ADEC 7910 Software Tools for Data Analysis, 3 credits
Woods College of Advancing Studies
Spring 2019 Semester
Jan 14 – May 14, 2019
Fri, 6:30pm–9pm
Gasson Hall 201

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Boston College Mission Statement
Strengthened by more than a century and a half of dedication to academic excellence, Boston College commits itself to the highest standards of teaching and research in undergraduate, graduate and professional programs and to the pursuit of a just society through its own accomplishments, the work of its faculty and staff, and the achievements of its graduates. It seeks both to advance its place among the nation's finest universities and to bring to the company of its distinguished peers and to contemporary society the richness of the Catholic intellectual ideal of a mutually illuminating relationship between religious faith and free intellectual inquiry.

Boston College draws inspiration for its academic societal mission from its distinctive religious tradition. As a Catholic and Jesuit university, it is rooted in a world view that encounters God in all creation and through all human activity, especially in the search for truth in every discipline, in the desire to learn, and in the call to live justly together. In this spirit, the University regards the contribution of different religious traditions and value systems as essential to the fullness of its intellectual life and to the continuous development of its distinctive intellectual heritage.

Course Description
The course provides students with an overview of popular software packages used today for data exploration, analysis and visualization. The first part of the course will offer an overview of the non-programming tools — spreadsheet/Excel and Tableau. In Excel we will cover basic method, tools, charts, with the emphasis on pivot tables. In Tableu students will be introduced to data collection, exploration and visualization methods. The second part of the course will cover basic data analysis in statistical software package R. Here students will learn how to write their own code for importing, cleaning and exploring large datasets, as well as how to create, modify and export complex charts and summaries for visual, qualitative and quantitative analysis of the data. The third part of the course will provide an intro to using SQL databases, where students will learn how to create SQL queries to select, filter and arrange the data.

Textbooks & Readings (Required)
There are not required textbooks or readings for the course. We will be using a variety of readings, tutorials and

materials available online.

Textbooks & Readings (Recommended)

None of the listings below is required to fully learn the materials of the course, but they may provide you with extra guidelines and in-depth help on specific topics.

1. Data visualization
    a. Visualization Analysis and Design, Tamara Munzner (A K Peters Visualization Series, CRC Press, 2014)
    b. The Visual Display of Quantitative Information, Edward R. Tufte (Graphics Pr; 2nd edition, 2001)
    c. Information Dashboard Design: Displaying Data for At-a-Glance Monitoring, Stephen Few (Analytics Press; 2 edition, 2013)
    d. Visual Insights: A Practical Guide to Making Sense of Data, Katy Börner and David Polley (The MIT Press, 2014)
2. Excel
    a. Microsoft Excel Data Analysis and Business Modeling (Microsoft Press; 5th edition, 2016)
    b. Excel 2016 Pivot Table Data Crunching (Que Publishing; 2015)
    c. Excel PivotTables and PivotCharts: Your visual blueprint for creating dynamic spreadsheets (Visual; 2nd edition, 2010)
3. R
    a. Introduction to Data Science with R (O'Reilly Media, 2014)
    b. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data (O'Reilly Media, 2017)
4. SQL
    a. SQL in 10 Minutes, Sams Teach Yourself (Sams Publishing; 4th edition, 2012)
    b. SQL QuickStart Guide: The Simplified Beginner's Guide To SQL (CreateSpace Independent Publishing Platform, 2015)
    c. SQL Queries for Mere Mortals: A Hands-On Guide to Data Manipulation in SQL (Addison-Wesley Professional; 3rd edition, 2014)
    d. SQL Practice Problems: 57 beginning, intermediate, and advanced challenges for you to solve using a "learn-by-doing" approach (Independently published, 2017)

Canvas

Canvas is the Learning Management System (LMS) at Boston College, designed to help faculty and students share ideas, collaborate on assignments, discuss course readings and materials, submit assignments, and much more - all online. As a Boston College student, you should familiarize yourself with this important tool. For more information and training resources for using Canvas, click here. In the case of any technical difficulties or concerns, please contact canvas@bc.edu or 617-552-HELP (4357) for immediate assistance. NOTE: Canvas requires particular computer specifications and Wi-Fi access. It is important that you plan accordingly, particularly for courses that have online components.

Course Objectives

1. Students will demonstrate knowledge and skill across cultural settings and will learn the impact of culture, gender, and age in data analysis as demonstrated by exploring various datasets.
2. Students will demonstrate ethical competency pertaining to data analysis as demonstrated by using data visualization techniques to address important social and ethical questions.
3. Students will be able to employ a variety of software tools related to data analysis, as demonstrated by completing a course project.
4. Students will be able to deliver complex data exploration and visualizations results orally and in writing, as demonstrated by completing a presentation on a course project.

