

Computer Methods in Civil Engineering

CGN 3421 Class # 11446 (Section 3F44)

Class Periods: Lecture -M,W,F | Period 5 (11:45 AM - 12:35 PM)

Lab - W | Period 9 - 11 (4:05 PM - 7:05 PM)

Location: Online

Academic Term: Fall 2020

Instructor:

Mr. Randal (Randy) Switt

randy.switt@essie.ufl.edu

(352) 392-3533

Office Hours: Friday, 9:30 AM – 11:00 AM (other times available by arrangement) - Online

Graders:

Please contact through the Canvas website

- Wilmer Carrion, wcarrion@ufl.edu, Office hours - TBD
- Marisha Innis, innismarisha@ufl.edu, Office hours - TBD

Course Description

Review of computer programming. Numerical methods as applied to civil engineering problems and civil engineering software. (3 credits)

Course Pre-Requisites / Co-Requisites

COP 2271 - Computer Programming for Engineers

Ordinary Differential Equations

Course Objectives

This course will introduce the fundamentals of structured programming and numerical solution methods for solving natural and engineered systems. After initial familiarization with the Python programming language, we will apply those skills to developing programs to implement several numerical solution techniques.

Specific Course Objectives are as follows:

- To *understand* and *apply* the Python programming language to accomplish tasks
- To *understand, identify* and *estimate* the sources of errors in numerical models
- To *create* programs to *employ* several different methods to find solutions of non-linear equations
- To *understand* concepts of linear algebra and use them to *solve* solutions of systems of linear equations
- To *understand* Runge-Kutte numerical methods and *develop* numerical solutions by *employing* them

Materials and Supply Fees

N/A

Professional Component (ABET):

The course introduces and reinforces computer and programming skills needed for Civil and Environmental Engineering practice, as well as introducing numerical methods applicable to a wide range of areas of research and practice in Engineering. These tools are applicable in subsequent laboratory, analysis and design classes in the required B.S. curriculum and potentially in graduate study. General problem-solving skills are also developed and refined.

Relation to Program Outcomes (ABET):

Outcome	Coverage*
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1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	Medium
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- A Student's Guide to Python for Physical Modeling: Updated Edition
- Jesse M. Kinder and Philip Nelson
- 01/30/2018, Edition: Updated (2)
- ISBN: 9780691180571

Course Schedule

Week 1:	Introduction to Course and Programs / Appendix A, Chapters 1 – 1.3
Week 2:	Data Structures / Chapters 1.4, 2 – 2.2.1
Week 3:	Arrays (NumPy module) / Chapters 2.2.2 – 2.2.10
Week 4:	Strings and Control Structures / Chapters 2.3, 3 – 3.5
Week 5:	Importing and Exporting Data / Chapter 4 – 4.2
Week 6:	Charts and GUIs / Chapters 4.3 – 4.3.9
Week 7:	Functions / Chapters 6.1 – 6.1.5
Week 8:	Review and Midterm Exam
Week 9:	Sources of Numerical Error
Week 10:	Root Finding Methods
Week 11:	Linear Algebra
Week 12:	Systems of Equations
Week 13:	Runge-Kutta Approximation Methods
Week 14:	Review and Final Exam

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is expected during scheduled lecture and lab periods (though lab period attendance after initial introduction is optional), and graded quizzes may be given during lectures without prior notice. Students are required to have a working and available computer (either Mac or Windows based) that they can install and run programs on. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Late assignments or labs will only be accepted as allowed in Canvas and are subject to a 40% score penalty. Missed or rescheduled Exams must be arranged beforehand.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (13)	5 each	25%
Quizzes (4)	100 each	15%
Midterm Exam	100	25%
Final Exam	100	25%
Project	100	10%
		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

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.a.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.a.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Robert Thieke, Civil and Coastal Department Head, 352-294-7783, rthie@ce.ufl.edu
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

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. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

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 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>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://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.
<https://teachingcenter.ufl.edu/>.

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

Student Complaints Campus: <https://care.dso.ufl.edu>.

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