ADS-599: Capstone Project

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Instructor and Contact Information

For this course, your instructor's contact information is listed in Blackboard.

Communication in this course is conducted via email through Blackboard. Your instructor will respond to emails within 24 hours during the week and within 48 hours on the weekends. Log into Blackboard regularly to check your messages to ensure that you receive important course communications and are up-to-date with course announcements from your instructor.

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Course Description and Course Learning Outcomes

The purpose of this Capstone Project is for students to apply their acquired theoretical knowledge obtained during the Applied Data Science Program to a research based, code-oriented data science project. During the project, students lead the entirety of the end-to-end process that involves the collection and processing of the data while utilizing the appropriate analytical methods. The project will be documented in an academic journal style article and orally presented, including technical content, in a recorded presentation. Students will work in teams and are encouraged to find project topics that originate from real-world domains in order to tackle unique problem statements that have real world impact. All projects must be approved by the program director and/or instructor.

By the end of this course, you will be able to:

- Produce a comprehensive end-to-end, production ready and code-oriented, data science product.
- Practice collaborative teamwork and conflict resolution.
- Develop applicable data science goals and a project plan.
- Construct a comprehensive literature review summarizing comparable projects.
- Practice data preprocessing and project specific exploratory data analysis.
- Practice the correct methodology using the required tools such as R and Python to tackle a complex real-word problem.

- Evaluate the model performance and translate these metrics in determination of satisfying business objectives.
- Produce a publishable article chronicling the entirety of the end-to-end data science project.
- Prepare to transition into the data science field through learning how to navigate the data science interview process.
- Integrate data ethics best practices over the course of the project.
- Adapt leadership strategies for the world of data science.
- Propose strategies for building high performing data science teams.
- Evaluate the positive impact of data science on enterprise, society, and humanity.
- Devise a technical presentation representative of each capstone's unique of the end-to-end data science process and its intricacies.

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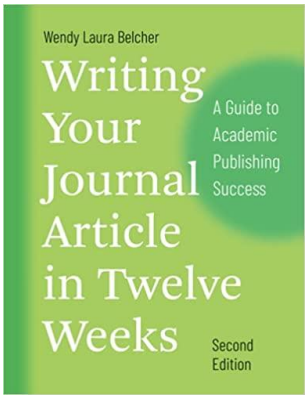
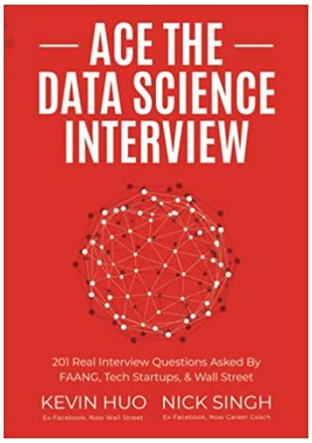
Required Textbooks



Required: Belcher, W. L. (2019). *Writing your journal article in twelve weeks: A guide to academic publishing success* (2nd ed.). The University of Chicago Press.
ISBN-10: 022649991X
ISBN-13: 978-0226499918



Required: Huo, K. & Singh, N. (2021). *Ace the data science interview: 201 real interview questions asked by FAANG, tech startups, & Wall Street*.
ISBN-10: 0578973839
ISBN-13: 978-0578973838

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Course Schedule and Assignments

This course is conducted entirely in the Blackboard learning management system and is comprised of seven modules. Each module may contain readings, presentations, discussion forums, and activities or assignments for you to complete. You are expected to progress through one module per week and actively participate in discussion forums and other activities during the week in which they are assigned. You are encouraged to work in conjunction with the posted calendar.

An abbreviated course schedule is provided below. Detailed information on all course components and specific activities such as readings, assignment details, etcetera, can be found within each module. You should plan ahead by reviewing each module prior to the first day of the course.

Discussion Forums:
Every module includes a forum with at least one discussion question. An initial response to each thread prompt should be posted as early as possible, but by Day 4 of the week assigned (Fridays) at the latest. You are also expected to actively engage in ongoing conversation with classmates in the discussion threads by posting at least one additional substantive contribution to each discussion thread by the last day of each module at 11:59 pm, PT.