Grading
The class grade will be determined by a set of five homework assignments and a course project. There will be no letter grades or curving per each assignment, instead each assignment is going to be graded on a 0-100 scale. The final score will be calculated as a weighted sum of all assignments. Then the final class score will be translated from 0-100 scale into a letter grade using a curved distribution.

The undergraduate grading system for Woods College is as follows:

A (4.00), A- (3.67)
B+ (3.33), B (3.00), B- (2.67)
C+ (2.33), C (2.00), C- (l.67)
D+ (l.33), D (l.00), D- (.67)
F (.00)

The graduate grading system for Woods College is as follows:

A (4.00), A- (3.67)
B+ (3.33), B (3.00)
B- (2.67), passing but does not count toward degree
C (2.00), passing but not for degree credit
F (.00)

All students can access final grades through Agora after the grading deadline each semester. Students who complete course evaluations can access grades earlier, as they are posted.

Deadlines and Late Work
All deadlines are strictly enforced. Late submission of assignments is only allowed due to a valid excuse in the form of a medical condition as shown by the appropriate documentation.

Course Assignments
It is expected that you will spend 12-16 hours per week on out-of-class assignments and exercises. Please note that some weeks will require more time and some weeks less time but the average is approximately 12-16 hours per week over the summer session.

Course Schedule
Course schedule below is subject to change at any time during course term. Please refer to Canvas for latest schedule changes.

Week	Date	Topic	Reading/Assignments
Week 1	Jan 18	Class Introduction / Excel	
Week 2	Jan 25	Excel	Excel HW
Week 3	Feb 1	Tableau	
Week 4	Feb 8	Tableau	Tableau HW
Week 5	Feb 15	Tableau / R	
Week 6	Feb 22	R	
Week 7	Mar 1	R	R HW1
Week 8	Mar 8	No class – Spring Break	
Week 9	Mar 15	R	

Week 10	Mar 22	R	R HW2
Week 11	Mar 29	R	
Week 12	Apr 5	R	
Week 13	Apr 12	R / SQL	R HW3
Week 14	Apr 19	No class – Easter Break	
Week 15	Apr 26	SQL	
Week 16	May 3	SQL	

Written Work

Woods College students are expected to prepare professional, polished written work. Written materials must be typed and submitted in the format required by your instructor. Strive for a thorough yet concise style. Cite literature appropriately, using APA, MLA or CLA style per your instructor's requirements. Develop your thoughts fully, clearly, logically and specifically. Proofread all materials to ensure the use of proper grammar, punctuation and spelling. For writing support, please contact the Connors Family Learning Center.

Attendance

Attending class is an important component of learning. Students are expected to attend all class sessions. When circumstances prevent a student from attending class, the student is responsible for contacting the instructor before the class meets. Students who miss class are still expected to complete all assignments and meet all deadlines. Many instructors grade for participation; if you miss class, you cannot make up participation points associated with that class. Makeup work may be assigned at the discretion of the instructor. If circumstances necessitate excessive absence from class, the student should consider withdrawing from the class.
While there will be no attendance credit assigned in this course, class attendance is vital due to the fact that class meets once a week for 3 hours. Missing any class will require a lot of effort on your

Consistent with BC's commitment to creating a learning environment that is respectful of persons of differing backgrounds, we believe that every reasonable effort should be made to allow members of the university community to observe their religious holidays without jeopardizing their academic status. Students are responsible for reviewing course syllabi as soon as possible, and for communicating with the instructor promptly regarding any possible conflicts with observed religious holidays. Students are responsible for completing all class requirements for days missed due to conflicts with religious holidays.

Accommodation and Accessibility

Boston College is committed to providing accommodations to students, faculty, staff and visitors with disabilities. Specific documentation from the appropriate office is required for students seeking accommodation in Woods College courses. Advanced notice and formal registration with the appropriate office is required to facilitate this process. There are two separate offices at BC that coordinate services for students with disabilities:

- The Connors Family Learning Center (CFLC) coordinates services for students with LD and ADHD.
- The Disabilities Services Office (DSO) coordinates services for all other disabilities.

Find out more about BC's commitment to accessibility at www.bc.edu/sites/accessibility.

Scholarship and Academic Integrity

Students in Woods College courses must produce original work and cite references appropriately. Failure to cite references is plagiarism. Academic dishonesty includes, but is not necessarily limited to, plagiarism, fabrication, facilitating academic dishonesty, cheating on exams or assignments, or submitting the same material or substantially similar material to meet the requirements of more than one course without seeking permission of all instructors concerned. Scholastic misconduct may also involve, but is not necessarily limited to, acts that violate the rights of other students, such as depriving another student of course materials or interfering with another student's work. Please see the Boston College policy on academic integrity for more information.