



Units:	3
Instructor:	Anurag Tiwari
	Harbor Walk East - Rm.
	tiwaria@cofc.edu - Include CSCI 270 in subject
Office Hours	TBD
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Lecture Time:	09:30-10:20 MWF
Location:	Harbor Walk East - Rm. 300
Lab Time:	N/A
Location:	N/A
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Webpage:	<ul style="list-style-type: none">OAKS
Text:	Artificial Intelligence for Humans, Vol 1: Fundamental Algorithms - Free Ebook Book Codebase
Recommended Reading:	<ul style="list-style-type: none">Geeksforgeeks
Programming Practice:	W3Resource
Course Prerequisites:	<ul style="list-style-type: none">CSCI 218CSCI 218LORCSCI 220CSCI 220L



Tentative Grading:		Mid Term Exam: 15% Final Exam: 20% Programming Assignments: 25% Projects: 25% Attendance:: 5%	
Grade Scale:		≥ 93.00 A 90.00 - 92.99 A- 87.00 - 89.99 B+ 83.00 - 86.99 B 80.00 - 82.99 B- 77.00 - 79.99 C+ 73.00 - 76.99 C 70.00 - 72.99 C- 67.00 - 69.99 D+ 63.00 - 66.99 D 60.00 - 62.99 D- ≤ 59.99 F	



Course Description: Welcome to **Applied AI**! This course is designed to provide you with a comprehensive understanding of the foundational and some advanced techniques in artificial intelligence, with a strong emphasis on practical application. As we dive into the world of AI, you'll learn to model problems, understand data structures, and apply algorithms to solve real-world challenges.

What You Can Expect

We'll begin by exploring the **relationship between AI and the human brain**—how AI attempts to mimic human thought processes and the potential and limitations of these models. You'll learn about key AI techniques like **data classification, regression analysis, clustering, and time series forecasting**. These techniques will form the backbone of your AI toolkit, enabling you to tackle a wide range of problems.

As we move forward, we'll delve into **training models**, covering both supervised and unsupervised learning. Understanding how to properly train and evaluate AI models is crucial, and you'll gain hands-on experience with the algorithms that power modern AI.

We'll also focus on **normalization and distance metrics**—core concepts that ensure your models can effectively process and interpret data. You'll learn how to apply various normalization techniques and calculate distances in multi-dimensional spaces, which are essential for tasks like clustering and classification.

A significant portion of this course will be dedicated to **machine learning**. You'll start with foundational algorithms like **K-Means clustering** and progress to more complex models like **radial basis function networks**. We'll also cover optimization techniques, including **simulated annealing and the Nelder-Mead algorithm**, to help you fine-tune your models.

Finally, we'll explore **discrete optimization problems** like the Traveling Salesman and Knapsack problems, which are central to AI's application in logistics and resource management.

Hands-On Learning

This course is not just about theory. You'll be working on coding assignments that will require you to implement AI models, analyze data, and evaluate your results.



By the end of this course, you'll have a portfolio of AI projects that showcase your ability to apply what you've learned to solve complex problems.

Preparing for the Future

AI is a rapidly evolving field with immense potential. This course is designed to equip you with the knowledge and skills you need to not just understand AI but to contribute to its development. Whether you're aiming for a career in AI, data science, or just want to understand the technology shaping our future, this course will give you a solid foundation.

Exams:

Mid-Term: 1st Week of October

Finals: 1st week of December

Exams are cumulative from the 1st day of class.

Note: Both the mid-term and final exams are handwritten exams (pencil and paper). There can be (but is not limited to) long & short form questions, multiple-choice questions, fill-in the blanks and true or false questions. Completely closed book - no cellphones, laptops, smart watches or cheat sheets. If you pay attention in class and programming labs/assignments, these two exams should be trivial. Time duration for the test will be 10x the time it takes me, your instructor, to do the exams.



Other Dates:

- **Tuesday, August 20**
 - Fall full semester and Express I classes begin.
- **Monday, August 26**
 - Last day of Add/Drop for full semester classes.
 - Last day for student to submit a request to Audit or apply for a Pass/Not Pass grade option for full semester classes
- **Monday, September 30**
 - Last day to submit an Undergraduate Application to Graduate in Fall 2024.
- **Friday, October 25**
 - Last day for students to withdraw with a status indicator of "W" from full semester classes. NOTE: Registration holds prevent students from being able to withdraw from a course in Banner Self-Service. Students should resolve their registration holds prior to this date if they wish to withdraw from a course.
- **Wednesday, November 27 - Sunday, December 1**
 - Thanksgiving Holiday. No Classes.
- **Wednesday, December 4**
 - Full semester final exams begin.
- **Wednesday, December 11**
 - Full semester final grades due at Noon.



