Note: The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be by announcement in class or email notice.

Class location: Online (Zoom in Canvas)
Class time: 12:00pm – 2:45pm, Wednesday
Instructor: Dr. Dongsong Zhang, Belk Endowed Chair Professor of Business Analytics, UNCC
Office: Friday building room 363A
Email: dzhang15@uncc.edu
Telephone: 704-687-1893
Virtual Office hours: Wednesday 10-11:30am. By appointment at other times. If a student wants to set up an appointment with the instructor (normally 20 minutes/session) during office hours, please send an email request to the instructor that includes the preferred time and questions to be discussed no later than 6pm on Tuesdays. The instructor will then create a one-on-one Zoom meeting session with him/her and send the detailed meeting link and time to the student. The best way to contact the instructor is by email. The instructor will try to respond emails within 24 hours.

TA: Mr. Vishnu Vardhan Rao Madamanchi (vmadaman@uncc.edu), a TA of the instructor for the course, will be available to answer questions about SAS class demos and provide help and general guidance on assignments and the course project. Students who need help on SAS programs can directly contact him by email to set up a virtual meeting.

Important Information & Policies for Fall semester

Niner Nation Cares: All students must follow the updates and instructions related to Fall semester reopening posted on http://ninernationcares.uncc.edu and https://ninernationcares.uncc.edu/students. For your own health and safety and that of your friends and families, make sure to adhere to the health and safety guidelines posted on the above links. Please do not treat these guidelines lightly.

Absenteeism during Covid-19: Students are expected to attend every class and remain in class for the duration of the session when it is safe to do so in accordance with university guidance regarding COVID-19. Failure to attend class or arriving late may impact your ability to achieve course objectives which could affect your course grade. An absence, excused or unexcused, does not relieve a student of any course requirement. Regular class attendance is a student’s obligation, as is a responsibility for all the work of class meetings, including tests and written tasks. Any unexcused absence or excessive tardiness may result in a loss of participation points.
If you have been exposed to COVID-19 positive individuals and/or have been notified to self-quarantine due to exposure, complete this form to alert the University. Representatives from Emergency Management and/or the Student Health Center will follow up with you as necessary, and your instructors will be notified.

To return to class after being absent due to a COVID-19 diagnosis or due to a period of self-quarantine, students should submit an online request form to Student Assistance and Support Services (SASS). Supporting documentation can be attached directly to the request form and should be from a student’s health care provider or the Student Health Center, clearly indicating the dates of absences and the date the student is able to return to class. Instructors will be notified of such absences.

If you are absent from class as a result of a COVID-19 diagnosis or quarantine, please notify your instructor immediately and seek instructions to help you continue to make progress in the course. The specific instructions for this situation will be provided on a case-by-case basis. The final decision for approval of all absences and missed work is determined by the instructor.

Course Description
This course provides an introduction to big data analytics as a strategic resource in creating competitive advantages for businesses. The course focuses on understanding the basic concepts and techniques and integrating the knowledge of analytics tools with an understanding of how companies could leverage data analytics to gain strategic advantage. An emphasis is placed on developing the ability to think critically about complex problems/questions in real-world data science and business analytics (DSBA) challenges.

Learning Objectives
1. Understand the role of big data analytics in organizational strategy and how organizations can leverage useful data/information to gain competitive advantage and acquire insights.
2. Gain an introductory knowledge of data science and business analytics tools that are useful in extracting intelligence and value from data.
3. Apply big data analytics tools to analyze business opportunities and threats.
4. Use business cases/examples, develop data-driven strategies that enhance stakeholder relationships, open new market opportunities, and/or better position the organization for competitive advantage during industry transition.
5. Apply data analytics techniques to address a real-world problem.
This class is not about learning or mastering Hadoop or Python programming, etc. As such, you will not be taught any programming language or Hadoop coding in this class. Rather, the focus is on an awareness of issues, tools, and techniques of big data analytics and how they can be leveraged to address business opportunities and problems. SAS Enterprise Guide and Miner will be covered at a level appropriate for doing data preparation and modeling. More importantly, this course is designed to emphasize critical thinking and business problem-solving with big data.

Course Materials & Software

1) Reading Materials: There is no required text book for this class. All reading materials will be posted or linked by the instructor on the Canvas class page (The materials related to each lecture will be posted at least 24 hours in advance). Those materials may include, but not limited to, power-point slides, handouts, videos, and research articles, etc. You can print out the posted material before the class. Please note that the instructor will not provide printed copies of any of the posted materials.

