

CWR 5305 - U01 (17680) – SURFACE HYDROLOGY
Prerequisites: CWR 3201 and CWR 3540 (see the instructor for equivalent background)
Department of Civil and Environmental Engineering
Florida International University
Spring 2025

Instructor: Professor Fuentes, Ph.D., P.E., B.C.E.E.

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Office Hours: M: 10:00AM - 12:00PM & W: 12:00PM – 2:00PM (first-come, first-served)

All other office hours by appointment.

Lecture location and time: EC-1114; Wednesday: 6:25 - 9:05 PM.

A. Course Description & Objective

The field of hydrology is fundamental to civil and environmental engineers, hydrogeologists, and other earth scientists because of the importance of water supply, storm water and drainage, flooding and droughts and their management, in non-urban and urban environments, among others. The learning objective of this course is to expand knowledge from an introductory undergraduate course in water resources engineering (i.e., in hydrology and hydraulics) by studying approaches and models to simulate flow of surface water in systems such as watersheds and urban development settings. The course also offers an opportunity to learn and apply aspects of the next generation of hydrologic analysis with GIS methods, radar rainfall data and advanced distributed computational models. Some relevant questions are: How can the movement of a flood be predicted down a canal or a reservoir? What models are available to support hydrologic simulation that result from tropical storms and hurricanes? What is the use of GIS in hydrology? How accurate can rainfall measurements made using NEXRAD be?

B. Textbook & Reading Assignments

Required textbook and other material:

1. *Bedient, P. B., W. C. Huber and B. E. Vieux, Hydrology and Floodplain Analysis, 6th Edition, Prentice-Hall. Upper Saddle River, NJ, ISBN 13:978-0-13-475197-9 and 10:0-13-457197-3.*
2. Textbook Chapters 1, 2 and 3 present prerequisite fundamentals that all students should have completed in their undergraduate engineering programs. The instructor expects the student to review the material on his/her own but will overview them, assigning and grading homework, earlier in the course
3. Students are expected to master the appropriate use of databases and hydrology-related internet links that are listed in Appendices A through E of the textbook. In addition, detailed information on important computer models is available from the US Corps of Engineers,

Hydraulic Engineering Center, and the US Environmental Protection Agency (see Appendix E, with direct links to federal models and software).

4. For your consideration, the lead author of the required textbook maintains a website (hydrology.rice.edu). The instructor may also assign you supplementary handouts for your personal review.

Although the textbook will assist you well during the course, you are expected to complement textbook contents with additional information, as previously explained. You are responsible for the timely study (i.e., in advance to all lectures) of all assigned material. Careful study of theory and examples and solving problems are crucial in mastering the learning objective.

C. Use & Management of Class Time

Class time is primarily used to present, illustrate and discuss theory and applications. Lectures will follow the sequence of themes that are listed below. Lectures will focus on basic concepts and representative methodologies, with descriptions of applications. Power point presentations will be used as appropriate throughout the course program.

<u>Theme/Reading Assignment</u>	<u>Estimated Lectures</u>
General Introduction and Organization	2
Chapters 12 & 13: Flood Policy and Risk Management & Case Studies in Hydrologic Engineering (individual and team quizzes)	2
Overview of Chapters 1, 2 and 3 (prerequisite background: review)	3
Chapter 4: Flood Routing: Sections 4.1 through 4.7	4
Chapter 5: Hydrologic Simulation Models: Sections 5.1 through 5.6	2
Chapter 6: Urban Hydrology: 6.1 through 6.8	3
Chapter 7: Floodplain Hydraulics: Sections 7.1 through 7.14	3
Chapters 10 and 11: GIS and Radar Applications (PPP presentations, amongst others)	2
Team Project: Chapter 9 Design Applications (could be linked to concepts of either GIS (Chapter 10) or Radar Rainfall (Chapter 11) or both	5

D. Grading Policies

Quizzes (individual and team)	10 (i.e., 5 & 5) (Chapter 12 & 13, 01/15//25)
Homework (each graded over 100)	10 (Estimated Number: 6 to 8, TBD)
Exam 1	20 (February 19, 2 nd lecture)
Exam 2	20 (March 26, 2 nd lecture)
PPP Presentations	10 (individual or groups, see schedule)
Project	30 (written report due on 04/18/2025); oral defense on 04/23/25, EC 1114, 5:00 – 7:00 PM)
Total Maximum	100

The instructor will assign problems as homework, so that students apply concepts in problem solving, prepare for exams and earn a grade with minimum time pressure. Homework is strictly due on the scheduled day at the beginning of the class. Late homework will not be accepted, receiving zero points. Homework will follow the requested format and must be presented in engineering paper. Students are responsible for discussing their homework approach and solutions with the instructor, during his scheduled office hours, in advance to the due day. It must be understood that assigned problems are not comprehensive of all study material.