Attendance:

Attending the classes will make it significantly easier for you to get a better grade and its 5 free points towards your grade. That being said, attendance is not mandatory.

Exams, projects and assignments are mandatory. There will be no make-up sessions for these.

If you have a business commitment, family or medical emergency, you must submit a signed letter from your manager or physician along with approval from your advisor.

Homework Policy:

All submissions for this course must be made by the posted deadlines.

1 day grace period (including weekends) can be used for all programming assignments and projects while incurring a 10% penalty. Submissions will be closed after this grace period and will result in a zero grade.

Students are encouraged to discuss homework assignments with each other. However, submitting identical solutions or copying from online sources (including the use of LLM AI like ChatGPT) is considered cheating. This will result in a F for the homework assignment. Repeated offense will result in a F for the course. (see policy on cheating and plagiarism below).

Content Policy:

Posting any course content (homeworks, labs, projects, exam questions) on online forums and repositories like quizlet, coursehero, chegg, github, azuredevops etc., is strictly prohibited! Students are encouraged to maintain a source control repository for their labs and assignments/projects in a private repo after the semester has ended.

Discovery of course content on online platforms, accessible to the public, even after the course completion (even after graduation) will be reported to COFC officials as academic dishonesty for disciplinary action and may be noted on your school graduating records and transcripts.



Class Decorum and Behavior:

Students are requested to maintain a respectful and productive environment in the classroom. Use of electronic devices should be for class related activities only. Be on time and be prepared for the class.

Disruptive behavior will result in expulsion from the lecture at the discretion of the instructor. Repeat offenders will be recommended to COFC officials for disciplinary action.

Note from Instructor: Having been a student myself, I understand that life happens. You may have to take a phone call, might forget to silence your phone or watch, or may get stuck in traffic. **If you need to enter the class late or must leave the class before the session expires, you may do so.** But please be mindful of being as non-disruptive as possible. Making me or the students lose their train of thought by making unnecessary noise is considered disruptive. This is not highschool - you do not need my permission to enter or leave the class.

For in-class exams, you must manage your time appropriately and arrive early if you must. Outside of unforeseen circumstances wherein a significant portion of the class is late - if you are late, you must abide by the general time limit which started before your arrival. What time you have lost is lost.

If I instruct you to stop writing and finishing your exam or assignment, you are required to stop. Continuing beyond the time limit will result in a zero grade for the assignment/exam.

Disability and Special Assistance:

Students that need special assistance or accommodation as a result of a disability are requested to contact me personally. Schedule an appointment to meet me during office hours or talk to me after class. College of Charleston provides help and guidance on

<https://charleston.edu/disability-services/index.php>

Emergency/Crisis Situation:

Students will be instructed by COFC leadership, in the event of a declared emergency or crisis situation, on how to continue the course (if required to do so), through OAKS, teleconferencing and other online tools. If travel to the campus becomes infeasible, please follow college and local authorities' protocols first before worrying about submission deadlines. For more information visit:

<https://emergency.charleston.edu/wp-content/uploads/2016/08/emergency-preparedness.pdf>



Student Honor Code & Academic Integrity:

Please read <https://charleston.edu/student-handbook/handbook/honor-code.php> for a comprehensive description on things not to do as a student. Students are expected to strictly abide by these rules

Students found responsible for academic dishonesty by the College of Charleston Honor Board will receive a X-F grade - indicating failure in the course due to academic dishonesty. This is recorded and will remain on the student transcripts for 2 years, after which the student may request for the removal of the 'X' from 'X-F' resulting in a 'F' grade in the course. Other consequences include (but are not limited to) academic probation, temporary suspension from school or permanent dismissal from the College by the Honor Board.

Note from Instructor:

DO NOT PLAGIARIZE; DO NOT ENABLE PLAGIARISM!

