Data Science Fundamentals
Hanyang University, School of Intelligence

Course Information
Course #: 202010-HYSOI-1003-12613
Spring 2020
MWF 9am-12pm
Fusion Technology Center (FTC, 208), Room TBD
Course Management System: https://learn.hanyang.ac.kr/

Instructor Information
Instructor: Casey Bennett
Office: TBD
Office Hours: MWF 2pm-3pm (other times by appointment)
Phone: TBD
Email: cabennet@hanyang.ac.kr
Home page: http://www.CaseyBennett.com

Course Description
The course is an introduction to data science fundamental concepts. The course will cover the history of data science, the connection to artificial intelligence, fundamental data concepts, machine learning techniques, data engineering, big data principles, data visualization techniques, and the role of ethics in data science practice. We will also touch on several special topics to understand how they are related to data science: natural language processing, computer vision, simulation modeling, internet-of-things, human-computer interaction, and cyber-physical systems. The goal of the course is for students to develop a broad understanding of how all these topics interconnect in the practice of modern data science, and to lay the foundation for students to take more advanced courses on these topics in the future.

Course Learning Goals
At the end of the course, students should be able to:
- understand the basics behind each data science topic, and how they interconnect to each other in modern data science
- understand the history of data science, and its development from computer science, statistics, cognitive science, etc. into its own separate field
- understand basic principles of machine learning and AI
- understand basic principles related to data, data engineering, and big data when it comes to managing data in modern computing systems
- understand basic principles of data visualization, and related topics around human computer interaction, for effective communication and storytelling
- understand the role of ethics and privacy issues in the practice of modern data science
- understand the role of special topics like NLP, computer vision, simulation modeling, and IOT
- have a foundational understanding of all the above data science topics, with proficiency to engage in more advanced courses in the future

Required Books
- *Data Science (MIT Press Essential Knowledge series)* by Kelleher & Tierney, ISBN 9780262535434
  - Introductory book for data science basics
- Other readings will be assigned and provided as PDFs

Prerequisites
None

Grading
The homework assignments will be worth 40% of the course grade, paper reviews will be 20%, class participation will be 20%, and the final essay will be worth 20%.

The summary of the weights of each assignment for contributing to the final grade is as follows:

Assignment	Weight in final grade
Homework Assignments	40%
Reading Reviews	20%
Final Essay	20%
Participation/Attendance	20%

Final Grades: A: 90% - 100%
B: 80% - 90%
C: 70% - 80%
D: 60% - 70%
F: less than 60
(+/- will be given for borderline grades)

Assignments
Homework assignments
There will be 4 homework assignments during the semester. Students should plan to submit a written answer to assignment questions as a PDF, as well as any additional analysis files that were part of the completed homework (python code, excel). Make sure you completely answer all questions. Work will be graded based on thoroughness and quality. Late submissions are allowed for 1 days (up to 24 hours after the due date/time), with a penalty of -10% per day. No late work will be accepted after one days since the assignment was due.

The assignments must be submitted online on the class Blackboard at https://learn.hanyang.ac.kr. Only legible, organized homework which shows your work will be graded. Include your name, section number, date, and homework number on the first page of your assignment. It is your responsibility to check that your files are uploaded correctly to Blackboard

Reading Reviews:
Throughout the semester, the students will be also provided with an assigned reading related to the class topics for that week. A "reading schedule" will be maintained on the class Blackboard at https://learn.hanyang.ac.kr. It is students' responsibility to make sure you pay attention to which readings are due, and when.

Readings will be a mix of chapter readings form the course textbook, and several assigned readings from

other sources (journals, news articles, etc.) which will be provided on the class website as PDFs. For each assigned reading, students should submit a "Reading Review" following the instructions on the course website. These reading reviews will be graded.

Final Essay:
The purpose of the final essay is to demonstrate students' ability to apply the knowledge and the techniques learned during this course to a two hypothetical problems ("prompts") related to course topics. The final essay for this class is more extensive analysis task. Students will be graded based on their ability to synthesize course knowledge and apply it to a novel problem, while presenting a coherent argument to back up their conclusions. Use of outside resources, or independent research on the prompt topics to add supplemental information is encouraged.

Deliverables for the final project:
Essay: The final submission should be written in the format of an essay. There should be two separate essays, one for each prompt, approximately 2-3 pages long each (~5 pages total). Submissions should be in PDF format (.pdf). Use of images or graphs is okay, but those don't count towards the page limit. Where appropriate, citations should be given for referenced material. Essays should have appropriate layout and content (thesis statement, introduction, conclusion, body, etc.). Students should follow published guidelines on how to write an academic essay, such as:
- https://writingcenter.fas.harvard.edu/pages/essay-structure
- https://www.fastweb.com/student-life/articles/essay-tips-7-tips-on-writing-an-effective-essay

Participation
Students will also be graded based on their participation in in-class discussion and regular attendance. There will be a number of in-class group activities. The belief is that students learn better when they engage their own curiosity, rather than just engage in rote memorization. So bring your curiosity to class.

Software
The use of Python will be a component of the class, and some prior knowledge is a prerequisite for the course. Outside of that, there will be some tasks using SQL for database manipulation (which will be taught in class) and some manipulation of data in MS Excel.

Course Schedule
The course schedule will be maintained on the course website on Blackboard.

Attendance
It is expected that you will attend every class and remain for the duration; it is the single most important action you can take in mastering the course objectives. Coming 15 minutes late or leaving 15 minutes constitutes an absence for the student. You are responsible for all material covered, assignments delivered or received, and announcements made in class sessions that you miss. For distance learning students, this means viewing the classes in a timely manner, participate in the discussion forum, and being sure to email or call in any questions that you have.

Email
Email is the primary means of communication between faculty and students enrolled in this course outside of class time. Students should be sure their email listed in Hanyang's system is correct.

Attitude
A professional and academic attitude is expected throughout this course. Measurable examples of

nonacademic or unprofessional attitude include but are not limited to: talking to others when the instructor is speaking, mocking another's opinion, cell phones ringing, emailing, texting or using the internet whether on a phone or computer. If any issues arise a student may be asked to leave the classroom. The professor will work with the Office of Student Affairs to navigate such student issues.

Civil Discourse
Hanyang University is a community that thrives on open discourse that challenges students, both intellectually and personally. It is the expectation that all dialogue in this course is civil and respectful of the dignity of each student to become leaders. Any instances of disrespect or hostility can jeopardize a student's ability to be successful in the course

Cell Phones/On Call
If you bring a cell phone to class, it must be off or set to a silent mode. Should you need to answer a call during class, students must leave the room in an undisruptive manner. Out of respect to fellow students and the professor, texting is never allowable in class. If you are required to be on call as part of your job, please advise me at the start of the course.

Course Policies

Changes to Syllabus
This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, and an announcement will be posted on Blackboard and sent via email.

Academic Integrity and Plagiarism
This course will be subject to the university's academic integrity policy. More information can be found at the Office of Academic Affairs: https://academic.hanyang.ac.kr/home

Academic Policies
All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at More information can be found at the Office of Academic Affairs: https://academic.hanyang.ac.kr/home

Incomplete Grades
An incomplete grade is a special, temporary grade that may be assigned by an instructor when unforeseeable circumstances prevent a student from completing course requirements by the end of the term and when otherwise the student had a record of satisfactory progress in the course. All incomplete requests must be approved by the instructor of the course and the Associate Dean. Only exceptions cases will receive such approval. More information can be found at the Office of Academic Affairs: https://academic.hanyang.ac.kr/home