



**ISE 543: Enterprise Business Intelligence
and Systems Analytics**

3 Units

Spring 2022

Day/Time: T/R 12:30 – 1:50 PM

Location: SLH 100

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Teaching Assistant: TBA

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Catalog Course Description

Overview of data management and analytical techniques used in corporate environments and their practical implementation using a state-of-the-art Business Intelligence software.

Expanded Course Description

Business Intelligence (BI) combines analytics, data mining, data visualization, and statistical methods to enable large organizations to make improved data-driven decisions by extracting important information from complex enterprise systems. Modern BI platforms bring all the components of a project lifecycle from data preparation through discovery and modeling to assessment, deployment, and governance together in a single, integrated environment that requires minimal to no low-level coding (“low-code/no-code”).

The primary objectives of this course are to provide the student a theoretical overview of the entire lifecycle of a data science initiative in commercial settings and to provide the opportunity to get experience implementing these techniques using advanced Business Intelligence software currently used by large corporate and public sector entities.

Prerequisite(s): None.

Recommended Preparation: It is recommended that students have an undergraduate-level familiarization with statistics. While this course will not involve significant amounts of programming, a basic familiarization and comfort with traditional programming languages will be helpful.

Learning Objectives and Outcomes

The overall course objective is to learn the latest techniques used in large enterprises to perform a broad range of business intelligence and systems analytics activities

- The latest generation of business intelligence and analytics software is moving towards a "no-code/low-code" data and analytics platform. We will be using a leading commercial platform from the SAS Institute
- Techniques covered will include data preparation and management, data exploration and reporting/dashboarding, advanced analytical modeling (descriptive and predictive), free text analytics, forecasting, and deployment of analytical products in a large enterprise.
- The course will focus developing an advanced understanding of setting model hyperparameters, interpreting and assessing model results, and deploying and managing data and analytics products in an enterprise environment

Course Overview and Schedule

The course is structured into modules that correspond to many of the components of a typical analytics project. In general, each module will consist of lecture material to introduce (or refresh for the student) the theoretical basis of the technique being covered, a case study with sample data for classroom discussion, and instruction in the use of the corresponding BI software to perform the techniques. Readings will be assigned prior to each module and there will generally be a hands-on assignment.

Course Notes

All course materials (PowerPoints, assigned readings, etc) will be distributed via Blackboard.

Technological Proficiency and Hardware/Software Required

An advanced BI Analytics software platform will be used. The hardware/software required is a laptop or other personal computer and a browser. Accounts will be established for each student and a basic orientation to the software will be provided in the first session. The SAS Viya advanced analytics platform will be used. Information on the specific SAS Viya modules that we will be using can be found at the links below:

- [SAS Data Preparation](#)
- [SAS Visual Analytics](#)
- [SAS Visual Statistics](#)
- [SAS Visual Data Mining and Machine Learning](#)
- [SAS Model Studio](#)
- [SAS Visual Forecasting](#)
- [SAS Visual Text Analytics](#)

Required Readings and Supplementary Materials

There are no mandatory texts for this class. Required readings and supplementary materials will be assigned for each module and distributed via Blackboard and will include the following:

- A primary reference book for the theoretical background for the modeling component of the class is *An Introduction to Statistical Learning with Applications in R* by James, et. al (2013). (ISLR)
- Additional theoretical materials will be drawn from *The Elements of Statistical Learning*, by Hastie, et. al. (2017) (ESL)
- A variety of books and other materials published by the SAS Institute
- Selected journal papers of significance in the field of data science

Grading Breakdown

Assignment	% of Grade
Assignments (6)	40
Mid-Term Exam (take-home)	30
Final Project	30

Grading Scale

Course final grades will be determined using the following scale

A	95-100
A-	90-94
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Submission Policy

Assignments will generally consist of exercises developed using the BI software and will be submitted on Blackboard. The assignment may also include some form of a short report or document which will also be submitted via Blackboard. Assignments are due one week after the corresponding module has been completed.

Grading Timeline

Grading and feedback will generally be provided one week after the assignment due date.

Course Schedule: A Weekly Breakdown

Week	Date	Topics/Daily Activities	Assigned Reading	Homework
1		Introduction to Business Intelligence and Systems Analytics Introduction to SAS Viya	<i>50 Years of Data Science</i> , Donoho, 2015. Exploring SAS Viya, Programming and Data Management, 2019.	
2		Data Preparation and Analysis. Business needs analysis and data understanding. Variable identification, univariate and bivariate analysis, data quality assessment.	<i>Tidy Data</i> , Hadley Wickham, Journal of Statistical Software, Volume 59, Issue 10, 2014. <i>Be Prepared: An Introduction to SAS Data Preparation</i> , Queen, 2019	
3		Data Preparation and Analysis. Data integration, cleansing, visualization. Data reduction and enhancement.	<i>The Future of Data Analysis</i> , John Tukey, 1961 <i>Smart Data Discovery Using SAS Viya</i> , Felix Liao, 2020. <i>Machine Learning with SAS Viya</i> , Chapters 2-4.	
4		Dashboarding. Introduction to interactive dashboard design.	<i>Smart Data Discovery Using SAS Viya</i>, Liao, 2020	
5		Dashboarding. Advanced dashboard design concepts. Geographic mapping, network analysis, path analysis.	<i>Exploring SAS Viya: Visual Analytics, Statistics, and Investigations</i> , 2020	
6		Modeling and Evaluation – Linear Models. Introduction to model development and model assessment and validation. Regression modeling theory and linear regression model development. Overview of classification and logistic regression.	<i>Machine Learning with SAS Viya</i> , Chapter 5. ISLR, Chapters 3 & 4	
7		Modeling and Evaluation - Moving Beyond Linearity. Generalized additive models, generalized linear models, nonparametric logistic regressions	ISLR, Chapter 7	
8		Modeling and Evaluation - Tree-Based Methods. Decision trees, forests, gradient boosting	ISLR, Chapter 8	
9		Modeling and Evaluation - Support Vector Machines and Factorization Machines	ISLR, Chapter 9 ESL, Chapter 12	
10		Modeling and Evaluation – Neural Networks and Bayesian Networks	ESL, Chapter 11 ESL, Chapter 17	

11		Modeling and Evaluation. Model pipelines, ensemble models, and deploying models into production applications.	<i>Machine Learning with SAS Viya</i> , Chapters 12-13.	
12		Text Analytics	TBA	
13		Text Analytics	TBA	
14		Forecasting	TBA	
15		Forecasting	TBA	
		Final Exam		Refer to the final exam schedule in the USC <i>Schedule of Classes</i> at classes.usc.edu

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 Campus 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.symplcity.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