

Belk College of Business Administration, University of North Carolina at Charlotte

INFO 3221-001: PROGRAMMING FOR BUSINESS ANALYTICS

Spring 2020¹

Class Website: Canvas will be the website for course information and primary communication channel for this class. Go to <http://canvas.uncc.edu> and login with your ninernet credentials.

Instructor: Dr. C. Subramaniam
Office: 353-A Friday building
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Class time: MW 1.00-2.15pm
Classroom: **280 Friday (second floor)**, unless indicated otherwise by instructor
Office hours: M 2.30-4.00pm; W 11.00-11.30am;
By appointment at other times

Catalog Description

INFO 3221. Programming for Business Analytics. (3) Prerequisites: INFO 2130 with a grade of C or above or permission of BISOM department. A study of fundamental programming constructs and concepts required for solving data analytics problems. Emphasizes the use of widely adopted industry platforms such as Python and R to extract, transform, and make use of business data.

Learning objectives

“Business analytics” is a field which deals extensively with structured and unstructured data to build predictive models and visualizations to drive business decisions and actions. This class will focus on how to write code in R and Python to extract, modify and prepare the data for analyses and to perform simple data analyses. The class will emphasize hands-on learning. You should be prepared to write programming code and use programming logic to solve data-driven problems.

The specific learning objectives are as follows:

- Understand data representations in R and Python (data types and structures)
- Read a variety of data files in R and Python (data frames)
- Reformat and process data files in R and Python
- Subset, slice, and modify data files in R and Python (data wrangling)
- Create visualizations in R (ggplot2)
- Write programs and functions in R and Python

¹ This syllabus may be subject to minor changes during the semester after adequate advance notice to students.

Course Materials & Software

- 1. Course materials:** There are no required text books to purchase for this class. All required readings will be posted as documents or web links on Canvas. Since the best way to learn R and Python is through hands-on problem solving, the instructor will post problem sets on various topics and these problems sets are considered part of your course materials. You can print the posted material and bring them to class. Please note that I will not provide printed copies of any of the posted materials.
- 2. Hardware:** During class, you can use the computers in the classroom (280 Friday building) or your laptop. You are also expected to have access to a personal computer/laptop outside of class in order to work your practice problems and assignments. Your personal computer/laptop should be capable of installing and running R, R-Studio, and Anaconda Navigator.
- 3. Software:** This class will use various R and Python-based software tools, including R-Studio, and Jupyter Notebook. The above software are installed in the computer labs in the Friday building. However, some software tools may not be available in the computer labs outside of Friday building. Please check for the availability of the relevant software if planning to work on campus computer labs outside of the Friday building. Instructions for installing the above software on your personal computers will be shared with you by the instructor and posted on Canvas.

Grading

Component	Points	Group/Individual
<u>2 Exams</u>		
Exam 1	250	Individual
Exam 2	250	
Comprehensive Optional Final Exam (can replace Exam 1 or Exam 2)		
Homework & In-class Assignments	300	Individual
Quizzes	100	Individual
Attendance & class participation	100	Individual
Total	1000	

A: ≥ 900 ; B: ≥ 800 and < 900 ; C: ≥ 700 and < 800 ; D: ≥ 600 and < 700 ; F: < 600

Exams

All exams are closed book and closed notes, unless otherwise indicated. The exams may include multiple-choice questions, short essay-type questions and problem solving with R and Python. All exam grades will be posted on Canvas. The instructor will keep all exams after grading. However, students can review their exams individually during office hours or by appointment. Students who like to review their exams should do so within 5 days of the posting of the exam

grades (except for the optional final exam). **No grade reviews or grade changes will be done beyond this 5-day period.**

Makeup exams

In the event that a student anticipates missing an exam, she/he must provide appropriate supporting documents at least 24 hours before the exam to the instructor to request a make-up exam. The instructor will review all requests and authorize, at his discretion, eligible students to take makeup exams. A student who misses an exam without prior approval, possibly due to unexpected situation on the exam day, should contact the instructor within 12 hours of the exam start date/time and provide appropriate supporting documentation to be eligible for the makeup exam. It is the student's responsibility to be aware of and follow the make-up exam policies and no special accommodations will be made for any exceptions. No makeup exam will be given after April 15, 2020.

Assignments and quizzes

During the semester, the instructor will give various assignments. Some of these assignments are required to be completed in class by the end of the class period (in-class assignments), while others can be completed at home (homework assignments). In addition, the instructor may give quizzes on topic that have been completed prior to that class. During every class, all students should have practiced and be prepared to answer any questions on materials covered prior to that class. There is **NO MAKE UP** for any missed quiz or in-class assignment, irrespective of the reason for a student missing the assignment. Instead, you will be allowed to drop ONE quiz or in-class assignment from all the quizzes and in-class assignments given throughout the semester and it could be the one that is missed or with lowest grade.

