

# Cloud Computing for Data Analysis

DSBA 6190-U91 (CRN 14410)

UNC Charlotte – Fall 2019

## Instructor Information

### Instructor

Colby T. Ford, Ph.D.

### Email

colby.ford@uncc.edu

### Office Location & Hours

Bioinformatics 224 (By Appt.)

## General Information

### 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 will include data architecture such as SQL databases and data lakes, parallel computing using cluster technologies such as Apache Spark, machine learning using common classification, clustering, and regression algorithms, and deep learning using GPU-based infrastructure.

**Restriction(s):** Familiarity with R and/or Python, SQL, Unix, Data Structures, Machine Learning Algorithms, and Statistics; good programming skills and a solid mathematical 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-premise versus in the cloud
4. Discuss the cloud and on-premise machine learning approaches and the benefits therein

## Course Materials

Cloud Data Design, Orchestration, and Management Using Microsoft Azure – [\[Link\]](#)

*(Other materials will be distributed throughout the course as needed.)*

## 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
Machine Learning Lab	150	800-899/1000pts	B
Midterm Exam	200	700-799/1000pts	C
Parallel Computing Lab	150	<700/1000pts	D or Inc.
Deep Learning Lab	100	Academic Dishonesty	F
Final Exam	300		
	<b>Total</b>	1000	

## Tentative Course Schedule

Date	Section	Topic(s)	Lab
August 22 <sup>nd</sup>	Intro	<ul style="list-style-type: none"> <li>- Introduction to the course</li> <li>- Getting Started/Setup</li> </ul>	
August 29 <sup>th</sup>	Data Platform	<ul style="list-style-type: none"> <li>- Structured Data Stores                             <ul style="list-style-type: none"> <li>o Databases</li> <li>o Data Warehouses</li> </ul> </li> </ul>	Begin Data Platform Lab
September 5 <sup>th</sup>	Data Platform	<ul style="list-style-type: none"> <li>- Azure Data Factory</li> <li>- Unstructured Data Stores                             <ul style="list-style-type: none"> <li>o NoSQL Databases</li> <li>o Data Lakes</li> </ul> </li> </ul>	
September 12 <sup>th</sup>	Machine Learning	<ul style="list-style-type: none"> <li>- Intro to Machine Learning</li> <li>- ML Options in the Cloud</li> <li>- Cognitive Services</li> <li>- Automated Machine Learning</li> </ul>	Data Platform Lab Due Begin Machine Learning Lab
September 19 <sup>th</sup>	Machine Learning	<ul style="list-style-type: none"> <li>- Regression</li> <li>- Classification</li> <li>- Clustering</li> </ul>	
September 26 <sup>th</sup>	Machine Learning	<ul style="list-style-type: none"> <li>- Cross Validation</li> <li>- Parameter Tuning</li> <li>- Intro to Training Parallelization</li> </ul>	
October 3 <sup>rd</sup>	Review	<ul style="list-style-type: none"> <li>- Review Data Platform</li> <li>- Review Machine Learning</li> </ul>	Machine Learning Lab Due
October 10 <sup>th</sup>	Midterm Exam		
October 17 <sup>th</sup>	Parallel Computing	<ul style="list-style-type: none"> <li>- Intro to Parallel Computing</li> </ul>	Begin Parallel Computing Lab
October 24 <sup>th</sup>	Parallel Computing	<ul style="list-style-type: none"> <li>- Data Structures and Machine Learning in Spark</li> </ul>	
October 31 <sup>st</sup>	Deep Learning	<ul style="list-style-type: none"> <li>- Other Cluster Technologies</li> <li>- Intro to Deep Learning and Neural Networks</li> </ul>	
November 7 <sup>th</sup>	Deep Learning	<ul style="list-style-type: none"> <li>- Training Neural Networks with GPUs</li> </ul>	Parallel Computing Lab Due Begin Deep Learning Lab
November 14 <sup>th</sup>	Deep Learning	<ul style="list-style-type: none"> <li>- Operationalization: ML/DL as a Service</li> </ul>	
November 21 <sup>st</sup>	Deep Learning	<ul style="list-style-type: none"> <li>- Review Parallel Computing</li> <li>- Review Deep Learning</li> </ul>	Deep Learning Lab Due
November 28 <sup>th</sup>	NO CLASS	(Thanksgiving Break)	
December 5 <sup>th</sup>	NO CLASS	(Reading Day)	
December 12 <sup>th</sup>	Final Exam		

**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.

**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.

**E-Mail 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 his / her UNC Charlotte e-mail address (ex. userName@uncc.edu ) please be sure to access this e-mail and check it regularly during this course.