Course Syllabus for Spring 2021 (note that some changes are possible)

Professor: Dr. Franck Soh
Office: 489 Bryan Building
Email: f_sohnoume@uncg.edu
Course Meeting Time: Tuesday from 6:30 pm to 7:45 pm
Office Hours: This is an online course. Make appointments, as necessary.

➢ Course Description:
Data are analyzed to answer questions. Students are exposed to concepts and techniques to understand analytics results and appropriately infer relationships to answer questions and visualize results using contemporary techniques.

➢ Course Goals
Upon successful completion of this course students will be able to:
- Analyze business problems to evaluate and design effective visualization strategies
- Develop effective visualizations using contemporary software applications
- Apply principles of effective data visualization to inform problem-solving strategies
- Implement visualization strategies for problem-solving
- Evaluate visualization techniques and applications for problem-solving
- Synthesize technical and organizational requirements for effective problem-solving using data visualization strategies

➢ Textbooks
The following books are available for you to download in the library as eBooks. I encourage you to download and review these books.


I will share additional materials and references for course materials on canvas. To succeed in the class, practicing the software, reading the chapters, and watching the videos shared in the class are equally important. Please note that there are multiple books, guides, and references available for both Tableau and R. My choice of the textbooks reflects my desire to manage the cost while maintaining the quality of materials and coverage of concepts and technologies for the course.

I encourage you to explore alternative, and perhaps more current, resources for Tableau and R that are readily available on the web and find what works for you. Please share your finds and preferences with the rest of the class.
Programming Environment
We will use Tableau and R as visualization tools in this course. I do not expect you to have any prior experience with either Tableau or R.

Tableau is available for students as a free download at https://www.tableau.com/academic/students. I will provide access keys and a guide to downloading and installing Tableau for you in canvas.

We will use R Studio (https://www.rstudio.com/) to design and develop analytics and visualizations in R. R is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. R Studio is an Integrated Development Environment to build R analyses and visualizations.

Canvas Learning Management System
UNCG Canvas is available at https://canvas.uncg.edu. Course materials, announcements, and updates will be posted on Canvas regularly. Please check canvas daily for announcements, discussions, and materials. You will be responsible for any information or announcements provided to you through emails and for any updates on Canvas.

Participation
Students are expected to regularly discuss their progress in the course and participate in discussions using the topic/assignment specific discussion boards on Canvas.

Assignments
Designing and developing problem-solving strategies constitute a significant aspect of your skill development in this course. Much of this is accomplished through discovering solutions as you solve problems presented in your assignments. Assignments, therefore, are an integral part of your learning in the course.

All assignments must be completed by you and outside of class. They are due at 11:59 pm on the assigned due date unless otherwise announced. Assignments submitted after their due dates may be accepted without a penalty based on valid reasons and documented cause, following discussion with the instructor. If no valid reason or documentation is provided, late projects will have a 10%-point deduction/day. Late projects will be accepted up to 4 business days after the due date only.

Group Project I
The 1st group project enables you to extend your skills in data visualization by exploring advanced topics. I suggest the students explore an advanced topic in one of the three categories below:
- Type of visualization approaches
  - e.g., animated, 3D, AR, VR, etc.
- Type of datasets
  - e.g., image, video, audio, genes, etc.
- Other visualization tools
  - Python, Power BI, etc.

For the project, you will submit (specific submissions dates are provided in the tentative schedule):
Proposal – that indicates the topic you will study, a high-level outline of the content of the presentation, and the members of your group. While I prefer group projects with a demonstration, I am aware that some advanced topics are difficult to demonstrate. If you plan to include a demonstration, your proposal should include the source and information about the data you will use. If you are not planning to include a demonstration, please discuss it with me before-hand.

Changes to the proposal are possible during the progression of the course. Please inform me of the change – unapproved changes will result in a loss of points. The proposal should be no more than 2 pages and address all the items discussed above.

Interim Report – that indicates the graphs and charts that you will include in the presentation. Ideally, if you plan on using a demonstration, you should have completed at least 50% of the graphs and charts. Moreover, you should report on the data preparation and analysis you have done. Finally, the interim report should include your plan for completing the project and the expected process. If you are using a demonstration, highlight your progression in the completion of graphs and charts.

Submit a document of no more than 5 pages that describes the graphs, charts, and process to complete the project.

Presentation – submit a video presentation (preferably a PowerPoint presentation + demonstration) to educate the class about the advanced topic you studied.