Attendance

Regular attendance is necessary for doing well in this course. It has been my observation that students who miss more than 3 classes are most likely to end up with a failing grade in this class. However, when you attend class, it is important to not arrive late or leave early as it is very, very disruptive. You are responsible for completing the work from all of the class meetings. You are responsible for any material covered, announcements made, assignments distributed, and any other type of work you may miss during any absence from class. The exams may contain material discussed in the class but not posted on Canvas.

Attendance will be taken at random in class during the semester and will count towards your attendance and participation grade. Attendance will also be an important factor in making borderline grade decisions. Besides, there are a number of good reasons to attend all classes:

- some topics discussed in the class are not covered adequately in the posted materials and the instructor may present alternative explanations.
- **historically, those who skip the class tend to make less than their target grades.**
- **instructor may refuse to answer questions already covered in class but missed due to absenteeism.** A student who misses a class is responsible for obtaining any needed information (e.g., notes, announcements) from fellow students.

Tardiness or early departure is highly disruptive and is strongly discouraged in my class. Recurrence of such disruptive behavior will be noted and will lead to deduction of significant grade points and the student being asked to leave the class.

Class conduct

Disruptive behavior in class distracts from the ability of others to benefit from their in-class experience. Such disruptive behavior includes arriving late, leaving early, using cell-phone/smartphones in class without the instructor's explicit permission, surfing the net during the class, side conversations between two or more students during lecture, unnecessary comments that add no value to class, and any activity that negatively impacts the ability of other students to learn and/or follow in class. Such behavior will be considered inappropriate and **will not be tolerated**. Since it is my responsibility to provide an environment that is conducive to learning for everyone in the class, I will deduct points from the grade of any student who chooses to repeatedly engage in disruptive behavior. In particularly egregious and/or recurrent cases, I will have the student permanently removed from the class.

Please avoid spending class time working on assignments for other classes, checking e-mail, surfing the Web, or printing out homework. Repeated engagement in such behavior will be reflected in lower grades and may lead to removal from the class.

Electronic Devices in Class

Students are permitted to use laptops or tablets during class for **note-taking and other class-related work only**, but this should be done without distracting other students and without distracting you from the topic of discussion. Those using these devices during class for work not related to this class must leave the classroom for the remainder of the class period.

Cellular phones **MUST BE TURNED OFF/SILENCED DURING CLASS** and students are strongly discouraged from checking their cell-phone messages when the class is in progress. Use of instant messaging, email or other communication technologies during class time is not allowed. Calculators and computers are not allowed during examinations and quizzes, unless specifically allowed by the instructor.

I will take very seriously any disruptive behavior in my class. Students in my class should feel free to let me know if any electronic device usage behavior of fellow student/s is distracting her/his learning experience. Such complaints will be treated as confidential, but will help me to take appropriate actions to make sure that such distractions are eliminated and there is a positive learning environment in the class.

Students violating the electronic devices policies will be marked for disruptive behavior and may be asked to leave the class. Their grade will also be affected according to the rules of class conduct.

Due dates for submitting work

Students are expected to complete homework assignments and submit by the specified deadline. Late homework submission is allowed for 24 hours beyond the scheduled deadline,

but will incur a 25% penalty. After that period, your homework will not be accepted, and you will receive a 0 for that assignment. **No exceptions will be made.** If you know you will miss class, make arrangements to turn in your work ahead of time.

Quality of Work

The expectation is that all your submitted work will be of **professional quality** both in terms of **content and presentation**. All files submitted for grading should be named as specified in the assignment. Any descriptive work should be clearly marked with a title and name of student responsible for the work. The question being answered should be spelled out or identified so the instructor knows what is being answered. Work submitted online must have all files named appropriately so that the instructor can easily know who submitted the file and what it contains. The instructor will not spend time going through all your files in order to find your submitted work. Work that does not have proper identifications as described above will automatically get a deduction of 20% of the assigned grade for that work.

Instructor's help for homework and project

As you practice various sample problems in this class, you will invariably encounter programs that do not work. It is your responsibility to pay attention to discussions in class related to debugging. If you are not able to identify the errors when practicing the sample problems, I will be happy to go through your work with you and help you identify the problems. I can provide any amount of help with the examples and practice problems. But, I cannot provide any help with your homework assignments or exam work, if you face any problems. Specifically, I cannot take a look at your homework before the submission deadline in order to identify/correct bugs/errors or to judge how well the work meets the requirements. If you follow the materials covered in class and work on the practice problems, you should know what is expected in the assignments and exams. Clarifications related to any typo or ambiguity in the problem description will, however, be answered by the instructor.

