INFO 3236-091: BUSINESS ANALYTICS

Fall 2020

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

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 Website: Canvas will be the website and primary communication channel for all information about this course. Go to http://canvas.uncc.edu and login with your Ninernet credentials.

Instructor: Dr. Dongsong Zhang, Belk Distinguished Professor in Business Analytics, UNCC
Office: Friday building, room 363A
Phone: 704-687-1893
Email: dzhang15@uncc.edu

Class time: Wednesday, 5:30pm-8:15pm
Classroom: Online (using Zoom available in the UNCC Canvas)
Virtual Office hours: Wednesdays 3:30pm-5pm (By appointment). 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 no later than 6pm on Tuesdays and inform the questions that he/she wants to discuss. The instructor will then create a one-on-one Zoom meeting session with him/her and provide the detailed meeting link and time. The best way to contact the instructor is by email. The instructor will try to respond emails within 24 hours.

Mr. Vishnu Vardhan Rao Madamanchi (vmadaman@uncc.edu), a TA of the instructor, will be available to help answer questions about SAS class demos, if any, and provide some guidance on assignments and course project. Students who need help 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.

**Catalog Description INFO 3236. Business Analytics**

Prerequisites: Junior or senior standing; and MIS, OSCM, Economics, or Marketing major or minor in good standing; or permission of department. Students are expected to be familiar with:

1) file downloading and uploading on the course Canvas website;  
2) using Microsoft WORD and PowerPoint;  
3) taking a screenshot (e.g., pressing FN (Function) key and “Print Screen” key simultaneously) and then paste into a WORD document if you are using Microsoft Windows;  
4) having a PC or a laptop with a microphone, speakers, and a camera for participating in the virtual class

This course covers various data mining and business intelligence methods, such as rule-based systems, decision trees, logistic regression, and clustering. In addition, this course also covers fundamentals of statistics, association rule mining, online analytical processing (OLAP), artificial neural network, and various issues relating to modeling, storing, securing, and sharing the organizational data resources.

**Learning objectives** “Business analytics” refers to the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions (Davenport and Harris, 2007, Competing on Analytics: The New Science of Winning). This class will provide the conceptual foundations of business analytics and an overview of several analytics techniques and software tools.
The specific learning objectives are as follows:
1. To develop an understanding of business intelligence, analytics and decision support, as well as the principles of data management for analytics.
2. To understand basic concepts in statistics and be able to perform descriptive statistics (e.g., mean, standard deviation, variance, probabilities, odds, odds ratio, normal distribution, hypotheses testing).
3. To use SAS Enterprise Guide and Miner tools and techniques (e.g., decision trees, logistic regression, cluster analysis) for data management, building predictive models, and data clustering.
4. To apply the learned analytics techniques to a real-world business problem through a team course project.

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 course page (The instructional 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. Those software programs are required because students will go through SAS data management and analytics demos/exercises during lectures and use the software to complete 4 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)
**Class Format**
This course will use in-class lectures as the primary learning format. Lectures will typically take the form of presentation of theoretical materials and class discussion. We will also use this time to demonstrate how to use SAS Enterprise Guide and Miner for 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 are encouraged.

We should 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, not using computer/cell phones for anything irrelevant to the course, and allowing all students of the class to participate in a 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.

**Grading**

<table>
<thead>
<tr>
<th>Components</th>
<th>Points</th>
<th>Percentages and Weights of the Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-term and Final exams</td>
<td>40 pts/each</td>
<td>40% (20% each)</td>
</tr>
<tr>
<td>Assignments (5)</td>
<td>10 pts/each</td>
<td>20% (4%/assignment)</td>
</tr>
<tr>
<td>Quizzes (2)</td>
<td>10 pts/each</td>
<td>6% (3%/quiz)</td>
</tr>
<tr>
<td>Course group project</td>
<td>24 pts</td>
<td>24%</td>
</tr>
<tr>
<td>In-class group topic presentation</td>
<td>3 pts</td>
<td>3%</td>
</tr>
<tr>
<td>Attendance/Course participation</td>
<td>7 pts</td>
<td>7%</td>
</tr>
</tbody>
</table>

A=90-100  
B=80-89  
C=70-79  
D=60-69  
F=Below 60

Grading reflects students’ course performance. If students have questions about a grade of an exam or an assignment, please contact the instructor within one week after the grade is released. Students may communicate with the instructor to get feedback regarding their course performance at any time during the semester. While I will always correct mistakes in my arithmetic computation of grades, if any, final letter grades are not negotiable. Late assignments will receive a 15% deduction for each day they are late. There will be a “Two Day Grace Period”. Any assignment turned in after that period will not be accepted.

1) **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 data analytics 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 request a make-up exam while providing 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.

Exams take many time and effort to prepare and, as a form of intellectual property, belong to those who create them (i.e., professors). Consequently, students are not allowed to copy or record any exam questions. **Any violation of these requirements will be considered theft of intellectual property and will result in an exam grade of zero automatically and warrant further disciplinary actions.**

2) There will be 5 individual assignments throughout the semester, each contributing 4% toward your course grade. All assignments, unless explicitly specified otherwise, **will be released in the “Assignment” Section on course Canvas website and due at 5:30pm 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. All of the remaining four assignments will be data management and analytics assignments using SAS.

