

Troy University

Course Syllabus

Course Information

<i>Course Number/Section</i>	CS2220 (Section IHFB)
<i>Course Title</i>	Numerical Methods in Computing
<i>Term</i>	International Spring 2025
<i>Days & Times</i>	TBA
<i>Location</i>	TBA

Professor Contact Information

<i>Professor</i>	Dr. Hyung Jae (Chris) Chang
<i>Email:</i>	hjchang@troy.edu (If you email me, you will receive my response within 24~48 hours.)
<i>Office Hours</i>	Or by appointment via email

Course Description

Introduces a broad range of mathematical problems and their applications in scientific computing using various numerical computation techniques with Python. Topics include but are not limited to numerical analysis, floating point arithmetic, computational algebra, the iterative solution to nonlinear equations, and interpolation. (*Prerequisite: MTH 1112*)

Student Learning Objectives/Outcomes

After successful completion of this course, the student should have the ability to:

1. write a solution to the various numerical problems in Python.
2. describe the problems and solutions of the linear algebra and systems of linear equations.
3. describe Eigenvalues and Eigenvectors and related numerical problems and solutions.
4. describe the least squares regression concepts and solve related problems.
5. solve the problems related to Taylor series, root finding and numerical differentiation.

Late Registration

Students who register during the first week of the term, during late registration, will already be one week behind. Students who fall into this category are expected to catch up with all of Week #1 and Week #2's work by the end of Week #2. No exceptions, since two weeks constitutes a significant percentage of the term's lessons. Students who do not feel they can meet this deadline should not enroll in the class. If they have registered, they should see their registrar, academic adviser, CTAM/eArmyU representative, or Military Education officer to discuss their options.

Also note that late registration may mean you do not receive your book in time to make up the work you missed in Week #1. Not having your book on the first day of class is not an excuse for late work after the deadlines in the Schedule.

Requirements and Criteria

1. **Individual Assignment:** Assignments are due **midnight of the due dates**. Homework and project assignments are given on a chapter basis. Homework must be done by each individual without collaboration. Reading should be done prior to class since there is a strict outline that is to be followed to achieve the course objectives.
2. **Examinations:** There are written Mid-term and final examination on the course readings and lectures.

Teaching Methods

1. This course is taught in a **lecture format**. I will make every possible effort to help you understand and master the course material in the most possible effective way. I'll be more than happy to answer any course related questions and you are welcome to make any comments and suggestions for the course. The students will be expected to take notes and study the notes in addition to the selection of pages from the textbook. This selection of pages to be studied from the textbook is to be announced in class.
2. For this course, **reading and discussion** are very important to succeed. Therefore, I will try to provide you with many opportunities to share ideas with the course instructor and your classmates.
3. The best learning takes place when you find problems on the subject, find solutions for the problems, refine the solution and understand how these new solutions fit to what you already know. The course of this process can be obtained by **critical thinking exercises**. Therefore, this course will help you to achieve this goal.
4. There are many benefits to working as a team (**group study**). Working together on homework and during class keeps everyone actively involved, which improves learning. Having a group gives you a great resource when you have questions. And even if you feel you understand a topic, explaining it to the others in your group will improve your understanding. **But make sure that copying other's work is not a group study.**

Required Textbooks and Materials

Required Textbooks

Python Programming and Numerical Methods – A Guide for Engineers and Scientists, Qingkai Kong, Timmy Siau and Alexandre Bayen, Academic Press, 1st Edition/2020, ISBN 978-0-12-819549-9.

Suggested Course Materials

N/A

Assignments & Course Calendar

Class Assignments:

There will be regularly assigned reading and homework problems. Reading assignments should be done before the class lecture. Homework problems will require the student to spend time outside of class.

Topics, Reading Assignments, Homework Weeks, Exam Dates

This is tentative and subject to change at the discretion of the professor.

