# CMGT 599: Data Analytics and Visualization
## Summer 2016

**Instructor**: Liuning "Matt" Zhou, Ph.D.
**Class time**: Tuesdays, 6 pm - 10:10 pm
**Classroom:** ANN 211
**Office**: ASC 321
**Office hours**: Tuesdays, 4 pm - 6 pm
**Email**: liuningz@usc.edu

Check your email linked to Blackboard regularly. The instructor relies on email to inform students about class agenda and logistical details.

## Course Overview and Objectives

Taught from the perspective of market researcher/research analyst, this course aims to help graduate students make sense of data and improve their data-based digital storytelling skills for effective communication. To accomplish those goals, the course focuses on two major topics, data analytics and data visualization. It starts with the conceptualization of empirical research, and concludes with visual display of research findings to target audiences. It provides students with a deep conceptual understanding of the research process as well as practical skills in analytics and visualization necessary to succeed as a researcher in commercial firms and non-profit research organizations.

The course consists of three modules: (i) Fundamentals of Market Research; (ii) Data Visualization and Reporting; and (iii) Advanced Statistics for Market Research. The first module covers the fundamental components of the market research process, and introduces students to SPSS' programming function for data analytics and management. The second module covers the principles behind data visualization, introduces guidelines for designing effective visual displays to communicate research findings to appropriate audiences, and examines different forms of reporting such as PowerPoint presentation, press release and research report. The final module focuses on more advanced statistical techniques for market research. Methods of statistical analysis include multiple regression, factor analysis, cluster analysis, discriminant analysis and conjoint analysis. Students develop a deep conceptual understanding of those methodologies and a thorough knowledge of their application in different market research scenarios. Throughout the semester, class meetings are conducted through a combination of lectures, group activities, and cases of data analytics and visualization.

By the end of the semester, students will walk away with practical skills needed to succeed as a research analyst and data communication specialist. Specifically, students will be able to: (i) command a conceptual understanding and the ability to manage different aspects of the market research process; (ii) use SPSS syntax for data analytics and management; (iii) adopt appropriate statistical procedures to conduct analyses depending on the research goals and the nature of survey data; (iv) develop insights based on analytical results to help clients better understand

consumer attitudes, perceptions and behavior; and (v) use computer software programs such as SPSS, Excel and PowerPoint to create data visualization packages for effective communication through messages and images/graphs.

## Course Materials

**Textbooks** (optional)
*Data Visualization and Presentation with Microsoft Office,* by Valerie M. Sue and Matthew T. Griffin, SAGE, 2016.

*An Intermediate Guide to SPSS Programming*, by Sarah Boslaugh, SAGE, 2005.

**Other Materials**
The course syllabus is posted under "Syllabus" in Blackboard. Other materials introduced during the semester are either posted in Blackboard under "Weekly Materials" or provided to students in class.

## Assessment

**Homework assignments, in-class exercise, and group project**
Student performance in this class is evaluated based on four homework assignments, four in-class exercises, a group project, and class participation.

There is a total of four individual homework assignments, each counting 9% towards the final course grade. The assignments involve designing survey questionnaire, visualizing data, writing a press release, and running regression analysis using SPSS. There is a total of four in-class exercises that give students the opportunity to practice data analysis and visualization skills, each counting 6% towards the final course grade. There is a group project due at the end of the semester. It requires students to work in groups, analyzing data, identifying the story behind the numbers, and sharing their stories/insights through communicative images and messages. Class participation accounts for 5% of the final grade.

For detailed instructions on homework assignments, in-class exercise, and group project, see Guidelines for Homework Assignments, In-Class Exercise and Group Project.

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| Homework Assignments (4 x 9%) | 36% |
| In-class exercise (4 x 6%) | 24% |
| Group Project | 35% |
| Participation | 5% |

**Grading Schema**
The following grading scheme is adopted for this class:

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| A | 95.0% or higher |

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| A- | 90.0%-94.9% |
| B+ | 87.0%-89.9% |
| B | 83.0%-86.9% |
| B- | 80.0%-82.9% |
| C+ | 77.0%-79.9% |
| C | 73.0%-76.9% |
| C- | 70.0%-72.9% |
| D | 60.0%-69.9% |
| F | 59.9% or lower |

## Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

**Note:** Any draft submitted to the instructors is a formal document, subject to the University's policies regarding plagiarism. Plagiarism is not excused for drafts.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu/ or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us.

This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

## Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more.

Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students.

*The Office of Disability Services and Programs*
http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations.