Participation Requirement:
Checking your course daily and monitoring/tracking your progress is crucial. Your participation and regular attendance are **required** and are an integral part of your overall success in the course. You can expect to spend 18-22 hours per week working on this course.

Assignment Due Dates:
Unless otherwise specified within the module, all assignments are due on the final day of the module/week (Day 7) by 11:59 pm, PT.

Module/Week	Module Learning Outcomes	Module Activities
Module 1 **Week 1**	• Propose and elaborate on an end-to-end data science project with real-world implications. • Construct a hypothesis to satisfy the problem and project objectives. • Compile and present a project plan. • Prepare to transition into the field of data science through learning how to navigate the data science interview questions and processes.	• **Readings (8)** • **Media (3)** • **Presentations (1)** • **Discussion Threads (2)** • **Assignments (2)** • **Quizzes (1)**
Module 2 **Week 2**	• Synthesize information from comparable projects through an extensive literature review of peer-reviewed scholarly articles. • Assemble the project background, highlighting the justification for a data science project. • Prepare to transition into the data science field by learning how to navigate the data science interview process.	• **Readings (5)** • **Presentations (1)** • **Discussion Threads (1)** • **Capstone Project Check-In (1)** • **Assignments (1)** • **Quizzes (1)**
Module 3 **Week 3**	• Assess the dataset characteristics through an exploratory data analysis.	• **Readings (6)** • **Media (1)**

	• Complete the data cleaning and data preparation tasks to prepare the dataset for modeling. • Integrate data ethics best practices throughout the cycle of exploratory data analysis, data cleaning, and data preparation. • Prepare to transition into the data science field through learning how to navigate the data science interview process.	• **Presentations (1)** • **Discussion Threads (1)** • **Capstone Project Check-In (1)** • **Quizzes (1)**
Module 4 **Week 4**	• Complete project-specific data preparation. • Construct a data science model to solve the problem. • Integrate data ethics best practices throughout the modeling phase. • Integrate leadership skills into a real-world scenario based problem. • Prepare to transition into the data science field through learning how to navigate the data science interview process.	• **Readings (7)** • **Media (2)** • **Discussion Threads (1)** • **Capstone Project Check-In (1)** • **Assignments (1)** • **Quizzes (1)**
Module 5 **Week 5**	• Evaluate the model using appropriate evaluation metric benchmarks. • Evaluate findings against the original hypothesis and problem statement. • Propose strategies for building high performing data science teams. • Prepare to transition into the data science field through learning how to navigate the data science interview process.	• **Readings (5)** • **Discussion Threads (1)** • **Capstone Project Check-In (1)** • **Assignments (1)** • **Quizzes (1)**
Module 6 **Week 6**	• Compile derived insights gained from modeling. • Assemble a publishable journal article chronicling the end-to-end data science process. • Prepare to transition into the data science field through learning how to navigate the data science interview process. • Express the value and positive impact that the field of data science brings to enterprises, society, and humanity.	• **Readings (5)** • **Discussion Threads (2)** • **Capstone Project Check-In (1)** • **Assignments (1)** • **Quizzes (1)**
Module 7 **Week 7**	• Assemble a publishable journal article chronicling the end-to-end data science process. • Summarize the end-to-end project process through a collaborative technical presentation highlighting methodology, key findings, derived insights, and next steps. • Produce a technical presentation of the unique end-to-end data science process of each capstone project. • Prepare to transition into the data science field through learning how to navigate the data science interview process.	• **Readings (4)** • **Discussion Threads (1)** • **Final Capstone Submissions (3)** • **Assignments (2)**

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Pacing Guide

Each Module Introduction includes an overview of required activities for that particular module. The overview includes a list of assignments and activities for the module, the day(s) the assignments are due, and the format of the assignment (discussion, assignment, etc.). Although you are expected to review each module thoroughly and become familiar with deliverable items, the pacing guide overviews provide a quick snapshot of required module activities and due dates.

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Grading and Academic Policies

Grading Criteria:
The following are the assignments that will assess your academic performance. The grading weight is based on a 1000-point system.