1. Python Basics
2. Variables and Basic Data Structures
3. Functions
4. Branching Statements
5. Iterations
6. Recursion
7. Object-Oriented Programming
8. Representation of Numbers
9. Reading and Writing Data
10. Visualization and Plotting
11. Linear Algebra and Systems of Linear Equations
12. Eigenvalues and Eigenvectors
13. Least Squares Regression
14. Interpolation
15. Taylor Series
16. Root Finding
17. Numerical Differentiation

Grading Policy

Program assignments

Code Development 25% (compile w/o error)
Program Execution 25% (run successfully)
Program Design 20% (conform to spec)
Documentation 20% (program, comments)
Coding Style 10% (clear, efficient)

Course Grade

Mid-term Exam 25%
Final Exam 35%
Programming Project Assignments 25%
Quizzes 15%

Letter Grade Scale

A 90 ~ 100
B 80 ~ 89
C 70 ~ 79
D 60 ~ 69
F 0 ~ 59

Course Policies

Make-up exams

No supplemental exams. Exceptional cases, such as illness and accidents, will be handled on an individual basis. Proof is required and is the responsibility of the student.

Extra Credit

This depends on the performance and circumstances of the class.

Late Work

Assignments are due at 11:59 pm on the dates given. For the late assignments, there will be a 20% penalty for each day the assignment is late. This means that no late assignments accepted after (1) 4 days or (2) the last class day.

Field Trip Policies / Off-Campus Instruction and Course Activities

N/A

General Information and Policies

Arrive in class on time.

Effective learning requires reading in the book, attending classes, looking at my class materials and adding your own notes to the class materials.

The progress in the class depends on your interaction. If there are no questions, we will be faster, if you have questions we will spend more time on an issue. It is in your hands to determine the speed. Due to this I cannot give you a number of pages to read - you will quickly figure out how much material we will cover in a class. Besides, if you have a question never hesitate to ask.

I am also available for office hours by appointment if the posted hours conflict with your schedule. The best way to reach me is by email.

Incomplete Grade Policy

Missing any part of the Course Schedule may prevent completion of the course. If circumstances prevent the student from completing the course by the end of the term, the student should complete a request for an incomplete grade. Note: A grade of incomplete or "INC" is not automatically assigned to students, but rather must be requested by the student by submitting a Petition for and Work to Remove an Incomplete Grade Form. Requests for an incomplete grade must be made on or before the date of the final assignment or test of the term. The form will not be available after the last day of the term. A grade of "INC" does not replace an "F" and will not be awarded for excessive absences. An "INC" will only be awarded to students presenting a valid case for the inability to complete coursework by the conclusion of the term. It is ultimately the instructor's decision to grant or deny a request for an incomplete grade, subject to the policy rules below. Policy/Rules for granting an Incomplete (INC). An incomplete cannot be issued without a request from the student. To qualify for an incomplete, the student must:

- Have completed over 50% of the course material and have a documented reason for requesting incomplete (50% means all assignments/exams up to and including the mid-term point, test, and/or assignments.)
- Be passing the course at the time of their request.

If both of the above criteria are not met an incomplete cannot be granted.

An INC is not a substitute for an “F”. If a student has earned an “F” by not submitting all the work or by receiving an overall “F” average, then the “F” stands.

The Honor Code

The awarding of a university degree attests that an individual has demonstrated mastery of a significant body of knowledge and skills of substantive value to society. Any type of dishonesty in securing those credentials therefore invites serious sanctions, up to and including suspension and expulsion (see Standard of Conduct in each TROY *Catalog*). Examples of dishonesty include actual or attempted cheating, plagiarism*, or knowingly furnishing false information to any university employee.

