USC Viterbi
School of Engineering
Information Technology Program

ITP 249: Introduction to Data Analytics
Units: 4, Fall 2021

Section 1: TTh 8 – 9:50 am, ZHS 252
Section 2: TTh 10 - 11:50 pm, SGM 123

Instructor: Nitin Kalé
Office Hours: To posted on Blackboard
Contact Info: kale@usc.edu

Teaching Assistants:
TBD
Office hours: To posted on Blackboard

IT Help:
USC IT (ITS): https://itservices.usc.edu/contact/
Viterbi IT: https://viterbi.usc.edu/resources/vit/contact-us.htm

Course Description
Data is now an integral part of our lives and to be successful in today's business landscape, we need to be able to leverage data to make critical business decisions. This course will teach students how to use data to make those decisions confidently.

Learning Objectives
After completing this course, students will be able to:
- Use Excel, SQL, NoSQL, SAS and leading industry tools
- Collect, clean, and analyze data from multiple sources
- Pose questions, collect relevant data, analyze data, interpret data and provide insights
- Present data-driven insights using data visualization and dashboards
- Use statistical techniques to gain insights

Prerequisite(s): None

Course Notes
Lecture slides and any supplemental course content will be posted to Blackboard. All announcements for the course will be posted to Blackboard. Information about assignments, due dates, exams and grades will also be posted on Blackboard. Students should check Blackboard regularly for updates.

Technological Proficiency and Hardware/Software Required
Most assignments in the class are done using software. Software will be provisioned for download or available through a virtual lab. Students are expected to have access to a computer. ITP has a limited number of laptops that students can request to borrow.

Optional Books
Carlos Coronel, Steven Morris. *Database Systems: Design, Implementation, and Management*. Boston, MA: Cengage Learning, 2018. ISBN-13: 978-1337627900

Robert Stine and Dean Foster. *Statistics for Business Decision Making and Analysis*. Essex, UK: Pearson Education Limited, 2017. ISBN-13: 978-0134497167

Additional reference material will be provided in class as needed.

Description and Assessment of Assignments

This course will make use of Blackboard for assignments. All assignments will be posted to Blackboard under the "Assignments" section. Each assignment will include instructions, a due date, and a link for electronic submission. Assignments must be submitted using this link.

USC Technology Support Links

Zoom information for students
Blackboard help for students
Software available to USC Campus

Grading Breakdown

The weight of the graded material during the semester is listed below:

Item	% of Grade
Individual Assignments	25
Team Projects	15
Exam I	30
Exam II	30
Total	**100**

Project

For a hands-on experience, there will be a final team project. The goal of the project is to solve real world problems using data analytics. This is a team project with each consisting of 2 to 3 members. Each team will work together to identify a problem to solve, collect the necessary data, prepare, clean and format the data, analyze the data, create visualizations, dashboards and models to analyze and understand the problem and to use insights to develop solutions.

The project grading breakdown is listed below:

Item	% of Grade
Project Statement, methodology and accuracy	2.5
Final Report	5.0
Peer Evaluation	2.5
Total	**10**

Software

List of software that will be used in the course. Software will be provisioned through a virtual lab or available for free trial download

- Excel
- Access
- MySQL
- MySQL Workbench
- MongoDB
- SAS
- Tableau

Policies

Students are expected to attend and participate in lecture discussions, in-class exercises and team meetings.

Students are responsible for completing individual assignments and their fair share of team assignments by stated deadlines. Assignments turned in late will have 25% of the total points deducted from the graded score for each late day.

No make-up exams (except for documented medical or family emergencies) will be offered. If they will not be able to attend an exam due to an athletic game or other valid reason, then they must coordinate with the instructor before the exam is given. They may arrange to take the exam before they leave, with an approved university personnel during the time they are gone, or within the week the exam is given. If students do not take an exam, then they will receive a 0 for the exam.

If students need accommodations authorized by DSP (Disability Services and Programs), notify the instructor at least two weeks before the exam. This will allow time for arrangements to be made.

Zoom synchronous sessions will be recorded and provided to all students asynchronously.

Sharing of course materials outside of the learning environment

SCampus Section 11.12(B)

Distribution or use of notes or recordings based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study is a violation of the USC Student Conduct Code. This includes, but is not limited to, providing materials for distribution by services publishing class notes. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the Internet or via any other media. (See Section C.1 Class Notes Policy).

Course Schedule: A Weekly Breakdown

	Topics	Reading	Homework
Week 1:	**The Value of Data** • Explanation of course objectives and tools • Syllabus Review • Discussion of the value and impact of data-driven decision making • Discussion of visual analytics and common presentation strategies • Excel Analytics • Brief history of databases and their role in information systems • Different types of databases and their organizational context • Survey of DBMS	Please check Blackboard	Please check Blackboard
Week 2	**Foundations of Databases and SQL** • Data Modeling • Data models • Business rules • Relational and entity-relationship modeling • Entities, attributes, relationships • Keys: primary, foreign, candidate, surrogate, super • Minimum and maximum cardinality		
Week 3	**Normalization** • Anomalies and the need for normalization • Normal forms • First, second, third normal forms • Denormalization • Dependency Diagrams		
Week 4	**Introduction to SQL** • Database structures • Introduction to SQL's SELECT statement with WHERE clauses • Query command tools: GROUP BY, HAVING, DISTINCT, COUNT, AND, and OR • Conditional operators: =, !=, >, <, IN, NOT IN, and BETWEEN • Aggregation functions: MIN, MAX, SUM, AVG, and COUNT		
Week 5	**Combining Data in SQL** • Appending similar data together • Combining data from different tables together • Commands for combining data: JOIN and UNION **Cleaning Data and Creating Multiple Joins** • Creating relationships between tables: INNER, RIGHT, FULL OUTER, EXCEPTION and CROSS JOINs • Optimizing queries: WHERE, LIMIT and COALESCE		
Week 6	**Subqueries** • Asking multiple questions in a single query • Nesting queries		

	• Multi-step aggregation or filtering		
Week 7	**Data Visualization** • Introduction to Charting techniques • Tableau **Exam I**		
Week 8	**NoSQL** • Drawbacks of SQL • Why NoSQL • Introduction to MongoDB • Non-relational databases		
Week 9	**Fundamentals of MongoDB** • Data storage • Data Retrieval		
Week 10	**Fundamentals of MongoDB** • Queries • Aggregation Framework		
Week 11	**Introduction to Statistical Analysis with SAS**		
Week 12	**Categorical Data** • Introduction to categorical data • Frequency and relative frequency tables • Bar and pie charts • Contingency tables and mosaic plots • Strength of association and Cramer's V • Lurking variables **Numerical Data** • Introduction to numerical data • Histograms, boxplots and distributions • Scatterplots • Strength of association and correlation **SAS contd.**		
Week 13	**Analyses and Visualizations in SAS** • Creating calculated fields • Analyzing sample data • Connecting to data and building dashboards • Building a variety of visualizations **SAS contd.**		
Week 14	**Regression Model** • Linear patterns • Curved patterns • Building regression models • Multiple regression • Collinearity and covariance SAS contd.		

Week 15	**Exam II**		
Week 16	**Final Project due**		

Statement on Academic Conduct and Support Systems

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 Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press "0" after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710
campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.