The presentation should not be more than 1h. You must include an introduction to the topic (e.g., definition, origin, applications, importance, etc.). The introduction should be about 20% of the presentation. Moreover, you must present the graphs and charts associated with your topic (about 30% of the presentation). Finally, if you are using a demonstration (you are highly encouraged to have a demonstration to help students learn the graphs and charts), you should provide a step-by-step video tutorial about how to create the graphs and charts (50% of the presentation).

Group Project II
The 2nd group project allows you to apply your skills in data visualization. You can Tableau, R, or other technologies (e.g., Python, Power BI). You want to choose a platform different from Tableau and R, please discuss it with me before-hand. For the project, you will submit (specific submissions dates are provided in the tentative schedule):

Proposal - that details the nature of questions you will answer with the data, the source and information about the data you will use, the form your visualization will take (in broad terms) and the members of your group.

While I suggest you propose the platform/tools you intend to use, you may change these during the progression of the course. Please inform me of the change – unapproved changes will result in a loss of points.

The proposal should be no more than 2 pages and address all the items discussed above.
• **Interim Report** – An interim report of the progress and preliminary findings if any. The primary content of the interim report will be the data preparation and analysis you have done, along with any preliminary insights or findings that emerge. The interim report should include your plan for completing the project and expected process and results.

Submit a document of no more than 5 pages (put any charts or tables as appendices) that describes your process and preliminary findings.

• **Presentation**: Submit a video presentation using any tool of your choice that outlines the overall findings of your project. The primary purpose of the presentation is to showcase the analysis you have done using the platform you chose. Think about a narrated walkthrough of a storyboard or set of dashboards and present the implications of your analysis.

• **Final Report**: The final report should have an executive summary of your findings and the key outcomes from your analysis as well as a discussion of the implications of your work and suggested next steps.

The report should be no more than 10 pages long (+ 1 page of the executive summary). Provide summary and aggregate visualizations that support your findings. Any additional charts and tables may be submitted as appendices.

The final submission should include your final analysis tool in the form of an R Project or Tableau file (or the output of the tool you choose).

➢ **Exams**

• **Exams will be administered only once.** If a documented emergency develops and you miss an exam, there may be an alternative at the discretion of the instructor.

➢ **Grading**

The course grade will be calculated using the following distribution:

<table>
<thead>
<tr>
<th>Elements</th>
<th>Points</th>
<th>Final Grading Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Assignments</td>
<td>30%</td>
<td>97-100 A+</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
<td>93-96 A</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
<td>90-92 A-</td>
</tr>
<tr>
<td>Group Project I</td>
<td>15%</td>
<td>87-89 B+</td>
</tr>
<tr>
<td>Group Project II</td>
<td>15%</td>
<td>83-86 B</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>80-82 B-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77-79 C+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70-76 C</td>
</tr>
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<td></td>
<td></td>
<td>Below 69 F</td>
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</tbody>
</table>

**Please Note:**

• Grades in the ISSCM Department are NOT posted and are NOT given over the phone. You may check your grades on UNCGenie within 3-4 days after the final exam.
• Questions concerning the grading of an assignment, exam, or project must be resolved within a reasonable time (typically one week) after the grade has been posted in Canvas. After that period, all grades are final.

