ITP 487 – Enterprise Data Analytics

Units: 4
Summer 2023
10:30 am to 1:20 pm, MWF, Online
Duration: Wednesday May 17 – Tuesday June 27

Instructor: Nitin Kalé, Professor of Engineering Practice, Viterbi School of Engineering
Contact Info: kale@usc.edu
Office Hours: To be posted on Blackboard

Teaching Assistants:
TBD

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

Course Description

While the increased capacity and availability of data gathering and storage systems have allowed enterprises to store more information than ever before, most organizations still lack the ability to effectively consolidate, arrange, and analyze this vast amount of data. Analyzing large data sets to forecast and predict future events has become a highly sought-after skill in business, finance, engineering, services, science, health, and other industries.

This course will explore the theory and practice of three major areas:
- Data warehouses for Enterprises
- Business Intelligence for Enterprises
- Business Forecasting

Learning Objectives

After completing the course, students will be able to
- Describe the components of an Enterprise data warehouse
- Model the relational database required for an enterprise data warehouse
- Extract, cleanse, consolidated, and transform heterogeneous data into a single enterprise data warehouse
- Analyze data to generate information and knowledge that lead to informed decisions for businesses
- Author enterprise dashboards that are used to summarize and visualize data in a way that supports insight into trends
- Show how business intelligence can be derived from data warehouses
- Create standard reports for business users
- Describe the various forecasting techniques

Prerequisite(s): ITP 320 or ITP 249

Course Notes

All course materials will be made available through Blackboard. These include:
- Lecture slides

- Homework Assignments
- Readings
- Software details and instructions for accessing Viterbi Virtual Lab
- Grades and feedback
- Office hours
- Online discussion forums will be used for out-of-class discussions

Announcements made in class and content posted in Blackboard will supersede the contents of this syllabus.

Technological Proficiency and Hardware/Software Required

The assignments for this class will include both reading assignments as well as hands-on computer assignments. Students must bring their laptop computers (phones/tablets are not sufficient) to lecture sessions to participate in hands-on activities. Students will be given tutorials to gain familiarity with software tools.

Most of the SAP software required for the class is Windows based. The software will be provisioned through the Viterbi Virtual Lab. Specifically, students will be using:

- Eclipse with SAP BW Modeling Tools plugin
- SAP BW/4HANA (Business Warehouse)
- SAP GUI
- SAP Analysis for Microsoft Excel
- SAP Analytics Cloud

VITERBI VIRTUAL LAB – VMWARE VDI
All software can also be accessed into Virtual Desktop by logging in at:
https://mydesktop.vlab.usc.edu/portal/webclient/index.html#/
See blackboard for additional instructions.

Required Readings and Supplementary Materials

Practical Analytics, Nitin Kale and Nancy Jones, Second Edition, Epistemy Press 2020
http://store.epistemypress.com/books/analytics.html
DISCOUNT CODE: A 50% discount code for the textbook will be emailed to students during the first week of class. Please DO NOT share the code with others.

In addition to the required reading and supplementary materials listed in the weekly breakdown section of this syllabus, additional materials will be announced in class and published on Blackboard.

Description and Assessment of Assignments

Homework: Most homework is computer based. Homework should be turned in to Blackboard on time. Grading will be based on completeness, accuracy, and timeliness. Feedback will be provided through Blackboard. These are individual effort assignments.

Exams: will be in person.

Final Project: Final project is an individual summative assignment where you will be applying most of the skills that you have learned through the semester.

Grading Breakdown

Homework	30%

Exam I	30%
Exam II	30%
Final Project	10%
TOTAL	100%

Assignment Submission Policy

It is the responsibility of the student to make sure problem solution and assignment are turned in on time. Make sure you follow the procedures outlined in each assignment (Blackboard submissions).

Students are encouraged to work with their classmates. However, students must turn in their own, original work. Late homework submissions will be subject to a late penalty. The penalty is 25% per day. No assignments will be accepted later than four days from after the due date.

There will be three grace days. So, you can turn in a total of three late days without penalty. No grace days are available for the final project.

Grading Timeline

Assignments Grading will typically be completed 7 days after submission. Any variations will be announced in class or on blackboard. 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.

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. Accommodations religious observance must be arranged with the Professor ahead of time.

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.

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:

	Topics/Daily Activities	Due Dates
Week 1	Course Introduction • Course objectives and outcomes • Why do enterprises need Data Analytics? • What is a data warehouse? • Various types of data repositories Relational Database review • Relations, attributes, relationships • Database Normalization, normal forms • Denormalization of tables • SQL • JOINs • Introduction to in-memory databases	Check Blackboard for assignments, readings, and due dates
Week 1	Data Warehousing Fundamentals • Types and sources of data • Transactional databases vs. data warehouses • Enterprise data warehouses • Data store objects Data Warehousing fundamentals – Dimensional Modeling • Multidimensional Model for data warehouses • Star Schema • Dimension and fact tables • Snowflake Schema • Difference between star schema and snowflake schema	

Week 2	Data Warehousing fundamentals, contd.
	• Master data tables
	   o Attributes – Display, Navigational
	   o Texts
	   o Hierarchies
	   o Geo
	   o Time	

Week 2	Implementing the data warehouse • Characteristics and key figures • Creating InfoObjects • Handling aggregations – Standard and exception • Handling time dependency • Handling language dependency	
Week 3	Data Flow objects • Moving data through the data warehouse • ETL • Process chains	

Week 3	Extraction, Transformation, and Loading (ETL) • Source systems • Data Sources • Extractors for data (APIs etc.) • Mapping of fields	
Week 4	• Transformation rules • Data cleansing and harmonization • Composite Providers	
Week 4	Slicing and Dicing • Basics of slicing and dicing • Pivot tables • Working with aggregation functions, hierarchies • Currency conversion Building queries	
Week 5	Visualization of enterprise data • Charting techniques Connecting to data warehouses	
Week 5	Building dashboards • Cloud based dashboards • Designing and authoring dashboard	
Week 6	**Exam**	
Week 6	**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.