ITP489
In-Memory DBMS for Real Time Analytics

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Zoom Office: https://usc.zoom.us/j/92533897852
Office Hours: M/W   10:00 - 11:30 am
                              T/Th.   11:00 - 11:50 am
                                     1:00 - 1:50 pm

Class Web Page: https://blackboard.usc.edu/

Teaching Assistant: TBD

Course Description:

Multi-core processors and the availability of large amounts of main memory at low costs have made in-memory database management possible, enabling enterprises to collect and analyze vast amounts of data in real time. This course is designed to provide the student with a thorough understanding of the architecture and capabilities of in-memory database applications. Case studies on how businesses in various industries use data analytics for strategic decision making will be discussed and assignments will enable students to analyze large data sets to support their own strategic decisions.

Objectives:

At the completion of the course, students will be able to…

- Explain how various industries can use analytics to make strategic decisions
- Describe the architecture of in-memory database management systems
- Model and prepare an in-memory system for data population
- Identify which analytic models are most appropriate for a particular data set
- Analyze given data sets using tools such as SAP Predictive Analysis and SAS
- Make strategic business decisions based upon analytic results

Suggested Textbooks:

- In-Memory Data Management, 2nd edition, by Hasso Plattner and Alexander Zeier, Springer, ©2012, ISBN: 978-3-642-29574-4
- SAP Hana Essentials, by Jeffrey Word, , ebook version: https://www.amazon.com/SAP-HANA-Essentials-Jeffrey-Word-ebook/dp/B0089N7BHK

Suggested References:

- SAP HANA Academy: http://www.saphana.com/community/implement/hana-academy
- SAS Statistics 1: Introduction to ANOVA, Regression, and Logistic Regression https://support.sas.com/edu/schedules.html?ctry=us&crs=STAT1

Computer Software
- The software which you will be using throughout the semester is located on Vitirbi's Virtual Desktop system. By enrolling in the ITP course, you automatically have access to this system.
- Instructions on how to log in to the Virtual Desktop system will be posted on the course Blackboard web page, within the "Course Information" module.

Lab Assignments:
- At the beginning of each week, Assignments will be available within the "Weekly Content" section of the class Blackboard web site.
- You are to turn in only the "Answer sheet" and "Summary" portion of the project write-up as one document.
- It is **your** responsibility to turn in the lab assignments by the deadlines indicated later in this syllabus **and** verify that your assignment is available in the class "assignment box".
  - If you can't see or open your document, then neither can the grader!
- Answers to the assignments will be posted on the class web page immediately after the due date of the assignments for your review.

Case Studies
- Three case studies will be assigned during the semester.
- You are to read over the cases and type up a one-page analysis, double-spaced, explanation of the business situation, concerns, and possible suggested actions to take.
- Case studies are to be submitted by the beginning of the lecture on the dates indicated on the syllabus within the "Weekly Content" section of the class website (just as you do for submitting your Assignments).

Late Assignments and Case Write-ups
- The Assignments link within the class web site "closes" after the due date and time.
  - You will no longer be able to submit your assignment and your assignment will be considered late!
- **No late assignments will be accepted for credit**. **No excuses!** So, please turn in your assignments at the beginning of lecture on the dates indicated in this syllabus and noted on the class web site !

Handling Assignment Questions (in order of steps to be taken)
1. Re-read the instructions carefully.
2. Review the "Discussion Board" section of the class web site's forum for other students' questions and comments or post a question yourself to begin the forum.
3. And, of course, you are always welcome and encouraged to "stop by" during my office hours, or the TA's, to discuss your questions.

Final Project:
- The final project will require that the student take all that he/she has learned during the semester through the readings, case studies, and assignments, and apply it to a real-world situation. At minimum, the student will import data into an in-memory database system, model that data appropriately, and perform routine analytics. The student's recommendations presented in the conclusion of the final project must be supported by their analysis of the data.
- **No late final projects will be accepted for credit**.