If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* *http://emergency.usc.edu/*will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

## Online Resources

**1. Market Research**

www.quirks.com/articles/index.aspx

**2. SPSS/Statistics**

www.ats.ucla.edu/stat/spss/
www.onlinestatbook.com

**3. Data Visualization**

www.highcharts.com/
www.piktochart.com/
www.venngage.com/
www.canva.com/
www.flowingdata.com

**Schedule of Class Meetings**

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| **Week 1**<br>**May 24**<br><br>**Module I: Fundamentals of Market Research (1)** | Topics: Review of course syllabus; basics of analytics and measurements (i.e., levels of measurement; sampling design; *p*-value); survey questionnaire design; consumer panel<br><br>Lesson Activity<br>Form groups for in-class exercises and class project<br>Review ESOMAR 28 Questions<br><br>Homework Assignment 1<br>Re-write 10 questions from a psychology survey questionnaire using a variety of measurements |
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| **Week 2**<br>**May 31**<br><br>**Module I: Fundamentals of Market Research (2)** | Topics: Overview of the market research process: research proposal; external timeline; banner plan in market research projects; crosstabs<br><br>Readings<br>Examples of research proposals and external timeline are posted in Blackboard.<br><br>Guest Speaker 1: on market research (i.e., the industry, practice and methodology)<br><br>**Note**: Homework Assignment 1 **DUE** one hour before class in instructor's email box |
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| **Week 3**<br>**June 7**<br><br>**Module I: Fundamentals of Market Research (3)** | Venue: Computer lab TBD.<br><br>Topics: introduction to SPSS syntax; SPSS syntax for data analysis/ transformation/management and tabs checking; SPSS for charting<br><br>NO READINGS<br><br>Group practice<br>Use SPSS syntax for data checking/transformation and charting |
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| **Week 4**<br>**June 14**<br><br>**Module II: Data** | Topics: Principles of visual communication/data visualization; digital storytelling; imaging and messaging; data visualization using MS Office<br><br>Readings |

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| **Visualization and Reporting (1)** | Relevant materials are posted in Blackboard.<br><br>Lesson Activity<br>Review/critique cases of data visualization<br>Instructor shares data for initial discussion of final group project<br><br>Group practice<br>Develop and chart data for fundraising campaign<br>Chart car technology survey data using Excel and PowerPoint |
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| **Week 5**<br>**June 21**<br><br>**Module II: Data Visualization and Reporting (2)** | Topics: Data visualization using MS Office; data visualization in practical use<br><br>Readings<br>Relevant materials are posted in Blackboard.<br><br>Guest Speaker 2: on data visualization<br><br>Lesson Activity<br>Review cases/examples of data visualization<br><br>In-class exercise 1 (group work)<br>Charting car technology survey data using Excel and PowerPoint<br><br>Homework Assignment 2<br>Visualizing offline and online media consumption data |
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| **Week 6**<br>**June 28**<br><br>**Module II: Data Visualization and Reporting (3)** | Topics: Final deliverable in market research; reports and press releases from/for non-profit research organizations; online data visualization resources<br><br>Readings<br>Relevant materials are posted in Blackboard.<br><br>Lesson Activity<br>Review press release from research/news organizations<br>Review case of data analytics and visualization (Minnesota Nonprofit Economy Report)<br><br>Group practice |

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| | Creating infographics for sports survey data using online tools<br><br>Homework Assignment 3<br>Create press release using privacy data<br><br>**Note**: Homework Assignment 2 **DUE** one hour before class in instructor's email box |
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| **Week 7**<br>**July 5**<br><br>**Module II: Data Visualization and Reporting (4)** | Topics: the art and science of data visualization; the data fluency culture<br><br>Readings<br>Relevant materials are posted in Blackboard.<br><br>In-class exercise 2 (group work)<br>Visualizing sports survey data using Excel and PowerPoint<br><br>Lesson Activity<br>Meeting with instructor on progress of class project<br><br>**Note**: Homework Assignment 3 **DUE** one hour before class in instructor's email box |
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| **Week 8**<br>**July 12**<br><br>**Module III: Advanced Statistics for Market Research (1)** | Topics: Advanced statistics for market research: regression analysis; key drivers; factor analysis; profiling study<br><br>Readings<br>http://www.statsoft.com/Textbook/Multiple-Regression<br>http://www.guide-market-research.com/index.php?option=com_content&view=article&id=22&Itemid=36&d4dad6935f632ac35975e3001dc7bbe8=245f7499c16d77fbfa7b0ea81d752136<br><br>Lesson Activity<br>Discuss related sample questions/sample data<br>Discuss relate market research cases/scenarios<br><br>In-class exercise 3 (group work)<br>Profiling intense sports fans using Excel and PowerPoint<br><br>Homework Assignment 4<br>Regression analysis using SPSS |

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| **Week 9**<br>**July 19**<br><br>**Module III: Advanced Statistics for Market Research (2)** | Topics: Advanced statistics for market research: cluster analysis; segmentation study; market intelligence and consumer insights<br><br>Readings<br>http://www.statisticssolutions.com/cluster-analysis-2/<br>http://www.guide-market-research.com/index.php?option=com_content&view=article&id=24&Itemid=38&d4dad6935f632ac35975e3001dc7bbe8=245f7499c16d77fbfa7b0ea81d752136<br><br>Guest Speaker 3: on deriving consumer insights through data analytics<br><br>Lesson Activity<br>Discuss related sample questions/sample data<br>Discuss related market research cases/scenarios<br><br>In-class exercise 4 (group work)<br>Segmenting sports fans based on intensity of interest (intense sports fans vs. moderate sports fans) and visualizing comparative data using Excel and PowerPoint<br><br>**Note**: Homework Assignment 4 **DUE** one hour before class in instructor's email box |
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| **Week 10**<br>**July 26**<br><br>**Module III: Advanced Statistics for Market Research (3)** | Topics: Advanced statistics for market research: discriminant analysis; conjoint analysis<br><br>Readings<br>http://www.statsoft.com/Textbook/Discriminant-Function-Analysis<br><br>Other relevant materials are posted in Blackboard.<br><br>Lesson Activity<br>Discuss related sample questions/sample data<br>Discuss related market research cases/scenarios<br>Meeting with instructor to put final touch to group project |
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| **Week 11**<br>**August 2** | Topics: Research ethics; data and privacy; project management in (market) research activities |