*Plagiarism is defined as submitting anything for credit in one course that has already been submitted for credit in another course or copying any part of someone else’s intellectual work – their ideas and/or words – published or unpublished, including that of other students, and portraying it as one’s own. Proper quoting, using strict APA formatting, is required, as described by the instructor. All students are required to read the material presented at:

<http://troy.troy.edu/writingcenter/research.html>

- Students must properly cite any quoted material. No term paper, business plan, term project, case analysis, or assignment may have **no more than 20% of its content quoted** from another source. Students who need assistance in learning to paraphrase should ask the instructor for guidance and consult the links at the Troy Writing Center.
<http://troy.troy.edu/writingcenter/research.html>
- This university employs **plagiarism-detection software**, through which *all* written student assignments are processed for comparison with material published in traditional sources (books, journals, magazines), on the internet (to include essays for sale), and papers turned in by students in the same *and* other classes in this *and all previous terms*. The penalty for plagiarism may range from zero credit on the assignment, to zero in the course, to expulsion from the university with appropriate notation in the student’s permanent file.

Plagiarism is academic dishonesty and is an unacceptable activity at Troy University. Based on United States law, words and ideas are intellectual property and are protected from theft.

Defining Plagiarism:

Plagiarism is representing someone else’s ideas or work as your own original ideas or work.

Plagiarism encompasses many things and is by far the most common manifestation of academic fraud. For example, copying a passage straight from a book, a website, or any other source into a paper without using quotation marks *and* explicitly citing the source is plagiarism. *Additionally, paraphrasing is plagiarism where you fail to cite your original source and, in some cases, where you fail to use quotation marks as well.* It is very important that students properly acknowledge all ideas, work, and even distinctive words or phrases that are not their own. (1)

All of the following are considered plagiarism:

- Turning in someone else’s work as your own
- Copying words or ideas from someone else without giving credit
- Failing to put a quotation in quotation marks
- Giving incorrect information about the source of a quotation
- Changing words but copying the sentence structure of a source without giving credit

- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not (2)

Additionally, if you download a paper from the Internet and submit it as your own work or if you submit a paper, you wrote and submitted in a previous class, you have committed acts of plagiarism.

Penalties:

At Troy University, penalties for plagiarism include, but are not limited to, a reduction of grade on an assignment and/or a course as well as such sanctions as loss of student privileges, probation, suspension, and expulsion. These penalties for plagiarism are described in the Standards of Content section of *The Oracle: The Troy University Student Handbook*. (4)

Guidelines to Academic Honesty:

If you are unsure if an assignment is plagiarized, use the following checklist for guidance:

You need to cite the specific source(s) in your work, even if:

1. You put all direct quotes in quotation marks.
2. You changed words used by the author into synonyms.
3. You completely paraphrased the ideas to which you referred.
4. Your sentence is mostly made up of your own thoughts but contains a reference to the author's ideas.
5. You mention the author's name in the sentence.

When in doubt, provide the proper citation to show that the ideas and materials are not your own.

(3)

Academic honesty is a cornerstone of learning and should be practiced with all academic assignments.

Sources:

1. <http://www.virginia.edu/honor/documents/PlagiarismSupplementFINAL.pdf>
2. http://www.plagiarism.org/plag_article_what_is_plagiarism.html
3. <http://www.unc.edu/depts/wcweb/handouts/plagiarism.html>

Oracle: Troy University Student Handbook, 2010-2011

Disabilities

The Disability Services Office provides accommodations to students with physical, psychological and learning disabilities in accordance with the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act of 1973. Students must provide current documentation of disability from a qualified professional to determine eligibility to the program. The Disability Services Policy is contained in the policy section of this publication.

If you have any questions, please visit

<http://trojan.troy.edu/employees/humanresources/documents/ADAPolicy2003.html> or contact one of the specialists below for more information:

Jane Rudick
Disability Services Coordinator
1-334-241-5486

Linda Scanlon
Reader/Secretary
1-334-241-5486

FACULTY EVALUATION

At the end of each term, students will be notified of the requirement to fill out a course evaluation form. These evaluations are completely anonymous and are on-line. Further information will be announced later.

Caveat

Extenuating circumstances may require changes in any part of this syllabus; ***These descriptions and timelines are subject to change at the discretion of the Professor.***