CWR 5535C U01 (18599):
Advanced Modeling Applications in Water Resources Engineering
Prerequisites: Permission by Instructor
Department of Civil and Environmental Engineering1
Florida International University
Spring 2021

Instructor: Professor Fuentes, Ph.D., P.E., B.C.E.E.
Office: EC-3671; Mail Box: EC-3680
Phone No.: 305 348-2837, E-mail: fuentes@fiu.edu
Home Page: http://myweb.fiu.edu/fuentes/ Course Website: http://web.eng.fiu.edu/fuentes/
Office Hours: Tuesdays: 10:30AM-1:30PM (first-come, first-served; preferred via phone or Zoom).
All other office hours by appointment.

Lecture location and time: EC-1109; Tuesdays: 5:00PM-7:40PM. *Students must be fully aware that Professor Fuentes's "in-person" mode of delivery of his course lectures may be changed temporarily to "remote", via ZOOM (or equivalent), depending upon University instructions that can be announced at any time during the course program; if possible, officially scheduled lectures time will not be changed.*

COVID 19 Health & Safety: Please continue to adhere to mitigation measures to stop the spread of the coronavirus, including physical distancing guidelines, washing your hands with soap and water or using hand sanitizer, and wearing a face covering to protect yourself and those around you. Please note that FIU requires students, faculty and staff to check in on the *FIU P3 app* before the beginning of each day on campus. The app is available from the Google Play or Apple store. If you have any questions about the FIU P3 app or the campus visitor protocols, please email FIUP3support@fiu.edu.

For updated information on FIU's response to the COVID-19 pandemic, please visit FIU's Panthers Protecting Panthers website. For information, including guidelines, from the federal *Center for Disease Control & Prevention,* you may link to Coronavirus Disease 2019 (COVID-19) | CDC .

A. Course Description & Objective
Models are crucial tools that are used by engineers in support of analysis, design, operation and maintenance of water systems. Those systems are part of water infrastructure that is in urban or non-urban settings. Systems include those related to water supply (e.g., uptake, conveyance, storage and distribution) and wastewater and stormwater (e.g., collection, conveyance, storage, treatment and discharge). The overall goal of this course is to provide civil engineering and environmental engineering graduate students with a concerted opportunity to identify, assess, study, implement and use computer models in support of their engineering practice or research and development or both. Model applications in an approach that assesses technical and cost scenarios (i.e., alternatives). Students, working individually or in teams, will first study and apply several models to solve hydrologic and hydraulic problems. Second, all students will, individually or in group, upon instructor's approval, will complete a full model application to a water system of their choice.

Version 01/19/21 - Final

B. Textbook & Supplementary Material

Required text, reference material and computer access:

1.	Bentley Systems, Inc. - Haestad Methods Solutions Center, Computer Applications in Hydraulic Engineering, 8th Edition (your copy MUST include a CD with the licensed, academic version of the professional software covered in the course). Be very aware that the **software should only be used for academic purposes; any other use, including personal or commercial, is prohibited.** In consultation with the instructor, the student(s) may also consider other reference materials and software, in support of their course modeling experiences.
2.	www.bentley.com and supplementary downloadable material.
3.	Each students must have access to a computer to access software.

C. Use & Management of Class Time

Class time is used in two ways: a) organizational activities; b) presentation and discussion of hydrologic and hydraulic concepts, theory and models; c) e-training and reports; and d) completion of full model application.

Activity	**Topic (Study Assignment)**	**Estimated No. of Lectures**
1.	Organization and Introduction	2 (January 12)
2.	Hydrology Review: Ch. 2 & Probability Software*	2 (January 19)
3.	Hydraulic Principles & FlowMaster*: Ch. 1	2 (January 26)
4.	Culvert Hydraulics & CulvertMaster*: Ch. 4	2 (February 2)
5.	Inlets, Gravity Piping Systems, and Storm Sewer Systems & StormCAD*: Ch. 3	2 (February 9, 16)
6.	Detention Pond Design & PondPack*: Ch. 5	2 (February 16, 23)
7.	e-Training (i.e., on-demand courses, etc.)	2 (February 23)
8.	e-Training (i.e., on-demand courses, etc.)	2 (March 2)
9.	e-Training (i.e., on-demand courses, etc.	2 (March 9)
10.	Full Model Application Progress Report: (Theory, Model and System Description	2 (March 16)
11.	Modeling Work Period	2 (March 17 – April 12)
12.	Full Model Application: Written Report Due	2 (April 16)
13.	Full Model Application: Oral Presentation	2 (April 20)

* Presentations by Responsible Student & Class Discussion

D. Application Case(s)

The Full Model Application by MS Students can be accomplished either individually or in 2-member teams, depending on level of effort; PhD students must individually complete the Full model Application. Students should select one model amongst the following: WaterGEMS, SewerGEMS,

Version 01/19/21 - Final

HAMMER and CivilStorm. Other models, from Bentley Systems, Inc., may be considered in consultation with the instructor. *Students are expected to conduct a literature review identifying relevant references, in support of the water system of their application; emphasis should be scientific and engineering journal articles. Examples of systems include those for water supply distribution, municipal wastewater and stormwater collection and conveyance, and watersheds*