Examinations: Exams cover material from the reading assignments, lectures, and assignments. There will be two parts to the exam: ① a written exam containing questions of the form: multiple choice, short answer, and short problem solving, and ② a practical "lab" portion in which you will conduct exercises similar to those in the assignments. The exams will include material presented up to the date of the exam. The "Final" exam will be comprehensive and cover material presented throughout the semester, though emphasis will be placed upon the latter part of the course.

- Exam 1:   Mon. Sept. 18   12:00-1:50 p.m.   ITP 160
- Exam 2:   Mon. Oct. 16   12:00-1:50 p.m.   ITP 160
- Final Exam: Fri. Dec. 8   11:00-1:00 p.m.   ITP 160

❗ Note: <u>Exams will be conducted in class</u> during the times indicated above. No make-up exams will be offered nor will there be any changes made to the Final Exam schedule as established by the University.

Grading:

Grading will be on a straight scale (as opposed to a class curve/average).

94% and above	A
90% - 94% (not including 94%)	A-
87% - 90% (not including 90%)	B+
83% - 87% (not including 87%)	B
80% - 83% (not including 83%)	B-
77% - 80% (not including 80%)	C+
etc.	

Grades will be calculated by weighing the following work as described here:

Average of Lab Assignment scores	25%
Exam #1	10%
Exam #2	15%
SAS Analysis Game	5%
Case write-ups	10%
Final Project	15%
Final Exam	20%
	100%

❗ Final grades will be based strictly upon the total percentage earned. No exceptions! Nor, will any extra credit assignments be offered.

Class Schedule:

Class	Topic	Suggested Reading	Assignment
Week 1. Aug. 21 Aug. 23	**Course Overview** • Discuss the Syllabus • Overview of In-Memory Database Systems	Plattner: Introduction & Ch.1 Word: Ch. 1	**Case #1** – Carolina's Health Care System, due next Monday before class.
Week 2. Aug. 28 Aug. 30	**Relational Databases** • Discuss the Carolina's Health Care System case • Overview of Relational DB databases & Normalization	Class notes	**Assignment #1** – Overview of RDBMS, due next Wednesday before class.
Week 3. Sept. 4 Sept. 6	**HANA, In-Memory DBMS** • Univ. Holiday – no class • Intro to In-Memory Database Mgmt Systems & the HANA In-Memory Computing Engine	Plattner: Ch.4.1 – Ch.4.4 Berg: Ch. 5.6 Word: Ch. 2	**Assignment #2** – Overview of In-Memory DBMS, due next Monday before class. **Case #2** – Basecamp Pricing, due next Wednesday before class.
Week 4. Sept. 11 Sept. 13	**Reporting & Analysis** • Using the HANA Studio for initial data presentation and Excel for Analysis • Discuss the Basecamp Pricing case	Berg: Ch.6	**Assignment #3** – Intro to Reporting, due next **Sunday**, before 5:00 pm.
Week 5. Sept. 18 Sept. 20	**Data Provisioning** • **Exam #1** • Importing and preparing data for reporting and analysis	Berg: Ch.10 Word: Ch. 6	**Assignment #4** – Data Provisioning, due next Monday before class.
Week 6. Sept. 25 Sept. 27	**Data Modeling** • Data Structures & the Modeling Process • Attribute & Analytic Views	Berg: Ch.8 Word: Ch.7	**Assignment #5** –Data Modeling I, due next Monday before class.
Week 7. Oct. 2 Oct. 4	**Data Modeling (continued)** • Incorporating calculations columns in modeling views • Using Variables and Decision Tables	Berg: Ch.8 (cont.) Word: Ch.7 (cont.)	**Assignment #6** – Data Modeling II, due next Monday before class.
Week 8. Oct. 9 Oct. 11	**Data Modeling (continued)** • Creating Calculation Views • Calculation views (cont.)	Berg: Ch.8 (cont.) Word: Ch.7 (cont.)	**Assignment #7** –Calcu-ation Views, due next **Sunday** before 5 pm.

