow recommendations." River research and applications 22.3 (2006): 297-318.

15. Bunn, Stuart E., and Angela H. Arthington. "Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity." Environmental management 30.4 (2002): 492-507

GRADING SCALE;

A: 93 ≤ Average ≤ 100; A-: 90 ≤ Average < 93
B+: 87≤ Average < 90; B : 83≤ Average < 87; B- : 80≤ Average < 83;
C+: 77≤ Average < 80; C : 73≤ Average < 76; C- : 70≤ Average < 73;
D+: 67≤ Average < 69; D : 63≤ Average < 67; D- : 60≤ Average < 63;
E : ≤ Average =< 60

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Academic Policies and Resources

Academic policies for this course are consistent with university policies. See https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Campus Health and Wellness Resources

Visit https://one.uf.edu/whole-gator/topics for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

Please contact UMatterWeCare for additional and immediate support.

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.

Privacy and Accessibility Policies

[required for online courses, list all technology used]

- Instructure (Canvas)
  - Instructure Privacy Policy
  - Instructure Accessibility
- Zoom
  - Zoom Privacy Policy
  - Zoom Accessibility