USC Viterbi School of Engineering
Information Technology Program

ITP 249: Introduction to Data Analytics

Units: 4

Semester: Spring 2025

Section 31841:
Days and Times: 12:00-1:50pm Tue, Thu
Location: SOS B44

Instructor: Sinan Seymen, Ph.D.
Office: Listed on Brightspace and Piazza
Office Hours: Listed on Brightspace and Piazza
Contact Info: Listed on Brightspace and Piazza

Learning Assistants: Listed on Piazza
Office Hours: Listed on Piazza
Contact Info: Use Piazza Posts

IT Help: Provided by Viterbi IT
Hours of Service: 8 am – 5 pm; M – F
Walk-in: DRB 205
Contact Info: (213) 740–0517
Email: engrhelp@usc.edu

Catalogue Description

Introduction to data analytics. Basics of databases, applied statistics, data visualization. Leverage data to make critical business decisions.

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 SQL, NoSQL, Tableau 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 Brightspace. All announcements for the course will be posted to Brightspace. Information about assignments, due dates, exams and grades will also be posted on Brightspace. Students should check Brightspace regularly for updates.

Zoom?

There will be no remote attendance option, nor will there be any recordings of the lecture. Students are expected to attend lectures in-person.

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.

ITP Computers

ITP has a limited number of laptops that are available to borrow for ITP classes. Eligible students will be able to borrow a MacBook or Dell XPS for ITP coursework once their request is approved and their contract is signed via DocuSign. Though the initial loan period is 7 days, they will still be able to renew their device and extend the loan period as in previous semesters. They will need to pop into one of ITP's Zoom device check-in sessions before the end of each week. If all of them have been checked out, then the student will be placed on the waiting list. You will not be able to save your work on the ITP lab computers and the ITP laptops. Once they are restarted, all work will be deleted. Use an external USB drive, or a cloud-based service like Google Drive or Dropbox to save your work. ITP is not responsible for any lost work. Information about the ITP Loaner Laptop Program and the request form can be found at https://itp.usc.edu/current-students/itp-device-check-outs/.

Optional Books

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

Additional reference material will be provided in class as needed.

Description and Assessment of Assignments

This course will make use of Brightspace for assignments. All assignments will be posted on Brightspace. Assignment will include instructions, a due date, and a link for electronic submission. Assignments must be submitted using this link.

Using techniques and ideas outside the content of this course without proper citations can result in significant penalties. Each assignment must be completed individually. Do not collaborate with other students for these assignments. More information below.

Grading Timeline

Assignments Grading will typically be completed within ten days after submission. Any variations will be announced in class or on Brightspace. All grading discrepancies must be resolved within a week of grade release.
For grade disputes, contact your grader first. If resolution is not reached, contact the instructor.

Exams

No make-up exams (except for documented medical or family emergencies and religious holy days) 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.

Projects

Students can choose to work alone or with one other group member. Groups will be formed after Exam I. The project will include usage of ideas covered in class.

Grading Breakdown

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

Item	**% of Grade**
Individual Assignments	35
Group Projects	15
Exam I	25
Exam II	25
Total	**100**

Grading Scale

Course final grades will be determined using the scale below. For the Pass/No Pass grading option, you must earn at least 70% to pass.

Letter Grade	**Corresponding numerical point range**
A	>= 94
A-	>= 90 and < 94
B+	>= 87 and < 90
B	>= 83 and < 87
B-	>= 80 and < 83
C+	>= 77 and < 80
C	>= 73 and < 77
C-	>= 70 and < 73
D+	>= 67 and < 70
D	>= 65 and < 67
F	< 65

Software

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

- MySQL, MySQL Workbench
- MongoDB, Studio3T
- Tableau

Assignment Late Policy

Students are responsible for completing individual assignments as well their fair share of team projects by stated deadlines. Assignments turned in late will have 10% of the total points deducted from the graded score for each late day. After **5** days, the assignment will be graded 0%.

Students are given three 'grace' days for the semester (only for Individual Assignments). You can submit your assignments a total of three days late and will not receive late penalties (up to 30%). Other late submissions will be penalized, with no exceptions. Projects do not have grace days.

Course-Specific Policies

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

Any changes or modifications to these policies (such as extending grace days, deadlines, deviations in the course schedule, extra credit opportunities, etc.) will be communicated to the class using Piazza and/or Brightspace.

Classroom Etiquette

The instructor expects you to pay attention during lectures and be an active learner. Chatting while the instructor is talking, texting on your mobile device, and participating on social media sites during class is disrespectful to the instructor and your classmates. If you are not able to attend lectures, then you should study the missing material and ask your questions to the instructor and learning assistants.