3) **Quizzes:** There will be two online quizzes in the semester (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 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** unless a student can request in advance with legitimate reasons and relevant support documents.

4) **Course group project**
   Students are required to complete a course group project by using the learned data analytics techniques and SAS Enterprise Guide/Miner to analyze a business dataset, which will be available to students on canvas a month or so after the semester starts. There will be detailed tasks and instructions for students to follow. Students should create project teams
on their own no later than September 23. Each group should consist of 4 members. The projects will be graded based on the following criteria:

1) Model variable selection for each task (20%)
2) Parameter settings in the model building process (20%)
3) Performance of the generated models (30%)
4) Report quality (e.g., required screenshots, appropriate interpretations of the models) (20%)
5) Project presentation (10%)

Once a group is formed, each group member is expected to contribute to the course group project and in-class group topic presentation (which will be introduced next) actively and equally. The project report needs to contain information about which group member contributed what to the project and project report writing. At the end of the semester, 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.

5) **In-class group topic presentation**

In order to help students better understand the basic concepts introduced in the lectures and their practical applications in real-world settings, each course project team is expected to select one topic/date from the list in Table 2 at the end of the syllabus, search for a recent research paper/case study published after 2015 on the selected topic that focuses on the real world application of the selected topic, and presents the paper for 20 minutes in the class (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). 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 will probably 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. It contributes 3% to the course grade. 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.

6) **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. It has been a common observation that students who miss more than 2 classes are most likely not to perform well in this class. 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.

*Tardiness or early departure is strongly discouraged in this class. Recurrence of such behavior will be noted and may lead to deduction of points in class participation grade.*

**Class conduct**
Disruptive behavior in class affects the ability of others to benefit from their in-class experience. Such disruptive behavior includes arriving late, leaving early, surfing the net during the class, side chat between two or more students during a lecture, disrespectful comments or unnecessary/irrelevant 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 may have to have the student permanently
removed from the class. Thank you for your understanding and help to maintain an effective and focused online learning environment.

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.

All work submitted for evaluation (including group and individual work) must be clearly marked with a title and names of students 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 by following the instructions so that the instructor can easily understand what the file represents. The instructor will not spend time going through all files in order to find your submitted work. Work that does not have proper identifications as described above will automatically get a deduction of 10% of the assigned grade for that work.

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 (not doing them for you completely) and course project on a needed basis.

Team Work
For group activities, each team is responsible for organizing itself, dividing up the work, and deciding how relative contributions should be measured. It is your responsibility to promptly inform the instructor of any dysfunctional team dynamics and to solicit his help.
All team members must
- participate in all team activities equally,
• strive to maintain positive working relationships with other team members,
• assist team members to resolve issues relating to group work, and
• freely express their ideas, thoughts, comments, and constructive criticisms to their team members, me, and the class.

It is the responsibility of the team to ensure that all team members understand all concepts related to the completed projects and presentations. The instructor may ask questions about any completed project to any team member and any incomplete or unsatisfactory answers will affect the team grade. *The instructor may announce additional measures to obtain feedback on group member contributions and institute appropriate grade penalty for lack of participation. However, this grade penalty will be limited to the course-work that is group-based.*

**Extra Credits**
Extra-credit opportunities, if any, will be the instructor's decision and such opportunities will be presented to the whole class instead of individual students only. No extra-credit opportunities will be given after Dec. 1, 2020.

**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.

**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>
<thead>
<tr>
<th>Dates</th>
<th>Topics</th>
<th>Tentative Deliverable Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/9</td>
<td>Course overview and introduction to business analytics</td>
<td></td>
</tr>
<tr>
<td>9/16</td>
<td>Analytics methodology &amp; fundamental statistical concepts</td>
<td></td>
</tr>
<tr>
<td>9/23</td>
<td>Fundamental statistical concepts</td>
<td>Homework 1</td>
</tr>
<tr>
<td></td>
<td>Data Management with SAS Enterprise Guide</td>
<td></td>
</tr>
<tr>
<td>9/30</td>
<td>Decision trees</td>
<td>Homework 2</td>
</tr>
<tr>
<td>10/7</td>
<td>Decision Trees with SAS Enterprise Miner</td>
<td>Quiz 1</td>
</tr>
</tbody>
</table>
Table 2. In-class Group Topic Presentation Schedule:

<table>
<thead>
<tr>
<th>Dates</th>
<th>Topic</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/7</td>
<td>Decision Tree (1)</td>
<td></td>
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<tr>
<td>10/14</td>
<td>Decision Tree (1)</td>
<td></td>
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<tr>
<td>10/21</td>
<td>Regression Analysis (1)</td>
<td></td>
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<tr>
<td>11/11</td>
<td>Logistic regression (1)</td>
<td></td>
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<tr>
<td>11/18</td>
<td>Cluster analysis (1)</td>
<td></td>
</tr>
<tr>
<td>11/25</td>
<td>Association Rule Mining (2)</td>
<td></td>
</tr>
<tr>
<td>12/2</td>
<td>Artificial Neural Network (1)</td>
<td></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 present 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.

**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/](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](https://ninernationcares.uncc.edu/students/academic-support).
Health support: [https://ninernationcares.uncc.edu/health-support-services](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.

Wish everyone a successful semester!