**ITP249 - Introduction to Data Analytics**

Units: 4   Semester: Spring 2023

**Time:**
TTH 12:00 - 1:50 in KAP 160

**Instructor:**     **Maryam Majedi, Ph.D.**
Office:          RRB 243
Office Hours:    Listed on Blackboard
Contact Info:    majedi@usc.edu

Learning Assistants:  Listed on Blackboard
Office Hours:         Listed on Blackboard

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

**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, 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

**Prerequisite(s):** None

**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.

**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.

**USC Technology Rental Program**
If you need resources to successfully participate in your classes, such as a laptop or internet hotspot, you may be eligible for the university's equipment rental program. To apply, please submit an application. The Student Basic Needs team will contact all applicants and distribute equipment to eligible applicants prior to the start of the semester.

**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/.

**Supplementary Materials (Optional)**
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 Blackboard for assignments. All assignments will be posted to Blackboard under the "Homework" section. Each assignment will include instructions, a due date, and a link for electronic submission. Homework must be submitted using this link.

**Grading Breakdown**

| Assessment | % of Grade |
|---|---|
| **Individual Assignments** | 25 |
| **Team Projects** | 10 |
| **Exam I** | 30 |
| **Exam II** | 35 |
| **Total** | 100 |

**Projects**
Students can choose to work alone or with one other team member. Teams will be formed after the first Exam.

**Software**
Software will be provisioned through a virtual lab or available for free trial download.
- Excel
- MySQL, MySQL Workbench
- MongoDB, Studio3T
- Neo4J
- Tableau

**Grading Scale**
Course final grades will be determined using the following scale:

| Letter grade | Corresponding numerical point range |
|---|---|
| A | >= 93 |
| A- | >= 90 and < 93 |
| 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 |

For the Pass/No Pass grading option, you must earn at least 70% to pass.

**Policies**

Students are expected to attend and participate in lecture discussions, homework, projects and team meetings.

Students are responsible for completing individual assignments as well their fair share of team projects by stated deadlines. Assignments turned in late will have 25% of the total points deducted from the graded score for each late day. ***Students are given three "grace" days for the semester.  Other late submissions will be penalized, with no exceptions.***
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.

If students need accommodations authorized by OSAS, notify the instructor at least two weeks before the exam. This will allow time for arrangements to be made.
**Notice that projects have a hard deadline and do not have any grace days.**


**Grading Timeline**
Submissions will be graded within 10 days. Students have one week to contest a grade once it has been posted on Blackboard. After this one week, the grade will not be changed. To contest a grade, create a private post on Blackboard. In the post, include your name, the assignment name, and your reasons. This will allow the grader, instructor, and head LA (Learning Assistant) to view your submission and make a decision. Do **not** email the grader directly. All communications need to be seen and approved by the instructor.

**Course Schedule: A Weekly Breakdown**

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

| Week 6 | **Subqueries**<br>• Asking multiple questions in a single query<br>• Nesting queries<br>• Multi-step aggregation or filtering |
|---|---|
| Week 7 | **Data Visualization**<br>• Introduction to Charting techniques<br>• Type of variables: Categorical, numerical<br>• Tableau |
| Week 8 | **NoSQL**<br>• Drawbacks of SQL<br>• Why NoSQL<br>• Introduction to MongoDB<br>• Non-relational databases |
| Week 9 | **Fundamentals of MongoDB**<br>• Data storage<br>Data Retrieval |
| *Exam I* | **Thursday, March 9th** |
| Week 10 | Count. |
| Week 11 | **Fundamentals of MongoDB**<br>• Queries<br>Aggregation Framework |
| Week 12 | Count. |
| Week 13 | Graph DBs<br>• Why graph databases?<br>Introduction to Neo4J |
| Week 14 | Working with graph databases<br>• Querying<br>Graph Visualization |
| **Week 15** | **Exam II – Thursday, April 27th** |
| **Final Project** | **May 4th (Hard deadline – no extension – no use of grace days)** |

**Adding the Course after Week 1**
Per university policy, students are allowed to add the course until the end of week 3. Any students wishing to add the course should plan on attending the course from the beginning of the semester. Upon adding the course after week 1, the student should email the instructor immediately to make a plan for completion of work and learning missed materials. Any missed work is required to be completed and submitted according to the schedule provided by the instructor. If you register for the class after assignments/exercises are due, then you will need to coordinate with the instructor to determine appropriate deadlines for the missed assignments/ exercises.

**Attendance**
Attendance is not part of the grading breakdown, although attending lectures will help you to participate in the exercises and learn the material and succeed in this class. If you are not able to attend, then it is your responsibility to catch up with the material and complete the requirements.

**Communication**
The preferred way to communicate with instructors and LAs is posting on Piazza (https://piazza.com/). All ITP249 students, and LAs will have access to the same discussion board. Information about accessing Piazza is available on Blackboard. If you have questions about Homework, Projects, exams, 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 the instructor and LAs.

Students should **NOT** directly email the LAs or graders: all correspondence with the LAs should be done on Piazza.

**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.

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.

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).

Do not reproduce, distribute, or post any lecture material, assignments, or tests publicly without the written consent of the instructor. Students may take notes and make copies of course materials for their own use. Students may not post the course materials on sites such as CourseHero and Chegg. Doing so is a copyright violation and an academic integrity violation that will be dealt with accordingly.