➢ Tentative Schedule

A flexible schedule of topics and reading assignments is provided below and on Canvas. You are responsible for checking the schedule, coming to class prepared, and finding out if in-class assignments were made in case of your absence. The chapters are assigned in the schedule, and additional reading may be provided occasionally.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Class Topics</th>
<th>Readings &amp; Videos</th>
</tr>
</thead>
</table>
| 1    | 1/19-22 | Module 0  
- Data visualization  
  o Definition and applications  
- Data visualization tools  
  o Proprietary and open source  
- Introduction to Tableau products  
  o Tableau Desktop and Tableau Prep | TBA – Tableau Training Videos  
Ch. 1 of Loth (2019) |
| 2    | 1/25-29 | Module 1  
- Data preparation with Tableau Prep  
  o Input, cleaning, pivot, aggregate, join, union, and output steps | TBA – Tableau Training Videos  
Ch. 10 of Loth (2019) |
| 3 & 4 | 2/1-12 | Module 2  
- Basic charts and graphs  
  o Scatter plots  
  o Bar and pie charts  
  o Line graphs  
- Data management  
  o Hierarchies  
  o Parameters  
  o Relationships  
  o Filter  
  o Sets  
  o Sorting  
  o Grouping  
Group project I proposal due (2/5/2021)  
Group project II proposal due (2/5/2021)  
Assignment I posted (2/5/2021) | TBA – Tableau Training Videos  
Ch. 3 and 4 of Loth (2019) |
| 5 & 6 | 2/15-26 | Module 3  
- Visual analytics  
  o Clustering  
  o Explain data  
  o Reference lines  
  o Trend lines  
- Working with dates (time-series dataset)  
  o Forecasting  
- Calculations | TBA – Tableau Training Videos  
Ch. 5, 7 and 8 of Loth (2019) |
<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Assignments/Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>3/1-5</td>
<td>Midterm Exam</td>
<td>Assignment I due (2/26/2021)</td>
</tr>
<tr>
<td>8</td>
<td>3/8-12</td>
<td>Module 4 - Advanced charts</td>
<td>LOD expressions, Heat map, Tree map, Box plot, KPI chart, Waterfall chart, Bump chart, Group project I interim report (3/12/2021), Group project II interim report (3/12/2021), Assignment II posted (3/12/2021)</td>
</tr>
<tr>
<td>9</td>
<td>3/15-19</td>
<td>Module 5 - Visualization for geospatial data</td>
<td>Maps, Density Mark Type, Polygon Maps, TBA - Tableau Training Videos, Ch. 3 of Loth (2019)</td>
</tr>
<tr>
<td>10</td>
<td>3/22-26</td>
<td>Module 6 - Visualization for network data</td>
<td>Network diagrams, TBA</td>
</tr>
<tr>
<td>11</td>
<td>3/29-4/2</td>
<td>Module 7 - Visualization for text analytics</td>
<td>Word cloud, frequency, and sentiment, Simple words and N-grams, Network diagram, Tree diagram, Bubble line, Barcode, Group project I presentation due (4/2/2021), Assignment II due (4/2/2021), Assignment III posted (4/2/2021), TBA</td>
</tr>
<tr>
<td>12</td>
<td>4/5-9</td>
<td>Module 8 - Introduction to R</td>
<td>Basic charts and graphs, Scatter plots, Bar charts, Line graphs, Histograms, Ch. 1 &amp; 2 of Chang (2019)</td>
</tr>
<tr>
<td>13 &amp; 14</td>
<td>4/12-23</td>
<td>Module 9 - Advanced topics</td>
<td>Type of visualization, e.g., animated, 3D, AR, VR, Type of dataset, Students presentations</td>
</tr>
</tbody>
</table>
Franck Soh, Ph.D.

- e.g., image, video, audio, genes.
  - Other tools
    - Python, Power BI
  
  Group project II presentation due (4/23/2021)
  Assignment III due (4/23/2021)

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>15</td>
<td>4/26-29</td>
<td>No Class - Reading Day</td>
</tr>
<tr>
<td>16</td>
<td>4/30-5/6</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

Group project II final report due (4/29/2021)

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**References**


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- **Changes to the Syllabus/Schedule**
  
The syllabus and schedule are tools to help you plan your time. Every effort is made to make the syllabus and schedule as complete as possible, but there may be occasions when changes are required, including changes in the grading components, due dates, and exam dates. The instructor will announce any deviations from the syllabus or schedule in class.

- **Extra credits**
  
  There are few options to earn extra credits through the group projects. I will describe the group projects and associated extra credits in class. **The maximum extra credit a student can have in this course is 5% of the grade points.**

- **Make-up Exam Policy**
  
  It is to your advantage to take all exams at the scheduled times. Only in the case of a well-documented true emergency should an exam be missed. Please be sure to get your instructor’s prior approval for all but emergency cases. **Exams missed without the prior approval of your instructor or without adequate documentation of the reason for missing the exam will result in a recorded grade of zero for the missed exam.**

- **Grading Impact of Possible Class Disruptions**
  
  This section is about the impact of possible disruptions on your course grade. Rather than waiting for disruptions to happen, and then having to inform you how those are going to affect your grade, we want to tell you in advance how your course grade may be affected by possible disruptions. For example, what would happen if we have too many disruptions so we cannot complete all course assignments? What if we must cancel the project?

  If any course individual projects and exams are canceled (either by the instructor or the university), the course grade will be based on the exams, and projects that have been completed in the course. The percentage cut-offs listed in the course syllabus will change.

- **Attendance Policy**
ISM646 will meet on Tuesday from 6:30 pm to 7:45 pm beginning the week of January 19. It is the student’s responsibility to attend class online and to participate in class discussions. It is the student’s responsibility to stay on track with readings and assignments to be successful in the course. Because this is an interactive class, learning depends on attendance. Online attendance at all class meetings is expected. Information about upcoming assignments, including changes in deadlines and submission dates, may be discussed in class. If you must miss a class, you are responsible for finding out about assignments announced that day. Having missed a class will never be accepted as an excuse for missing a course requirement.