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| **Group Project** | Readings<br>Relevant materials are posted in Blackboard.<br><br>Lesson Activity<br>Group meeting to finalize group project |
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| **Week 12**<br>**August 9**<br><br>**Project Presentation** | Topics: Presentation of group projects; wrap-up |
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**Guidelines for Homework Assignments, In-Class Exercises and Group Project**

**I. Homework Assignments (36%)**
Homework is assigned throughout the semester. There is a total of four homework assignments, introduced and distributed at the end of class meeting and due in electronic form in the instructor's email box one hour before class time the following week (due by 5 pm on Tuesday in Week 2, Week 6, Week 7 and Week 9). No late assignments are accepted. All homework assignments are individual work. You may discuss the assignments with your classmates, but each student MUST submit his/her individual work. Each homework assignment counts 9% toward the final course grade.

When submitting homework assignment, put your name, course number and date on the top left corner of the first page.

**Homework Assignment 1: Questionnaire Design** (9%)
For this assignment, take 10 questions from a psychology survey questionnaire, and re-write them using a variety of measurement scales as you see appropriate. Use the original question numbers for all the re-written questions. You will be graded on grammar, syntax and proper use of measurement scales.

**Homework Assignment 2: Data Visualization** (9%)
For this assignment, you are provided with data in Excel to do some visualization work using offline and online media consumption data. You can visualize the original data, or you can analyze the data first and visualize your analytical results. Submit this assignment in PowerPoint slides, and put your name, course number and date on the first slide.

**Homework Assignment 3: Press Release** (9%)
For this assignment, you are expected to write a press release using privacy data. You are provided with crosstabs in Excel, and expected to dig into the data and derive insights from the data, and write a press release based on the insights. There should be one coherent theme, and you should use multiple questions and multiple data points to build the story. The press release should be at least one page long but should not exceed two pages. In the press release, quote yourself as an expert on the topic. You will be graded on grammar, syntax and quality of writing.

**Homework Assignment 4: Regression Analysis** (9%)
For this assignment, you are provided with a small data set in SPSS to run regression analysis. You should develop a hypothesis, run the analysis and then report findings (beta, slope, *p* value and whether the hypothesis is supported or not) in a write-up. Make sure to include your interpretation of the findings in the write-up. Attach SPSS output to the write-up.

**II. In-Class Exercises (24%)**
In-class exercises are designed to help students practice what they learn with the aid of the instructor, and are all group work. Instructor will provide data in SPSS or Excel tabs for each

exercise. Each exercise counts 6% towards the final course grade. For each exercise, each group is expected to submit at least three PowerPoint slides; extra slides will not earn you extra credit.

**Exercise 1** (6%)
Charting car technology survey data using Excel and PowerPoint

Each group is expected to use appropriate charts (e.g., bar chart, pie chart or line chart) to present survey data. Pay attention to labels, legends and axis format, among others. Submit at least three PPT slides (excluding a cover slide where you put your names, course number and date).

**Exercise 2** (6%)
Visualizing sports survey data using Excel and PowerPoint

Each group is expected to visualize survey data using infographics; make sure you use images that match the message/story behind the data on each slide. Submit at least three PPT slides (excluding a cover slide where you put your names, course number and date). Present multiple data points on each slide, with each slide focusing on one question/issue.

**Exercise 3** (6%)
Profiling intense sports fans using Excel and PowerPoint

Each group is expected to create a profile for intense sports fans using infographics. Present multiple data points on each slide. Submit at least three PPT slides (excluding a cover slide where you put your names, course number and date), with each slide focusing on one topic/theme.

**Exercise 4** (6%)
Segmenting sports fans based on intensity of interest (intense sports fans vs. moderate sports fans) and visualizing comparative data using Excel and PowerPoint

Each group is expected to visualize intense sports fans and moderate sports fans data in a comparative context using infographics. Present multiple data points on each slide. Submit at least three PPT slides (excluding a cover slide where you put your names, course number and date), with each slide focusing on one topic/theme.

**III. Group Project (35%)**
Students of this class are also expected to work on a final project in groups of three. The group project gives students an opportunity to practice techniques of data analytics and visualization covered in the class, due at the end of the semester. It is about designing and completing infographics featuring analytical results, and a written document telling a story behind the data.

To complete the group project, you are expected to conduct data analysis using SPSS, visualize the data by using Excel and PowerPoint, and share insights with the target audience in a one-page written document.