E. Grading Policies

Presentation - Basic Hydrology	9
Presentation - Basic Hydraulic Principles & *FlowMaster*	9
Presentation – Inlets, Gravity Piping Systems, and Storm Sewer Systems & *StormCAD*	9
Presentation - Culvert Hydraulics & *CulvertMaster*	9
Presentation - Detention Pond Design & *PondPack*	9
e-Training (minimum <u>20</u> hours in official Bentley transcript)	15
Full Model Application: Progress Report (March 16)	5
Full Model Application: Written Report (April 16)	20
Full Model Application: Oral Presentation (April 20)	15
Total Maximum	*100*

*See <u>Assignment Addendum</u> in course website. The graduate student(s), who is(are) responsible for the presentation and tutorial(s) are exempted from solving and submitting the problems. Their presentation will be graded as function of quality and effectiveness. Non-presenting students will solve the assigned problem(s), using the software of the presented chapter, and then submit a hard copy on the Tuesday that follows the day of the presentation. Be aware that non-presenters must also study and learn to use the software to solve the problems. Problem solutions should be submitted as a hard copy of both the printouts of the input data and results sheets, highlighting all answers to all questions. The printouts, including tables and graphs, are commonly generated by the software, upon your command.

The *Full Model Application Progress Report* of March 16 should be a 15-min oral presentation in MS Power Point, with 10 to 15 slides. For details on the Application Case Written Report and Oral Presentation, refer to the attached *Application Case Addendum*. The instructor may provide additional information.

Each student is expected to open a personal account to log in CITRIX in the FIU Engineering Center and at Bentley's STUDENTserver (http://apps.bentley.com/studentserver/), using our FIU School Code (see handout presented in class), immediately after the two official first lectures of January 12, 2021, to ensure full working access to needed software. Bentley access includes free downloading and installation of software on the student's personal computer, sign-up for on-demand software training, review and retrieval of e-Training transcript and Bentley Support Community, among other features (you are suggested to become familiar with all the services that Bentley provides via its website, www.bentley.com.

Version 01/19/21 - Final

<u>ADVICE</u>: ANY QUESTIONS OR CONCERNS ON GRADES WILL ONLY BE CONSIDERED WITHIN THE FIVE WORKING DAYS FOLLOWING THEIR OFFICIAL 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	$\leq$	100.0	$70.0 \leq$ C		$<$	76.7
$90.0 \leq$ A-	$<$	93.3	$60.0 \leq$ D		$<$	70.0
$86.7 \leq$ B+	$<$	90.0	F		$<$	60.0
$83.3 \leq$ B	$<$	86.7				
$80.0 \leq$ B-	$<$	83.3				
$76.7 \leq$ C+	$<$	80.0				

F. Other Performance Policies

Full attendance is required for all scheduled activities, including lectures, training sessions, team work, reports and presentations. Attendance is documented by signing the class roll. A student with three unjustified absences will be dropped from the course with a DR on March 22. Students will automatically loose 0.45 points per unjustified absence after March 22 including those prior to March 22. *Students must understand that missing class will impact team progress and work and any grading that is connected to in-class activities.* No make-ups or incomplete grades will be considered, unless properly justified and documented emergencies. Please, be in time for all activities and keep all electronic devices off, unless approved by the instructor for class-related work only.

G. Days to Remember (refer for confirmation to the FIU Fall 2020-2021 Semester Calendar and Deadlines)

http://catalog.fiu.edu/2020_2021/graduate/Admission_and_Registration_Information/GD_Academic_Ca lendar.pdf

January 11	Classes begin (Presentation assignments)
January 18:	Martin Luther King Day (University Closed)
March 22:	Deadline to drop a course with a DR grade. Last day to withdraw from the University with a WI grade.
March 16:	Full Model Application: Progress Report
April 16:	Full Model Application: Written Report Due
April 20:	Full Model Application: Oral Presentation (5:00-7:40PM)
April 17:	Classes end
April 19-24	Final Week
April 28	Deadline (by 11:59) for faculty to submit grades

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

Version 01/19/21 - Final

https://studentaffairs.fiu.edu/about/student-handbook/index.php

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 visit http://integrity.fiu.edu).

Students should be aware of both **Panthers Care** and **CAPS** services for students, which support their well-being.

H. Some Recommended References

A good number of relevant references, for your consideration and use, are available at the main library. In addition, the items below may be checked out from the instructor for up to 48 hours:

Chow, V. T., Open Channel Hydraulics, McGraw-Hill Book Company, 1988.
Gupta, R. S., Hydrology & Hydraulic Systems, Waveland Press, Inc., 2017
Mays, L. W., Water Resources Engineering, John Wiley & Sons, Inc. 2011.
Wurbs, R. A. and W. P. James, Water Resources Engineering, Prentice Hall, Inc. 2002.
www.bentley.com, www.usace.army.mil, www.usbr.gov
www.usda.gov, www.usgs.gov, www.nws.noaa.gov