Questions and problems in exams will focus on assigned and covered material and related applications. Homework grading and return do not condition any exam contents. Exams will be held on Wednesday, February 19 (No. 1) and on Wednesday, March 26 (No. 2), 2025.

Students will complete a project (see addendum on “project guidelines”), individually or, if at MS level, in 2-member teams depending on project scope. A one-page proposal, per guidelines, should be presented not later than 02/26/25 or earlier. The written project report is due on 04/18/25. The oral defense of the project will be held on 04/23/25, EC 1114, 5:00 PM). The instructor may later announce other criteria for either homework, exams or presentations.

ADVICE: BEGIN YOUR ASSIGNMENTS PROMPTLY. ALL YOUR WORK MUST BE AN INDIVIDUAL EFFORT, UNLESS OTHERWISE APPROVED BY THE INSTRUCTOR. CONCERNS ABOUT GRADES WILL ONLY BE CONSIDERED WITHIN THE FIVE WORKING DAYS FOLLOWING THEIR ANNOUNCEMENT.

Final grade is a function of the total number of points accumulated by the student at the end of the course, as follows:

$93.3 \leq A$	≤ 100.0	$76.7 \leq C+$	< 80.0
$90.0 \leq A-$	< 93.3	$70.0 \leq C$	< 76.7
$86.7 \leq B+$	< 90.0	$60.0 \leq D$	< 70.0
$83.3 \leq B$	< 86.7	F	< 60.0
$80.0 \leq B-$	< 83.3		

E. Other Performance Policies

Reading assignments, a prime student's responsibility, must be completed prior to their discussion in class. Class attendance is required. A student with three unjustified absences will be dropped from the course with a DR by March 17. Students will automatically lose 0.45 points per unjustified absence after March 17, including those prior to March 17. No make-ups or incomplete grades will be considered, unless caused by emergencies. Please, be in time for all scheduled lectures and activities and keep all cell-phones and unapproved electronic devices off.

F. Days to Remember (refer for confirmation to the FIU Fall 2024-2025 Semester Calendar and Deadlines)

[UG_Academic_Calendar.pdf \(fiu.edu\)](#)

January 6:	Classes begin
January 20:	Martin Luther King, Jr. Holiday (University Closed)
March 17:	Deadline to drop a course with a DR grade.
April 21 – April 26:	Finals Week
April 19:	Classes end
April 23:	Project Oral Defense (Wednesday, April 23, 2025, EC 1114, 5:00 PM)

The instructor will comply and enforce all applicable FIU's Policies and Regulations. It is the students' responsibility to know all applicable policies and requirements. All students should refer, for details, to the *FIU Student Handbook* (which includes the Student Code of Conduct) at

[docs=322. \(fiu.edu\)](#)

All students are deemed by the university to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the FIU Student Handbook. Misconduct includes, among other, *cheating, plagiarism, misrepresentation misuse of computer services, bribery, conspiracy and collusion, falsification of records and academic dishonesty*. Please find details at

[Student Conduct and Academic Integrity | FIU Division of Academic & Student Affairs](#)

Students should be aware of both [Panthers Care](#) and [CAPS](#) services for students, which support their well-being.

G. Some Recommended References

The following books, for your consideration and use, may be checked out from the instructor, during his scheduled office hours, for up to 48 hours.

Gupta, R. S., *Hydrology and Hydraulic Systems*, 3rd Edition, Waveland Press, Inc., Long

Grove, IL, 2008.

Mays, L. W., *Water Resources Engineering*, John Wiley & Sons, Inc., Hoboken, New Jersey (2005).

McCuen, R. H., *Hydrologic Analysis and Design*, 3rd Edition, Pearson Prentice Hall, Upper Saddle River, NJ (2005).

Wurbs, R. A and W. P. James, *Water Resources Engineering*, Pearson, Prentice Hall, Upper Saddle River, NJ (2002).

Wanielista, M., R. Kersten and R. Eaglin, *Hydrology: Water Quantity and Quality Control*, 2nd Edition, John Wiley & Sons, Inc. (1997).

<https://www.hydrology.rice.edu/>

<https://www.hec.usace.army.mil/>

<https://www.epa.gov/water-research/methods-models-tools-and-databases-water-research>