ADEC 7910 Software Tools for Data Analysis, 3 credits
Woods College of Advancing Studies
ONLINE, ASYNCHRONOUS
Summer 2021 Semester I
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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 — Excel and Tableau. In Excel we will cover basic charts with the emphasis on their use with pivot tables. In Tableu students will be introduced to more advanced data exploration and visualization methods via a variety of advanced charts and dashboards. The second part of the course will cover exploratory data analysis in 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 manipulate the data.

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

1. Employ a variety of software tools related to data analysis by completing a course project.
2. Deliver complex data exploration and visualizations results orally and in writing by delivering a presentation on a course project.
3. Apply knowledge and skill across varying cultural settings and learn the impact of culture, gender, and age by exploring various datasets.
4. Demonstrate ethical competency pertaining to data analysis by using data visualization techniques to address important social and ethical questions.

Assessments and Grading Policy

The course grade will be determined by a set of homework assignments/quizzes, weekly online discussions, course project paper and project presentation. 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. For details on assignments see class introduction video and slides.

Component	Weight
Home assignments/quizzes	50%
Weekly discussions	20%

Project paper	20%
Project presentation	10%

The graduate grading system for Woods College is as follows:

Quality of Performance	Letter Grade	Range %	GPA
Excellent – work is of exceptional quality	A	93 - 100	4.0
	A-	90 – 92.9	3.67
Good – work is above average	B+	87 – 89.9	3.33
Satisfactory	B	83 – 86.9	3.00
Below Average – passing but does not count toward degree	B-	80 – 82.9	2.67
Poor – passing but not for degree credit	C	70 – 79.9	2.00
Failure – not passing	F	<70	0.00

All students can access final grades through Agora after the grading deadline each semester. Transcripts are available through the Office of Student Services.

Deadlines and Late Work

Late work is not accepted and no credit will be earned on late work unless the student has arranged an extension ahead of time with me (and that is quite possible, I am flexible with everyone's challenging circumstance and time constraints), with rare exceptions based on individual circumstances (e.g. inability to communicate with me ahead of time based on an emergency).

Course Schedule

Course schedule below is subject to change at any time during course term. Please refer to Canvas for latest schedule changes, including assignment deadlines. For details on each week agenda see class introduction video and slides.

Week	Topic	Videos	Assignments
Week 1	Excel	Class Introduction Week 1 agenda Excel	Excel HW Discussion Piece #1
Week 2	Tableau	Week 2 agenda Tableau	Tableau HW Class Project Discussion Piece #2
Week 3	R, part 1	Week 3 agenda Basics of R	R HW1 Discussion Piece #3
Week 4	R, part 2	Week 4 agenda Data management in R	R HW2 Discussion Piece #4
Week 5	R, part 3	Week 5 agenda Data visualization in R	R HW3 Discussion Piece #5
Week 6	SQL	Week 6 agenda Basics of SQL	SQL Quiz Discussion Piece #6
Week 7	Class Project	Week 7 agenda Project Presentations	Project Presentations Discussion Piece #7

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.

Participation/Attendance
Participating in class is an important component of learning. Students are expected to participate in and complete all discussions, assignments, and assessments per schedule outlined on course Canvas site. 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.

Health Integrity Policy
Particularly during this time of the COVID-19 pandemic, we must take even greater measures to care for ourselves, for each other and for our community. Therefore, we are asking that all Woods College students care for themselves by monitoring their health and washing their hands thoroughly before class. We ask that students demonstrate their care for others by wearing a mask/cloth face covering at all times when in the buildings on campus, maintain appropriate physical distancing and to not attend class if feeling unwell.