Assignment	Points	Percentage
Discussion Forums	70	7%
Module Quizzes	60	6%
Capstone Project Check-Ins	25	2.5%
Module Assignments	345	34.5%
Final Capstone Submissions	500	50%
Total:	1000	100%

Grading Breakdown:
Below is the breakdown of points into letter grades.

Letter Grade	1000 Point Score
A	940-1000
A-	900-939
B+	870-899
B	830-869
B-	800-829
C+	760-799
C	730-759
C-	690-729
D+	660-689
D	630-659

D-	600-629
F	0-599

Grading Rubrics:

Assignment Grading Rubrics: Individual rubrics for each assignment are available within the Assignment section of each module.

Final Project Grading Rubric: The rubric for the final project is available in the Final Project section of Module 7.

Discussion Boards Grading Rubric: The grading rubric for each discussion forum is available within the Discussions section of each module.

Make-Up and Late Work:

To avoid late penalty deductions, assignments should be submitted on or prior to the due date on Blackboard. For each day after the deadline that an assignment is turned in late, its point credit will be reduced by **10%** per day. Work submitted after **48 hours/two days** past the original due date will not be accepted and will receive a zero.

Grade of Incomplete:

The grade of Incomplete ("I") may be recorded to indicate (1) that the requirements of a course have been substantially completed but, for a legitimate reason less than 25% of the work remains to be completed, and, (2) that your record in the course justifies the expectation that you will complete the work and obtain a passing grade by the deadline. It is your responsibility to explain to the instructor the reasons for non-completion of work and to request an incomplete grade prior to the posting of final grades. Students who receive a grade of incomplete must submit all missing work **no later than the end of the second week of the next semester**, otherwise the "I" grade will become a permanent "F."

Academic Integrity:

You are expected to be knowledgeable about the principles of academic honesty and their application at the University of San Diego. The Getting Started page of each course provides a link to USD's Honor Code. You are required to acknowledge that you have read Academic Integrity Policy and agree to adhere to the standards prior to beginning the course. Academic dishonesty erodes the quality of scholarship and learning. As a student at the University of San Diego, it is your responsibility to report incidents of academic dishonesty to the proper authorities.

Avoiding Plagiarism:

The nature of education and scholarship is the sharing of theories and ideas. Avoid plagiarizing by providing a citation whenever you use the words or ideas of others. It is your responsibility to give credit to the sources of information you consult when developing written work. For this course, you are expected to use APA for both formatting and citing references in your papers.

Professionalism and Student Conduct/Netiquette:

Online learning brings together students from diverse locations and populations. This creates potential for a rich learning community and also creates a need for thoughtful, courteous communications. Use a professional and collegial tone in course dialogue. Refrain from using inappropriate or offensive language. Humor can sometimes be a challenge because of the lack of cues in the online forum, such as facial and body gestures and voice inflection. Be sensitive to these limitations and respectful to all

participants. It is important that we maintain an open, respectful and professional environment in all discussions. Discussions should be an opportunity for learning from one another's background and experience level and disagreements and strong feelings surrounding course topics must be conveyed with respect and civility. It is the responsibility of all class members to foster a positive learning community. All students are expected to contribute to a respectful, welcoming, and inclusive environment for all members of the class.

Withdrawal from Class:
If you decide not to take a course that you registered for, you must contact the Program Coordinator on or before the first day of class. If you fail to officially withdraw, you will be assigned a grade of "F" and charged for the class. Please refer to the Drop and Withdrawal policies found in the Student Handbook.

Academic Grievance Procedures:
Concern about academic issues should first be raised with your course instructor. If dissatisfied, you should contact the Academic Program Coordinator to inquire about your concerns.

Extra Credit:
There are no opportunities for extra credit in this course.

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Requesting ADA Accommodations

The University of San Diego is committed to promoting knowledge and academic excellence for all learners. The University of San Diego's Disability and Learning Difference Resource Center helps students with verified disabilities obtain meaningful academic accommodations and support to help improve access to Professional and Continuing Education programs and courses.

If you would like to be considered for academic accommodations, please visit the Disability and Learning Difference Resource Center and follow the instructions under Requesting Services.

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