Grade Appeals

If you believe that the grade you received on an assignment, exam or other graded course component was in error or unfair, you can appeal to the professor in writing within 5 calendar days of the receipt of your grade. The appeal should clearly state the reasons why you believe the grade to be unfair or the nature of the error. Overdue appeals will not be considered late in the semester.

Incomplete grade policy

An "incomplete" grade is not based on a student's failure to complete a given work or as a means of raising his/her grade by doing additional work after the grade report time. An incomplete grade can be given only when a student has been progressing satisfactorily in the class, but has encountered a serious medical problem or other extenuating circumstance that legitimately prevents completion of the semester. In any case, the student's work to date, and before the interruption, should be passing, and the student should provide proper documentation (e.g., a doctor's note), in order to get an 'I' grade.

Exam Ownership

Exams take many hours to prepare and, as a form of intellectual property, belong to those who create them (your professors). Consequently, exams must remain in my possession or under my control at all times unless you are given explicit written permission to keep them.

This means that exams cannot be taken out of the room during their administration or during their review at a later class meeting.

Students are encouraged to review their exams during office hours or by appointment for study purposes. However, failure to return an exam after taking or reviewing it or removing an exam from my presence at any time will be considered theft of intellectual property. Such action will result in an exam grade of zero and may warrant further disciplinary action.

Civility

The University strives to create an inclusive academic climate in which the dignity of all individuals is respected and maintained. We celebrate diversity that is beneficial to both employers and society at large. Students are strongly encouraged to act appropriately when sharing their views in class discussions.

Academic Integrity/Honesty

Students have the responsibility to know and observe the requirements of The UNC Charlotte Code of Student Academic Integrity available online at <http://legal.uncc.edu/policies/up-407>. This code forbids cheating, fabrication or falsification of information, multiple submissions of academic work, plagiarism (which includes viewing others work without instructor permission), abuse of academic materials, and complicity in academic dishonesty. ***This forbidding includes sharing/copying work between individuals or teams without permission of instructors.*** Any special requirements or permission regarding academic integrity in this course will be stated by the instructor, and are binding on the students. Students who violate the code can be expelled from UNC Charlotte. The normal penalty for a first offense is zero credit on the work involving dishonesty and further substantial reduction of the course grade. In almost all cases the course grade is reduced to failing. Students are expected to report cases of academic dishonesty to the course instructor.

For this class, peer advice and interactions are allowed when discussing non-graded work. Each student, however, must develop her/his own solutions to any graded assignment or lab exercises. Students may not collaborate on graded assignments or lab exercises. Such collaborations, where not explicitly permitted by the instructor, constitutes cheating. A student may not use or copy (by any means) another's work (or portions of it) and represent it as his/her own. If you have questions about a graded assignment, contact your instructor or TA first, not other classmates.

If you do not have a copy of the Code of Student Academic Integrity, you can obtain one from the Office of the Dean of Students.

Disability Accommodations

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.

Accommodations for Religious Observances

UNC Charlotte provides reasonable accommodations, including a minimum of two excused absences each academic year, for religious observances required by a student's religious practice or belief. Please refer to <https://legal.uncc.edu/policies/up-409> for details on requesting such accommodations.

The Belk College of Business strives to create an inclusive academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity that includes, but is not limited to ability/disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status.

Tentative Schedule Next 2 Pages

Tentative Schedule (updated 1/5/2020)

Date	Topic
1/8	Course Overview
1/13	Introduction to R, R-Studio and Software Setup
1/15	R - Data Representations & Operations
1/20	Martin Luther King Day – No Class
1/22	R - Data Representations & Operations
1/27	R - Data Representations & Operations
1/29	R – Data Selection and Slicing
2/3	R – Data Selection and Slicing
2/5	R – Data Selection and Slicing
2/10	R – Data Visualization
2/12	R – Data Visualization
2/17	R – Data Cleaning and Preparation
2/19	R – Data Cleaning and Preparation
2/24	R - Catch-up and review
2/26	Exam 1
3/2 & 3/4	Spring Recess – No Classes
3/9	Introduction to Python, Jupyter and Software Setup
3/11	Python Variables and Data Structures (Scalar variables, Tuples, Lists, and Dictionaries)

Date	Topic
3/16	Python Variables and Data Structures (Scalar variables, Tuples, Lists, and Dictionaries)
3/18	Python Programming & Functions
3/23	Python Programming & Functions
3/25	Python NumPy Package
3/30	Python Pandas and Data Frames
4/1	Python Reading Data from Files
4/6	Python Pandas Data Selection and Slicing
4/8	Python Pandas Data Selection and Slicing
4/13	Python Data Cleaning and Preparation
4/15	Python Data Cleaning and Preparation
4/20	Statistical Models in Python
4/22	Open lab or catch-up
4/27	Exam 2
5/6	Optional Final Exam

Have a great semester at UNCC.