➢ e-Mail
- Always include a subject line.
- Remember without facial expressions some comments may not be interpreted accurately. Take care to word your emails. The use of emoticons might be helpful in some cases.
- Use standard fonts.
- Do not send large attachments without permission.
- Special formatting such as centering, audio messages, tables, Html, etc. should be avoided unless necessary to complete an assignment or other communication.
- Respect the privacy of other class members
- **Please Note:** E-mail is my preferred method of communication. Please send an email directly to my email address: f_sohnoume@uncg.edu

➢ Netiquette
The same guidelines that apply to traditional classes should be observed in the virtual classroom environment. Please use proper netiquette when interacting with class members and the professor.

➢ Policy on Server Unavailability or Other Technical Difficulties
The university is committed to providing a reliable online course system for all users. However, in the event of an unexpected server outage or any unusual technical difficulty which prevents students from completing a time-sensitive assessment activity, the instructor will extend the time windows.

➢ What you Need to Take this Course
- Textbooks, Tableau, and RStudio.
- You must have access to a computer that connects to the Internet. The course materials are only accessible online by logging in to canvas.uncg.edu – your student identification number is required. If you do not own a computer, the computer labs on campus might be open during this semester.
- You must have a working e-mail account. Your first assignment will be to update your e-mail address on the course Web site. Instructions are online at canvas.uncg.edu - you must log in to see the course materials.
- Because of e-mail viruses, you must use the subject ISM646 and your full name typed in the message, or the e-mail may be ignored.
- If you have questions, please do not respond to a Canvas Announcement, rather send me a direct email.
• You must check your e-mail account regularly throughout the semester. Official announcements will be made by e-mail and on the course Web site at canvas.uncg.edu.
• You are responsible for saving all assignments correctly, so you can turn them in electronically. You should be comfortable using word processing software, programming software, and have reasonable keyboarding skills. No assignments will be accepted in handwritten form.
• Supplies: Although you will be publishing (uploading) your assignments, it is a good idea to keep copies of everything.

➤ IMPORTANT: Academic Integrity Policy
Discussing your assignments with other students can be a valuable learning resource; however, each student is expected to do their original work. University students conduct themselves per the highest standards of academic integrity. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, forgery, or plagiarism. UNCG Academic Integrity Policy can be viewed at http://sa.uncg.edu/handbook/academic-integrity-policy/. Students should NOT make, borrow, or “share” copies of their assignments or files with other students, including previous ISM 646 students. Helping one another is allowed, but copying, even electronically, is cheating. This practice is against the UNCG Academic Integrity Policy and defeats the purpose of this course. No credit will be received for shared work, and other penalties may be imposed.

➤ Accommodations for Students with Disabilities
Students are responsible for requesting accommodations from the Office of Accessibility Resources & Services (OARS), according to their procedures and policies. The student is to provide a written request for each test accommodation to their instructor (an e-mail will suffice provided you have received a reply from the instructor). Both the requests to the OARS and the instructor are to be made at least ten school days before the test date.

➤ Important Health Statement
Health and well-being impact learning and academic success. Throughout your time at the university, you may experience a range of concerns that can cause barriers to your academic success. These might include illnesses, strained relationships, anxiety, high levels of stress, alcohol or drug problems, feeling down, or loss of motivation. Student Health Services and The Counseling Center can help with these or other issues you may experience. You can learn about the free, confidential mental health services available on campus by calling 336-334-5874, visiting the website at https://shs.uncg.edu/, or visiting the Anna M. Gove Student Health Center at 107 Gray Drive. For undergraduate or graduate students in recovery from alcohol and other drug addiction, The Spartan Recovery Program (SRP) offers recovery support services. You can learn more about recovery and recovery support services by visiting https://shs.uncg.edu/srp or reaching out to recovery@uncg.edu

➤ COVID-19 Spartan Shield Video
UNCG Chancellor Frank Gilliam has challenged us to create a Culture of Care at UNCG where we all wear face coverings and social distance, less to protect ourselves but rather more to protect everyone around us. It shows that you care about the well-being of everyone.
around you. We have created this video featuring your student body presidents to better explain how and why this is so important.

Please watch this video before the first day of classes.

https://youtu.be/Mb58551qxEk

- **Expectations of Faculty and Students in the Bryan School**
  Students should read the Guidelines for Faculty and Students presented on the web pages found at http://bryan.uncg.edu/wp-content/uploads/2012/08/faculty_student_guidelines.pdf