Cloud Computing for Data Analysis

DSBA 6190-U90 (CRN 11491)

UNC Charlotte – Fall 2025

Instructor Information

Instructor	Email	Office Location & Hours
Colby T. Ford, Ph.D.	colby.ford@charlotte.edu	Bioinformatics 442 (By Appt.)

General Information

Wednesdays 5:30 pm - 8:15 pm, Dubois Center 1101

Description

Introduction to the basic principles of cloud computing for data intensive applications. Covers a broad range of technologies and solutions from data platform architecture to data analytics. Focuses on the scalable deployment of cloud resources and the integration between individual services. Topics covered may include cloud management, building data architectures with data lakes, containerized applications, distributed computing using cluster technologies such as Apache Spark or Kubernetes, machine learning and deep learning model training and deployment using scalable/GPU-based infrastructure.

Prerequisites:

- **Courses:** DSBA 6160 and DSBA 6156.
- **Skills:** Competency with Python, SQL, Linux/Unix, data structures, machine learning algorithms, and statistics. Strong programming skills, familiarity with machine learning frameworks (e.g., scikit-learn, PyTorch) and a solid mathematical (linear algebra) background.

Learning Outcomes:

1. Understand the benefits of cloud-based architecture
2. Architect end-to-end solutions based on user/organizational requirements
3. Recognize the differences in data platform options on-premises versus in the cloud
4. Discuss the cloud and on-premises machine learning approaches and the benefits therein

Course Materials:

- **Required:** *None.* Content will be provided throughout the course.
- **Optional:** *Learning Microsoft Azure*, Jonah Carrio Andersson, O'Reilly Media.
- **Optional:** *Genomics in the Azure Cloud*, Colby T. Ford, O'Reilly Media. (If interested in life sciences.)

Grading:

The final course grade will be determined by the student's total number of points earned in the class out of the total possible points. Lab assignments are due at 5:29pm on the published due date. Late work is not accepted.

Exercise	Points
Data Platform Lab	100
Distributed Computing Lab	150
Midterm Exam	200
Machine Learning Lab	150
DevOps Lab	100
Final Exam	300
Total	1000

Final Grading Ranges	
≥900/1000pts	A
800-899/1000pts	B
700-799/1000pts	C
<700/1000pts	D or Inc.
Academic Dishonesty	F

Tentative Course Schedule

Date	Section	Topic(s)	Lab
August 20th	Intro	- Introduction to the course - Gitting Started/App Setup	

August 27th	Data Platform	- Unstructured Data Stores
		  ○ Blob Storage
		  ○ Data Lakes
			Begin Data Platform Lab

September 3rd	NO CLASS		

September 10th	Data Platform	- Structured Data Stores
		  ○ Databases
		  ○ Data Warehouses
		- Azure Synapse and Data Factory	

September 17th	Data Platform / Distributed Computing VIRTUAL CLASS	- Containerization (Docker) ○ Kubernetes	Data Platform Lab Due Begin Distributed Computing Lab
September 24th	Distributed Computing	- Apache Spark (Databricks) - Other Cluster Technologies - Cloud Architectures	
October 1st	Review / Machine Learning	- Review Data Platform Topics - ML Options in the Cloud - Intro to Azure Machine Learning	Distributed Computing Lab Due Begin Machine Learning Lab
October 8th	Midterm Exam		
October 15th	NO CLASS		
October 22nd	Machine Learning	- Azure AI Services (+ Azure OpenAI) - Azure AI Foundry	
October 29th	Machine Learning	- MLOps and Model Deployment - LLMs, Prompt Flows, and RAG	
November 5th	Machine Learning	- Intro to Deep Learning and Neural Networks - Accelerating Training with Distribution and GPUs	
November 12th	DevOps	- Arch. Deployment with Terraform - CI/CD Pipelines with GitHub Actions	Machine Learning Lab Due Begin DevOps Lab
November 19th	Security and Compliance	- RBACs, ACLs, and AAD - Compliance Considerations	
November 26th	NO CLASS		
December 3rd	Review	- Review Machine Learning, DevOps, and Security Topics	DevOps Lab Due
December 10th	Final Exam		DUBOIS 1101 5:30pm-8:30pm

Academic Integrity and Honesty:
Students are required to read and abide by the Code of Student Academic Integrity available from Dean of Students Office. This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism (including viewing others work without instructor permission), abuse of academic materials, and complicity of academic dishonesty. Violations of the Code of Student Academic Integrity, including plagiarism, result in disciplinary action as provided by the Code.

Civility:
We are concerned with a positive learning experience. This course strives to create an inclusive academic climate in which the dignity of all individuals is respected and maintained. We value diversity, equity, and inclusion that will be beneficial to both your future career and society at large. Students are encouraged to actively and appropriately share their views in class discussions, but with kindness and respect.

Inclement Weather:
University Policy Statement #13 states the University is open unless the Chancellor announces that the University is closed. The inclement weather hotline number to call is 704-687-1900. In the event of inclement weather, check your email, and Canvas. The instructor will post a message on Canvas, and through email. The instructor will use their best judgment as to whether class should be held.

Illness:
If you are feeling unwell, have a fever, have symptoms of COVID-19 or another illness (flu, RSV, etc.), or have been in contact with someone with COVID-19 or another illness, don't attend class.

Disability:
UNC Charlotte is committed to access to education. If you have a disability and need academic accommodation, please provide a letter of accommodation from Disability Services early in the semester. For more information on accommodations, contact the Office of Disability Services at 704-687-0040 or visit their office in Fretwell 230.

Religious Accommodation:
The University policy on Religious Accommodation allows students to request reasonable accommodation, such as class attendance, for a religious practices, observances, or beliefs. If you need accommodation, please contact the instructor via email.

Withdrawal:
The University policy on Course Withdrawal allows students a limited number of opportunities available to withdraw from courses. There are financial and academic consequences that may result from course withdrawal. If a student is concerned about his / her ability to succeed in this course, it is important to make an appointment to speak with the instructor as soon as possible.

Syllabus Revision:
The instructor may modify the class schedule and syllabus throughout the semester. Changes will appear on Canvas. Students are responsible for refreshing their syllabus.

Email Communication:
Students are responsible for *all* announcements made in class and on the class online resources. Students should check online class resources throughout the semester. The Instructor and Teaching Assistants send occasional emails with important information. We send this information to the student's UNC Charlotte email address listed on Banner system. If a student is not checking their UNC Charlotte email address (ex. userName@charlotte.edu) please be sure to access this email and check it regularly during this course.