2) Software: This class will use SAS Enterprise Guide and SAS Enterprise Miner Workstation software for data analytics assignments. Students will need them to complete 5 assignments (3 are SAS assignments) and a team course project, which will be introduced later in the syllabus. You can download the software to your personal computer from software.uncc.edu. If you plan to use computers in student labs on the campus, both programs are installed in the Friday building student labs.

For students who use other people’s computers or can’t download the software on your computer, you may use one of the following remote access to those two software programs:

   (1) SAS Miner and other SAS software are available from Apporto, a browser based virtual machine. Anyone can access Apporto by going to http://apporto.uncc.edu, sign-in with your Ninernet credentials, and launch the virtual desktop.

   (2) SAS Enterprise Miner is available via Citrix (Citrix.uncc.edu)

3) Other supplementary Readings: The instructor may recommend some useful books or articles that will enhance your understanding of the area of data science and business analytics. However, exams, homework, quizzes, and other class work will not be assigned from these recommended books, unless the instructor posts power points from these materials for class discussion and designates the power points as study materials.

Instructional Method
This course will take a lecture/discussion approach. Lectures will typically take the form of presentation of theoretical materials and class discussion. Students will be introduced to a number of analytics topics and tools through business cases and problems. In addition, students are expected to present recent research papers and/or business case studies on real-world business problems solved by big data analytics. I strongly encourage students to actively participate in class discussion. Such participation brings additional perspectives to classroom discussion, enables more effective knowledge sharing, and makes the lectures more interesting. Any class-related questions before, during, or after the class are welcome.
I expect that we all show mutual respect for each other in the learning process during lectures. In this context, mutual respect includes beginning and concluding the class on time, and allowing all students of the class to participate in dialogue without interruption or distraction. Adopting these practices can help us minimize disruption to class discussion and dialogue and maximize the value of the class for all students.

**Credit Hours**
This is a 3 credit hour course. Thus, the course has been designed to require on average about 10 hours/week (about 3 hours outside of class for every 1 credit hour) between readings, quizzes, assignments, and project work. Of course, the hours may be more or less than indicated above depending on the actual deliverables due. If a student has limited backgrounds in certain topics, they might need to spend additional time to keep up with other students in the course.

**Grading Policy**
The course grades will be determined based on students’ performance in the following deliverables:

<table>
<thead>
<tr>
<th>Components</th>
<th>Individual or Group based</th>
<th>Percentages in final grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments (5)</td>
<td>Individual</td>
<td>25% (5% each)</td>
</tr>
<tr>
<td>Exams (2)</td>
<td>Individual</td>
<td>40% (20% each)</td>
</tr>
<tr>
<td>Group project &amp; presentation</td>
<td>Group</td>
<td>22%</td>
</tr>
<tr>
<td>Quizzes (2)</td>
<td>Individual</td>
<td>6% (3%/quiz)</td>
</tr>
<tr>
<td>Class participation</td>
<td>Individual</td>
<td>7%</td>
</tr>
</tbody>
</table>

Grading reflects the instructor’s objective judgment based on students’ course performance. If you have questions about a grade on an exam or an assignment, please talk to the instructor within one week after the grade is released. Students may meet with the instructor to get feedback regarding their course performance at anytime during the semester. It is important to understand that the grade reflects academic achievement/performance. While I will always be glad to correct mistakes in the arithmetic computation of grades, final letter grades are not negotiable. In general, no late deliverables will be accepted unless the student gets extension from the instructor in advance due to legitimate reasons.

1) There will be 5 individual **assignments** throughout the semester, each contributing 5% toward your course grade. The major objective of those assignments is to help you better understand the concepts discussed in the class. All assignments, unless explicitly specified otherwise, **will be released in the “Assignment” Section on course Canvas website and due at noon EST on the due dates**. Students have at least one week for completing each assignment. You need to submit the required outcomes online through course canvas. The tentative due dates of all assignments are provided in Table 1 in this syllabus. The first assignment, which will be released on September 7 and due on Sept. 23, is about students’ self-introduction and project team formation. Please note that in general, **no late assignments will be accepted**.

2) **Exams:** There will be a mid-term exam and a final exam. Both will be online exams taken in Canvas within a designated time period. They may include true-false, multiple-choice, short essay questions,
and questions on solving business problems by using SAS software. **The exams may include questions related to any materials discussed in the class**, even though they may not appear in the PowerPoint slides or handouts. All exam grades will be posted on Canvas. The instructor will keep all exams after grading. However, exam reviews are available during office hours or by appointment. Students requesting a review of their exams should do so within a week after the exam grades are posted. **No grade reviews or adjustments will be permitted beyond this one-week period.**

Make-up exams will NOT be granted except under extreme circumstances. In the event that a student has to miss an exam due to emergencies, she/he must submit a request for a make-up exam with appropriate supporting documents in advance to the instructor. The instructor will review all requests and authorize, at his discretion, eligible students to take makeup exams. A make-up exam should generally be arranged within one week after the original exam is given. It is the student’s responsibility to be aware of and follow the make-up exam policies. No special accommodations will be made for any exceptions.

