DSCI 560: Data Science Professional Practicum

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Course Description

This course provides the students to work as teams to design and implement working systems that solve real-world problems using data science.

One of the fundamental principles of data science is the ability to live in the data. It is necessary to gain a level of immersion in the information environment to truly apply the diverse skill sets necessary to both become an effective analyst, and provide customers solutions to hard problems. While students will get a sense of this paradigm in many of the courses focused on knowledge and skill enhancement throughout their degree matriculation, the goal of this course is to combine previously learned capabilities and apply them against actual data sets, in real data environment, and toward solving difficult challenges for an external stakeholder.

The Data Science Professional Practicum is a capstone experience designed to allow students exposure to the world of data analytics from the perspective of the organization. Students will gain experience with tools and skill on realistic projects toward proposing, designing, implementing, and presenting their final project that solves real-world problems.

Required Textbook: None

Other Requirements/Recommendations: Experience in Linux, C programming, Virtual Environment, Web programming, Python and relevant Data Science related Python packages

Grading

- 20% Attendance and Class participation
- 10% Reading assignments (based on the scores for the summary presentation slides)
- 30% Laboratory assignments (based on the scores for all of the assignments)
- 40% Final Project

Preparation for Classes

- Students will be using Linux based system through the course. It is strongly recommended that the students become familiar with its navigation and use.
- Majority of the assignments will require the use of C/C++ and Python under various environments. It is recommended that students become familiar with the languages and relevant development environment.
- It is recommended that the students become familiar with cloud computing and virtual environments..

Grading Policies

- Late Policy: The score for the assignments turned in late will be deducted by 50%.
- Grade Adjustment: If you dispute any scoring of a problem on an exam or homework set, you have one week from the date that the graded paper is returned to request a change in the grade. After this time, no further alterations will be considered. All requests for a change in grade must be submitted in writing to me.
- Changes/Information: The student is responsible for all assignments, changes of assignments, announcements, lecture notes etc. All such changes should be posted on the course web-site.
- Other: As per university guidelines published in SCampus, the academic integrity policy will be upheld.

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located

in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. The Student Guidebook contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A:http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

Lecture Contents

Lectures	Topics Covered, Source, Due Dates and Exams
Lecture 1	Course Introduction
Lectures 2, 3	Data Science in Practice
Lecture 4	Ideals of Data Science
Lecture 5	Data Sources: Front End Sensors
Lecture 6	Data Preparation
Lecture 7	Development Environment and Tools
Lectures 8, 9	Data Extraction
Lecture 10	Data Processing
Lecture 11	Data Visualization
Lecture 12	Data Classification
Lecture 13	Data Analysis: Patterns and Partitions
Lecture 14	Data Analysis: Causal Discovery
Lecture 15	Data Analysis: Machine Learning/Artificial Intelligence
Lecture 16	Data Semantic Analysis and Embedding
Lectures 17, 18	Large Language Models
Lecture 19	Cloud Platforms: Storage and Back End Processors
Lecture 20	Scalable Data Processing Tools/Languages
Lecture 21	Hardware Accelerators for Data Analysis
Lecture 22	Final Lecture: Career Advice
Lectures 23, 24	Final Project Proposal/Practice
Lectures 25, 26	Final Project Presentations

Reading Assignments
There are weekly reading assignments for which summary slide presentations must be submitted. The presentation should be 3-4 pages including title and summary.

Laboratory Assignments

1 Virtual Environment Configuration and Basic Data Science Tasks
2 Advanced Data Scraping
3 (Two Parts) Stock Tick Data Collection and Trading Algorithms
4 (Two Parts) Internet Data Clustering based on Semantic Analysis
5 (Two Parts) Oil Well Data Analysis and Visualization
6 (Two Parts) Domain Specific Chatbot Design and Implementation

Final Project
Final project consists of presentation, report, and demonstrations. And the grades will be based on the scores from all of the components.

Presentation: There will be approximately 10 minute final slide presentation and 5 minute Q&A session for each project group. All students will be required to participate and attend.

Project Demonstration Video: There will be weekly demonstration of the project progress until the final due date of the project. Weekly milestones defined at the beginning of the project must be demonstrated for a full credit.