Class	Topic	Suggested Reading	Assignment
Week 9. Oct. 16 Oct. 18	**Exam #2** • **Exam #2** • Intro to SAP's Predictive Analytics Tool – Time Series, and Regression Analyses	Class notes	**Case #3** – Evaluating Cognitive Analytics, due next Monday before class. **Assignment #8** – Predictive Analytics I, due next Wednesday, before class.
Week 10. Oct. 23 Oct. 25	**SAP Predictive Analytics** • Discuss the Evaluating Cognitive Analytics case • SAP's Predictive Analytics Tool (cont.) – Apriori and K-Means Analyses	Class notes	**Assignment #9** – Predictive Analytics II, due next Monday, before class.
Week 11. Oct. 30 Nov. 1	**SAS Enterprise Miner** • Intro to Statistical Analysis System (SAS) for Analytics • Data exploration & analysis using SAS Enterprise Miner	Class notes	**Assignment #10** – Using SAS Enterprise Miner for Analysis, due next Mon., before class.
Week 12. Nov. 6 Nov. 8	**SAS Enterprise Miner (cont)** • Apriori analyses in SAS • K-Means analyses in SAS	Class notes	**Assignment #11** – Enterprise Miner II, due next Monday, before class.
Week 13. Nov. 13 Nov. 15	**SAS Enterprise Miner (cont)** • Text Mining analysis using SAS • Time Series Analysis of time series and transactional data	Class notes	**Assignment #12** – Enterprise Miner III, due next Monday, before class. **Final Project** available.
Week 14. Nov. 20 Nov. 22	**SAS Enterprise Miner (cont)** • Regression Analysis on binary vs continuous data • Thanksgiving Break – no class	Class notes	**Assignment #13** – Regression Analysis using SAS, due next Tuesday before class. Continue working on Final Project.
Week 15. Nov. 27 Nov. 29	**SAS Analysis Game** • SAS Analysis Game • Course Review	--	**Final Project**, due this Friday, before 11:59 pm
Week 16. Dec. 8	**Final Exam** – 11:00 -1:00 pm		

Important University Information

Students with Disabilities - *(213) 740-0776*

> The [Office of Student Accessibility Services](#) (OSAS) ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy. A letter of verification for approved accommodations can be obtained from OSAS. Please be sure the letter is delivered to me as early in the semester as possible.

Incomplete and Missing Grades

> A grade of Incomplete (IN) "is assigned when work is no completed because of documented illness or other 'emergency' occurring after the twelfth week of the semester (or 12th week equivalency for any course scheduled for less than 15 weeks)."

> A grade of Missing Grade (MG) "should only be assigned in unique or unusual situations… for those cases in which a student does not complete work for the course before the semester ends. All missing grades must be resolved by the instructor through the Correction of Grade Process. One calendar year is allowed to resolve a MG. If an MG is not resolved [within] one year the grade is changed to [Unofficial Withdrawal] UW and will be calculated into the grade point average as zero grade points.

> Please refer to: http://www.usc.edu/dept/ARR/grades/gradinghandbook/index.html

Academic Conduct

> ***Sharing of course materials outside of the learning environment*** - USC has a policy that prohibits sharing of any synchronous and asynchronous course content 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.*

> *Plagiarism* – is a serious academic offense with serious consequences

> > *Presenting someone else's ideas as your own, either verbatim or recast in your own words.*

> Students who plagiarize the work of other students or provide material for another student to copy, will receive zero points and **will be referred to** the Student Judicial Affairs and Community Standards (SJACS) board for further action. If SJACS determines the student violated the ethics codes, **the student will receive an F** in the course as suggested by the University. This is non-negotiable!!

> 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](#).

Support Systems:

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

988 Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
http://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
https://studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
https://eeotix.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
https://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.

USC Campus Support and Intervention - (213) 740-0411
https://campussupport.usc.edu
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
https://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
http://dps.usc.edu, http://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) 442-1200 – 24/7 on call
http://dps.usc.edu
Non-emergency assistance or information.