3) **Group Project**

Students are expected to form 2~3 member course group project teams on their own no later than Sept. 23 to complete a course group project. Each project team is expected to perform a data analytics project that uses SAS Enterprise Guide and Miner or other data analytics tool(s) of students’ preference (With the instructor’s approval in advance) and any meaningful datasets. The project should include data preprocessing and analytics. The final report should include an introduction to the business problem/opportunity that the project is aimed to address, description of the data, analytics techniques used, major findings/results (including some screenshots of outcomes), and discussion on business implications and recommendations based on the findings. Each team is required to submit a project proposal on Oct. 7, a progress report on Nov. 18, and a final project report/paper on Dec. 11. All groups will present their course projects in the class of Dec. 11, which contributes 10% to their group project grades.

Each student should actively and equally participate in the project. At the end of the semester, individual students’ group project grade will be determined based on not only the group project score, but also the level of their contributions to the project.

There are four deadlines related to the course group project:

1. Noon of Sept. 23: the deadline for creating your project groups. Students are welcome to discuss with the instructor in advance about the fitness and scope of the potential proposal(s) that they consider. One member of each project team should **post group information (i.e., full names of all team members) in the thread of “In-class topic presentations and course project team sign up” on the discussion forum on the course Canvas website, under a selected in-class presentation topic/date.** Please note that in general, once a group is formed, no group switching is allowed.

   In order to help better understand subject matters discussed in the class and share the knowledge, each team, in addition to the final course project presentation, will give a presentation on a topic selected from the list shown in Table 2 presented later in this syllabus.
Teams are expected to present one recent relevant paper or report (either a real-world data analytics project or case study), and present them in the class for 20 minutes (e.g., if a group chooses the topic “Association Rule Mining”, the group is expected to find a recent journal paper (not a conference paper) on how association rule mining was actually used to solve a real-world problem). **There will be one group only to present at each specified date.** Therefore, the selection of the presentation topics/dates will be on a first come, first serve basis.

Each group should identify 4~5 candidate papers (you can easily search articles from digital libraries such as ScienceDirect, ACM digital library, and IEEE Xplore digital library on the UNCC library web portal using keyword search) that meet the following four criteria and send them to me as email attachments for approval at least one week prior to the scheduled presentation date:

(a) journal papers published after 2015;
(b) papers focusing on real-world applications, not a conceptual paper;
(c) papers involved in datasets, data analytics/modeling, and evaluation results; and most importantly
(d) papers that the group feels interesting and comfortable with presenting (If you select a paper that you are not interested or can’t understand, the audience probably will not either).

Once I receive the candidate papers, I will take a look at them and provide you my recommendations in terms of which candidate paper seems more relevant and appropriate for the presentation (or in the worst case, when all candidate papers are inappropriate, the group will be asked to search for additional candidate papers). The in-class topic presentations must be prepared in PPT. Each group can select one or two members to present the paper on behalf of the group, or all members participate in the presentation. It is each group's decision.

(2) Oct. 7, noon: Each team should submit a 3-page project proposal (1.5 line-spacing, 12 Font size), which should explain the nature of the target business problem, why it is worthwhile to be investigated/analyzed, the objectives of the project, data source(s), and the tentative work plan. The proposals will be sent to the instructor by emails. They, along with instructor’s feedback and suggestions, will be returned to you in the following week.

(3) Nov. 18: progress report: write 3~4 pages in a word document to summarize what you have done so far, including references you have read, and what are remaining tasks. This deliverable should be sent to the instructor by email only. Students should expect to receive feedback and suggestions from the instructor within 48 hours. This report is mandatory but will not be graded because its main goal is to make sure that a group’s project is on the right track and in the proper status. Failing to submit this report will result in a loss of 10% project grade.

(4) Noon, Dec. 11: Final project report

Please write a 20~25 page project report (including citations and references). The format of references should be either in IEEE or APA format, whichever your team prefers.

