Computer Model Formulation (& Numerical Solutions)
COT 3502, Class # 29046
Class Periods: Mondays periods 8-9 (3:00-4:55 PM) and Wednesdays Period 8 (3:00-3:50 PM)
Location: Mondays MAEB 229, Wednesdays NZH 112
Academic Term: Fall 2024

Instructor:
Prof. Spyros A. Svoronos
Email: svoronos@ufl.edu
Office Phone: 352-392-9101
Office Hours:
    Mondays 5:15 -7:15 pm in Black Hall 312,
    Tuesdays 10:30-11:30 am via Zoom
    (https://ufl.zoom.us/j/6379945549?pwd=SHAzL1kwTmcyYm1PdkdzNVNLNUZ6dz09),
    Fridays 9:30-10:30 am via Zoom

Mask policy: I am considered high risk, as I will be turning 70 in a few weeks and have certain health issues. To protect myself I will be wearing a mask consistently. I believe that this precautionary measure is ample to safeguard my health. It's important for me to clarify that my decision to wear a mask should not be misconstrued as a solicitation for you to do the same. My choice to wear a mask should not influence your own decision regarding mask usage.

Teaching Assistant/Peer Mentor/Supervised Teaching Student: None

Course Description
Solutions of scientific and engineering problems using digital computers. Formulation of models for describing physical processes, numerical analysis, and computer programming. (3 credits)

Course Pre-Requisites
ECH 3023 and MAP 2302 and MAC 2313

Course Objectives
Formulate mathematical process models.
Solve mathematical models using numerical methods.
Write computer programs to solve mathematical models.

Materials and Supply Fees
N/A

Relation to Program Outcomes (ABET):

Outcome	Coverage*
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	
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	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

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

Required Textbook
Numerical Python, **Second Edition** by Robert Johansson. Do not purchase the twice as expensive 3rd edition that will be published very soon. You should be able to purchase the 2nd edition for about $30.

Required Software
Python. Can be installed for free using the Anaconda package: https://www.anaconda.com/download

Recommended Textbook
Numerical Methods for Engineers, **ANY EDITION** by Chapra and Canale

Required Computer
https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/
NOTE that the new line of Mac laptops (Apple Silicon processor line, e.g., the M1) are not currently able to use accelerated x64 virtualization. Therefore, they cannot run the standard (x64) versions of the Windows OS and Windows programs. Thus, they should be avoided by Chemical Engineering students.
Minimum System Requirements:
Operating System: Windows 10 or 11 required.
Processor: Intel Core-i5 family.
Memory: 16GB RAM
Storage: SSD with 120GB of available space.
Monitor: Graphics hardware acceleration requires a DirectX10 graphics card and a 1280 x 1024 or higher resolution monitor.
Network: 100MB/Sec.
Recommended System Requirements:
Operating System: Windows 11.
Processor: Intel Core-i7 family.
Memory: 16GB RAM
Storage: SSD with 250GB of available space.
Monitor: Graphics hardware acceleration requires a DirectX10 graphics card and a 1280 x 1024 or higher resolution monitor.
Network: 100MB/Sec.

Course Schedule (timing is approximate):

Week 1: No classes. (Classes are MW)
Week 2: 3 classes. Introduction to class; Model classification; Procedure for developing a model; Linear and nonlinear regression using Excel (beginning)
Week 3: 1 class. Linear and nonlinear regression using Excel (end)
Week 4: 3 classes. Pandas; Optimization using SciPy; Regression using Pandas and SciPy optimization
Week 5: 3 classes. Vectors, matrices, and multidimensional arrays with emphasis on NumPy
Week 6: 3 classes. Plotting and Visualization
Week 7: 3 classes. Numerical solution of systems of linear equations; condition number; Numerical solution of systems of nonlinear equations
Week 8: 3 classes. Midterm exam; Project start; Numerical integration (beginning)
Week 9: 3 classes. Numerical integration (end); Numerical solution of ordinary differential equations (beginning)
Week 10: 3 classes. Numerical solution of ordinary differential equations
Week 11: 3 classes. Numerical solution of ordinary differential equations
Week 12: 3 classes. Numerical solution of partial differential equations (beginning)
Week 13: 1 class. Numerical solution of partial differential equations
Week 14: 3 classes. Numerical solution of partial differential equations
Week 15: 0 classes. Thanksgiving
Week 16: 3 classes. Numerical solution of partial differential equations (end)

Important Dates

October 2   *Midterm Review (7:00 pm – until there are no more questions, could last 4-5 hours, via Zoom)*
October 7   *Midterm Exam (3:00-5:00 pm, MAEB 229)*
October 9   *Project starts (4:05 pm, NZH 112)*
December 2   *Project Due (3:00 pm)*
December 6   *Final Review (3:00 pm – until there are no more questions, could last 4-5 hours, via Zoom)*
December 13   *Final Exam (12:20 pm -2:40 pm, MAEB 229 or NZH 112)*

Attendance Policy, Class Expectations, and Make-Up Policy

Class attendance is required and will be monitored by the instructor when returning graded homework assignments at the end of each Monday's first period. Frequent absences will significantly affect your class attendance and participation grade, which accounts for 5% of your total grade (see below).

Requirements for class attendance, make-up exams, assignments, and other work in this course are consistent with university policies (see https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/). I will work with students who have University-excused absences to promote health and safety, and I will provide reasonable accommodations for exams and extensions for assignments.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Midterm Exam	100	35%
Final Exam	100	35%
Homework	Normalized to 100	15%
Project	100	10%
Class Attendance and Participation*	100	5%

*Students will receive an 88 if they attend all classes (aside from university excused absences) but do not contribute to class discussions, or ask questions, or correct lecture errors, something encouraged and appreciated. Then the grade is reduced according to the frequency of unexcused class absences and raised according to how active a participant they are.

Grading Policy

The grading scale for the course will be as follows:

90-100	A	4.00
85-89.9	A-	3.67
80-84.9	B+	3.33
70-79.9	B	3.00
65-69.9	B-	2.67
60-64.9	C+	2.33
50-59.9	C	2.00
40-49.9	C-	1.67
30-39.9	D+	1.33
20-29.9	D	1.00
10-19.9	D-	0.67
0-9.9	E	0.00

The instructor may lower the threshold for attaining the letter grades specified above (to the benefit of the students).

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

ADDITIONAL INFORMATION

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.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/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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/process/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 varied perspectives and lived experiences within our community and is committed to supporting the University's core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect

regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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:
• Your academic advisor or Undergraduate Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@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: https://counseling.ufl.edu, 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://elearning.ufl.edu/.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; https://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/;https://care.dso.ufl.edu.

On-Line Students Complaints: https://distance.ufl.edu/getting-help/; *https://distance.ufl.edu/state-authorization-status/#student-complaint*.