- I have a ZERO tolerance policy for plagiarism and cheating. I encourage students to talk and discuss problem sets and homeworks but you **MUST DOCUMENT** it! What you talked about, who you talked to, how much did you collaborate in coming up with the solution, write everything down in the comments of your submissions. You may **NOT** share or collaborate on the code writing portion of your assignments and projects. All of the submissions must be individual.
- Only reference/citation accepted for programming assignments (pseudocode) are publicly available research papers. While I will try to provide unique problem sets for programming, copy-pasting code from online sources is strictly prohibited, even with citation. Copy pasted code leaves their mark on the code editor in the IDE - this is trivially easy to identify and will be detected. **DO NOT** copy-paste even 1 line of code.



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- **AI Large Language Models like Chat GPT usage for completing homework/assignments/projects is strictly forbidden.** Here is why -
 - These tools do not write their own code. They gather information from a lot of online sources and then are very good at putting it all together as its own work. This is the very definition of plagiarism!
 - These tools are BAD at programming! They are notorious for making mistakes. These will be detected and result in a zero grade for your assignment along with other consequences listed below.
 - These tools have signatures - having worked with AI & Machine Learning tools for most of my time after my education, it has become evident to me and the rest of the computer science community that most of these tools have a unique signature, naming systems and a pattern of answering questions, unless heavily trained to do otherwise (highly recommend AGAINST trying this - it takes days to train a LLM or Narrow AI; your assignments will take hours at max, to do by yourself). As a result I have a keen eye for detecting these and have co authored tools to detect use of AI generated solutions to programming problem sets.
 - First offense will result in:
 - ZERO grade for the assignment
 - Mandatory handwritten 500 word essay on “Plagiarism in Computer Science: Ethical Implications” to be signed by your Advisor and Head of the Department, and submitted to me, to be allowed to continue the course.
 - Second offense:
 - Referred for disciplinary action to the Dean’s Office and Honor Board.

I, your instructor, implore you, the student, to refrain from academic dishonesty. A zero in the assignment for being late is better than the consequences for plagiarism and cheating. If caught, your credibility as a student and professional will be ruined, your aspirations for a career in academia (research, publications, study-grants, teaching) will come to an absolute end, and the repercussions may spill over into your professional career which might have legal implications. I have seen too many students and colleagues go down this path and never recover from it - sometimes leading to heavy financial and legal repercussions. Million dollar companies have had to close shop and declare bankruptcy for a few lines of plagiarized code. So please, do not cheat.



Tentative Class Schedule

**Attendance is mandatory in these sections.*

Week	Lecture Objective	Tasks/Resources	Assignments/Homeworks/Exercises
1	*Introduction		
	Intro to AI	Read Intro from ebook	Assignment 0 posted (due before midterm week)
2	AI Concepts		Project 1 posted (due before finals week)
	Data Modeling for AI	Read Chapter 1 from ebook	
3	Data Scaling & Normalization		Assignment 1 posted (due before midterm week)
	*Normalization	Read Chapter 2 from ebook	
4	Distance Metrics	Read Chapter 3 from ebook	
	Random Number Generator	Read Chapter 4 from ebook	Assignment 2 posted (due before midterm week)
5	K Mean & Error Calculation		
	K Mean & Error Calculation	Read Chapter 5&6 from ebook	
6	Linear Regression		Assignment 3 posted (due before midterm week)
	Linear Regression	Read Chapter 10 from ebook	
7	*Review		Assignment 4 posted (due before finals week)



	No Class		
8	*Mid Term		
	Intro to Machine Learning	Read Chapter 7 from ebook	Project 2 posted (due before finals week)
9	Machine Learning & Optimization		
	Machine Learning & Optimization	Read Chapter 8 from ebook	Assignment 5 posted (due before finals week)
10	Machine Learning & Optimization		
	Machine Learning & Optimization	Read Chapter 9 from ebook	
11	Machine Learning & Optimization		Assignment 6 posted (due before finals week)
	Machine Learning & Optimization	In Class Problem Solving: Financial data Analysis	
12	Machine Learning & Optimization		
	Machine Learning & Optimization	In Class Problem Solving: Image Recognition & OCR	Assignment 7 posted (due before finals week)
13	Machine Learning & Optimization	In Class Problem Solving: Genetic algorithms	



	Machine Learning & Optimization	In Class Problem Solving: Image recognition Optimization	
14	Machine Learning & Optimization	In Class Problem Solving: Boids Flock Algorithm	
	Machine Learning & Optimization		
15	Thanksgiving		
16	Review		
	Final Exams		