The project report needs to contain information about which group member contributed what to the project and project report writing at the end. After the final project is completed, each student may be asked to fill out a questionnaire about the performance of each of her/his
group members (in the scale of 1~10, with 10 being the full participation/contribution). Students can send the filled questionnaire to the instructor by email. The feedback received from the group for each team member will be averaged. The final course project grade for individual group members who have received unsatisfactory participation feedback will be decided as follows. Students whose receive an average participation score of less than 2 out of 10 will get a ZERO for the project, irrespective of the final project grade for the group. Students who receive average feedback score >=2 and <8 will receive \((\text{original group grade} \times (\text{average feedback score} + 1)) / 10\). Students who receive average feedback score >=8 will receive 100% of the original group project grade. The feedback policy will be applicable only to the group project.

4) Quizzes: There will be two online quizzes of the course (see the tentative dates in Table 1). Each quiz will only consist of a dozen true/false and multiple-choice questions, aiming to reinforce students’ learning and identify potential problems with concept understanding. Each quiz contributes 3% to the course grade. The instructor will inform the students about the coverage of each quiz and exams one week in advance. In general, there will be NO MAKE UP quizzes.

5) Class participation not only includes class attendance, but also the contribution to the class discussion. Students are expected to attend every class and strongly encouraged to actively engage in class discussion, such as asking/answering questions and sharing real-life experiences related to the course material. Missing a lecture without informing the instructor with a legitimate reason and receiving a permission in advance may result in losing a point in class participation (up to losing 5 points). A student will lose 2 points in class participation if he/she never involves in class discussion during the entire semester (e.g., asking/answering questions in the class, sharing personal experiences related to a discussed topic, or answering other students’ questions in the “General course related questions” forum).

Class attendance is important and necessary for doing well in this course. Students are responsible for completing the work from all of the class meetings and for any material covered, announcements made, assignments distributed, and any other type of work you may miss due to the absence from class. Attendance will be taken in class during the semester and will be counted towards your class participation grade. Attendance will also be an important factor in making borderline grade decisions. The Instructor will not answer questions already covered in the class but missed due to absenteeism. A student who misses a class is responsible for obtaining any needed information from fellow students.

Extra Credit Opportunities
Extra credit opportunities, if any, will be offered to the entire class. However, it is strongly encouraged that students do not rely on extra credit to improve their grades as we may end up with very few or no extra credit opportunities in the semester. No extra credit opportunities will be offered after Dec. 1. Most importantly, no extra credit will be offered to an individual student for the purpose of improving her/his grades because it would be unfair to other students.

Quality of Work
The expectation is that all your submitted work will be of professional quality both in terms of content and presentation.
• Spelling, grammar, punctuation, clarity of expression, and presentation will count in every piece of work you do for this course. If you have trouble with spelling, grammar or punctuation, have someone proofread your package.
• Your grade will be based on what you say or write and how you present it. It becomes difficult to read for content if the mechanics are sloppy, and a superior job may not be recognized as such if presented in an error-laden package.
• Good ideas sloppily expressed will receive mediocre grades, as will flashy presentations that lack content.
• Students whose native language is not English must meet the same quality of writing and presentations expected of all students.

Instructor’s help for assignments 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 **to be fair to all students, the instructor cannot take a look at your assignments or project before the submission deadline to help a student identify/correct bugs/errors or to judge how well the work meets the requirements.** Vishnu, the TA, will be available to provide some guidance on SAS assignments and course project on a needed basis.

Incomplete grade policy
An “incomplete” 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 a serious medical problem or other extenuating circumstance that legitimately prevents completion of required work by the due date. In any case, the student’s work to date, and before the interruption, should be passing, and the student should provide proper written proof (e.g., a doctor’s note), in order to get an 'I' grade.

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 be respectful and courteous towards others when sharing their views during class discussions.

Academic Integrity/Honesty
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, unless explicitly permitted by the instructor to work in groups. Collaborations, where not explicitly permitted by 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.

Student Assistance and Support Services
Student Assistance and Support Services (SASS) (https://sass.uncc.edu/) is operating remotely Monday-Friday from 8 AM to 5 PM. SASS is committed to ensuring that students are supported during this challenging time. It can be reached via email at studentsupport@uncc.edu or via phone at 704-687-0289.

Academic support: https://ninernationcares.uncc.edu/students/academic-support.
Health support: https://ninernationcares.uncc.edu/health-support-services

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.

Diversity
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.

Other Information
Students are responsible for all announcements made in class and on the class online resources. Students should check the online class resources available on Canvas throughout the semester. The instructors may send occasional emails or announcements with important information to the class. It is the students’ responsibility to make sure that their email addresses are accurate and checked regularly.

The instructors will only discuss grades with students one on one through a virtual meeting and only with the student him/herself (not with parents, spouses, etc.).

Class Schedule
The preliminary schedule for this class is shown below. It is organized based on weeks/topics. Please note that the class schedule may be slightly adjusted during the semester based on the learning pace of the class without adversely affecting the learning objectives. Please always refer to the latest class announcements posted on the Canvas class page or shared during the class.

