Cloud Computing for Data Analysis

DSBA 6190-U90 (CRN 11698)

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, 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

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.

Exercise	Points		Final Grading Ranges	
Data Platform Lab	100		≥900/1000pts	A
Distributed Computing Lab	150		800-899/1000pts	B
Midterm Exam	200		700-799/1000pts	C
Machine Learning Lab	150		<700/1000pts	D or Inc.
DevOps Lab	100		Academic Dishonesty	F
Final Exam	300			
Total	1000			

Tentative Course Schedule

Date	Section	Topic(s)	Lab
August 21st	Intro	- Introduction to the course - Gitting Started/App Setup	

August 28th	Data Platform	- Unstructured Data Stores
		  o Blob Storage
		  o Data Lakes
			Begin Data Platform Lab

September 4th	Data Platform	- Structured Data Stores
		  o Databases
		  o Data Warehouses
		- Azure Synapse and Data Factory	

September 11th	Data Platform / Distributed Computing	- Containerization (Docker) o Kubernetes	Data Platform Lab Due Begin Distributed Computing Lab
September 18th	Distributed Computing	- Apache Spark (Databricks)	
September 25th	Distributed Computing	- Other Cluster Technologies - Cloud Architectures	
October 2nd	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 9th	Midterm Exam		
October 16th	NO CLASS		
October 23rd	Machine Learning [Online Class]	- Azure AI Services (+ Azure OpenAI) - Azure AI Studio	
October 30th	Machine Learning	- MLOps and Model Deployment - LLMs, Prompts, and RAG	
November 6th	Machine Learning	- Intro to Deep Learning and Neural Networks - Accelerating Training with Distribution and GPUs	
November 13th	DevOps	- Arch. Deployment with Terraform - CI/CD Pipelines with GitHub Actions	Machine Learning Lab Due Begin DevOps Lab
November 20th	Security and Compliance	- RBACs, ACLs, and AAD - Compliance Considerations	
November 27th	NO CLASS		
December 4th	Review [Online Class]	- Review Distributed Computing, DevOps, and Security Topics	DevOps Lab Due
December 11th	Final Exam		DUBOIS 1101 5:00pm-7:30pm

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 that is beneficial to both employers and society at large. Students are encouraged to actively and appropriately share their views in class discussions.

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 e-mail, and [Canvas](#). The instructor will post a message on [Canvas](#), and through e-mail. 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 other illness, don't attend class.

Disability:

UNC Charlotte is committed to access to education. If you have a disability and need academic accommodations, 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.

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 the online class resources throughout the semester. The Instructor and Teaching Assistants send occasional e-mails with important information. We send this information to the student's UNC Charlotte e-mail address listed on Banner system. If a student is not checking their UNC Charlotte e-mail address (ex. userName@charlotte.edu) please be sure to access this e-mail and check it regularly during this course.