Communication

The preferred way to communicate with instructors and LAs is posting on Piazza (http://piazza.com). All students, instructors, and LAs will have access to the same class on Piazza. Information about accessing Piazza is available on Brightspace. If you have questions about assignments, labs, tests, and other aspects about this course, please post on Piazza. You are able to make public posts that all members can see and answer or private posts to individuals which are only accessible to instructors and LAs. To make a private post to all instructors and LAs, next to “Post to” select the “Individual Students(s) / Instructor(s)” option and enter “Instructors” in the text field.

Students should NOT directly email the LAs or graders: all correspondence with the LAs should be done on Piazza. If a direct email is required for any reason, the student must cc the instructor in the email.

OSAS Accommodations

If you have course accommodations authorized by OSAS (Office of Student Accessibility Services), please email the instructor or post privately on Piazza and attach your accommodation letter by the end of Week 3. In the body of the message, include your name and your class section. In addition, reach out the week before the test to discuss details for coordinating specific test accommodations.

Use of Artificial Intelligence (AI) Tools like ChatGPT

In this course, you are permitted to use artificial intelligence (AI)-powered programs to help you, but only on assignments that explicitly indicate a permitted use of AI. However:

- You should be aware that AI text generation tools may present incorrect information, biased responses, and incomplete analyses; thus, their answers may not meet the standards of this course.
- You should also be aware that in the exams AI will not be available, therefore, understanding of the material without relying on AI Tools is a crucial skill in this course.
- To adhere to our university values, you must cite any AI-generated material (e.g., text, images, and other content) included or referenced in your work and provide the prompts used to generate the

content. Using an AI tool to generate content without proper attribution will be treated as **plagiarism** and reported to the **Office of Academic Integrity**.

Please **review** the **instructions** in each assignment for more details on how and when to use AI Generators for your submissions.

Course Schedule: A Weekly Breakdown

	Topics	Reading	Assignment
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 Brightspace/ Piazza	-
Week 2	**Foundations of Databases and SQL** ● Data models ● Business rules ● Relational and entity-relationship modeling ● Entities, attributes, relationships ● Keys: primary, foreign, candidate, surrogate, super		Assignment 1 - Using MySQL Workbench
Week 3	**ERD Exercises** **Normalization** ● Anomalies and the need for normalization ● Normal forms: First, second, third normal forms ● Denormalization ● Dependency Diagrams		Assignment 2 - Data modeling following business rules
Week 4	**Normalization Exercises** **Introduction to SQL (Data Definition)** • Database structures • Import/Export/Create data in MySQL • Data Definition Language Discussion		Assignment 3 - Normalizing databases
Week 5	**Introduction to SQL (Data Manipulation)** • 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		Assignment 4 - Importing data
Week 6	**Aggregation function exercises** **Combining Data in SQL** • Appending similar data together		Assignment 5 - Queries

	• Combining data from different tables together • Commands for combining data: JOIN and UNION **Creating Multiple Joins** • Creating relationships between tables: INNER, RIGHT, FULL OUTER, EXCEPTION and CROSS JOINs • Optimizing queries: WHERE, LIMIT and COALESCE		
Week 7	**Join Exercises** **Subqueries** • Asking multiple questions in a single query • Nesting queries • Multi-step aggregation or filtering		Exam preparation
Week 8	**Review/Exam I**		-
Week 9	**Exercises of Querying Techniques** ● Applying beginner and intermediate query techniques: windows, ranks, text manipulation ● Discussing and offering solutions to real-world problems using querying		Assignment 6 - JOINS
Week 10	**Fundamentals of MongoDB** ● Drawbacks of SQL ● Intro to NoSQL ● Data storage ● Data Retrieval ● Queries in MongoDB ● Comparison of Contrast with MySQL		Assignment 7 - Queries, joins, subqueries for problem-solving
Week 11	**MongoDB** ● Queries Continued ● Aggregation Framework ● MongoDB operators		Assignment 8 - MongoDB Queries
Week 12	**MongoDB** ● Aggregation Framework Exercises ● Applying row-wise and column-wise data analysis **Data Visualization**		Assignment 9 - MongoDB aggregate pipeline
Week 13	**Data Visualization Continued** ● Introduction to Charting techniques ● Type of variables: Categorical, numerical ● Tableau functions and methods		Project work
Week 14	**Tableau Exercises** ● Reading data with Tableau ● Connecting MySQL and MongoDB to Tableau ● Exercises and practices to visualize data		Project work
Week 15	**Review/Exam II**		
Week 16	**Project due**		**Project**

Statement on Academic Conduct and Support Systems

Academic Integrity:
The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, comprises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Course Content Distribution and Synchronous Session Recordings Policies
USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. 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. (Living our Unifying Values: The USC Student Handbook, page 13).

Students and Disability Accommodations:
USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

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

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
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
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
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
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) 442-1200 – 24/7 on call
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.