Table 1. Topics and Tentative Schedule (as of 8/27/2020)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Theme/Topic of Discussion (Supplementary reading materials will be posted on Canvas)</th>
<th>Tentative Due dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/9</td>
<td>Class overview (Syllabus), Software Introduction to Big Data and Big Data Analytics</td>
<td></td>
</tr>
<tr>
<td>9/16</td>
<td>Big Data Use Cases in Business: Drivers and Challenges</td>
<td></td>
</tr>
<tr>
<td>9/23</td>
<td>Data Sourcing and Management: The Acquisition, Collection, and Storage of Big Data</td>
<td>HW1</td>
</tr>
<tr>
<td>Date</td>
<td>Theme/Topic of Discussion</td>
<td></td>
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<tr>
<td>----------</td>
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<td></td>
</tr>
<tr>
<td>9/30</td>
<td>Data Wrangling: Cleaning and Transforming Data management via SAS Enterprise Guide</td>
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<tr>
<td>10/7</td>
<td>Data Visualization and Exploration</td>
<td></td>
</tr>
<tr>
<td>10/14</td>
<td>Predictive Models: Decision Tree and Logistic Regression</td>
<td></td>
</tr>
<tr>
<td>10/21</td>
<td>Building a DT/LR model with SAS Miner</td>
<td></td>
</tr>
<tr>
<td>10/28</td>
<td><strong>Mid-term Exam</strong></td>
<td></td>
</tr>
<tr>
<td>11/4</td>
<td>Clustering and Association Models</td>
<td></td>
</tr>
<tr>
<td>11/11</td>
<td>Clustering with SAS Miner; Neural Networks</td>
<td></td>
</tr>
<tr>
<td>11/18</td>
<td>Neural Networks</td>
<td></td>
</tr>
<tr>
<td>11/25</td>
<td>Text Analytics</td>
<td></td>
</tr>
<tr>
<td>12/2</td>
<td>Social Network Analysis</td>
<td></td>
</tr>
<tr>
<td>12/9</td>
<td>Group project presentations</td>
<td></td>
</tr>
<tr>
<td>TBA</td>
<td><strong>Final Exam</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Always refer to the latest class schedule change announced in the class. Also, unless explicitly specified otherwise, all the deliverables are due at noon on the due dates.

<table>
<thead>
<tr>
<th>Date</th>
<th>Theme/Topic of Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/7</td>
<td>A research paper on big data wrangling or management (e.g., mobile health systems)</td>
</tr>
<tr>
<td>10/21</td>
<td>A research paper on using Decision Tree or LR (or both) in a real-world application</td>
</tr>
<tr>
<td>11/11</td>
<td>A Research Paper on association rule mining application</td>
</tr>
<tr>
<td>11/18</td>
<td>A Research Paper on data clustering application</td>
</tr>
<tr>
<td>11/25</td>
<td>A Research paper on neural network application</td>
</tr>
<tr>
<td>12/2</td>
<td>A Research paper on text analytics application</td>
</tr>
</tbody>
</table>

In order to make class discussion more interesting and closely tied to research and/or real-world practice, each course project group is required to select a refereed journal paper or a real-world case study related to one of the topics listed in Table 2 and presents the paper to the class on the corresponding designated date. Specific requirements of this in-class group topic presentation are as follows:

- Each group, once determining the preferred presentation topic/date, should first go to the discussion forum on the Canvas site and respond to the thread of the selected topic/date by including the names of all group members, indicating that the group has signed up for presenting a paper or case study on that topic. It will be on a first come, first serve basis.

- Each group should search the related literature and select 4~5 relevant journal papers or case studies on the selected topic to Dr. Zhang for approval at least one week prior to the scheduled presentation date. Dr. Zhang will provide suggestions on which one seems better for the course, or may ask for more alternatives if none of the candidate studies seems appropriate.

- Each group will present one and only one paper on the topic selected from the above list. The presentation should be prepared in the Microsoft PowerPoint;
• Each presentation will last about 20 minutes, including 3 minutes for possible question-answering. Your presentations should **NOT** repeat the basic concepts that have already been discussed in the prior lectures;

• Each presentation should consist of a good-quality, real-world applications or case studies that involve the use of selected technique. Those paper and case studies should be obtained from peer-reviewed **journal papers** or industry reports, preferably those that were **published after year 2015**.

• Either one or multiple group members can present, up to your choice;

• Each group should upload .ppt slides into the discussion forum (under the signed-up date/topic thread) on course Canvas site at least 24 hours before the presentation.