# Course Syllabus: Text Analytics and Natural Language Processing

**Hult University Spring 2022**

Dates: Feb 21, 2022 – Mar 24 2022 (specific dates below)

Time: 5:00pm-8:00pm

Instructor: Bikalpa Neupane, Ph.D.

bikalpa.neupane@faculty.edu

Office Hrs: Available upon request

Coding Lab: TBD hosted by TA

TA: Max Faramarzi

He is your resource for coding assignments, labs, and troubleshooting. Office hours will be announced soon.

## Important URLs:

https://mycourses.hult.edu/

<https://www.rstudio.com/products/rstudio/download/>

https://github.com/BikalpaN/Text-Mining-NLP

**Canvas**

For homework submissions and grading. Plus, course materials and recorded lectures.

The **Github** repository allows you to get all scripts, PowerPoints, and data sets throughout the semester. For those not familiar with GitHub, think of it like a shared drive like SharePoint or Dropbox but with added functionality for data and computer science.

<https://github.com/BikalpaN/Text-Mining-NLP>

## Streaming & Video Information:

Lectures will be in-person and streamed via zoom, with link in the canvas site.

## Prerequisites:

* Textbook: Text Mining in Practice with R

ISBN-10: 1119282012

1. Software: R & R-Studio
   1. This course expects basic understanding of R
   2. If you require a refresher for R programming, please take a short introduction to R course at Lynda.com, DataQuest.com or DataCamp.com.
2. Access to git software to download data sets and class material or ability to download directly from the Internet
3. Download RStudio - https://www.rstudio.com/products/rstudio/download/
4. A webcam for interacting during class if you are attending virtual
5. To avoid disruption please install R and R studio on your local laptop. This requires you to have administration privileges. Further one of the R packages `qdap` requires a java installation which may be challenging on Mac OS. As a backup you may use rstudio.cloud but issues may arise due to free tier limits.

## Course Descriptions & Learning Objectives:

This course is a deep dive into the principles and techniques of text analytics. Topics include text file analysis and construction, reading and writing text files in R, using the APIs for text analysis, and creating frequency histograms for a text corpus and tokens. Students will also

learn how to program in R for effective text analysis. Topics in statistical text analysis will provide working examples and exercises.

Natural Language Processing (NLP) and Text mining is the art and science of extracting insights from large amounts of natural language.  The course topics will help students add natural language processing techniques to their research, business, and data science toolset.  As a technical course with some machine learning elements, limited exposure to programming, graduate level statistics and mathematical theory is needed but much of the course content will be focused on applying popular text mining methods.  Students will be able to think systematically about how information can be obtained from diverse natural language.   
Students will learn how to implement a variety of popular text mining algorithms in R.

* CLO 1: Learn how to transform and mine a text file
* CLO 2: Access and use text APIs
* CLO 3: Import, review, manipulate and summarize text data sets in a Term Document Matrix
* CLO 4: Build a statistical model based on a text corpus
* CLO5: Investigate Conversational AI and NLP systems

## Attendance :

Regular attendance (participation in the classroom discussion or expressed by watching videos live or asynchronously) and remote participation (expressed by interacting in class and on the class forum) is essential to the successful completion of this course. You are responsible for material covered in class even if you have not attended class or watched the recorded lectures. Missing more than 1 class session for any reason may result in an automatic reduction in course grade. Unsatisfactory attendance may result in a failing grade. For remote participants, skipping videos and not participating may impact both your assignment sophistication and your participation grade. You should plan on spending at least three hours of independent study for each hour of class attendance.

## Code of conduct:

This course expects you to uphold and report violations of the Hult University code of conduct. Further, all assignments are the responsibility of each *individual* pupil unless assigned as a group assignment. Utilizing the class forum, online resources, teaching assistants, and the class professor to ask questions is (of course) acceptable but copying another peer’s work is considered a violation of the University code of conduct.

You are responsible for understanding Hult University policies on academic integrity and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting "the wrong draft", or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity.

Accessibility  
Your professor and Hult University are committed to providing an accessible, safe, diverse academic community. If necessary, contact school administration for academic, classroom or other appropriate accommodations.

## Grading:

A course grade will be assigned based on student performance on case studies, a written assignment, and attendance and participation.

**Assignments are due at 5pm on the data specified in the class table below.**

Assignments are accepted up to 24 hours late with a one letter grade deduction. Any work submitted 24hours will automatically be assigned an F. Pupils are expected to manage their own time and submit their work accordingly. Failure to submit submissions through the University approved portal by the assignment deadline will be considered late and not accepted. *Submissions to any other location will not be accepted*.

**Graduate Student Grading**

1. Skills Assessment 5%: **See class info table & student repo** for more information.
2. Homework I 15%: **Text Organization**; complete and turn in an R script, notebook or markdown performing the tasks shared in class. Code is graded for accuracy, completeness, logical construction, appropriate comments and being error free.
3. Case I 20%: **NBA Fan Engagement** - Exploratory Data analysis and basic NLP techniques
4. Homework II 15%: **Conversational AI** - Design a specification document for your own conversational AI and chatbot strategies.
5. Case II 20% **Text Document Classification -** Informing government policy decisions.Complete and turn in an R script, notebook or markdown performing the tasks shared in class. Code is graded for accuracy, completeness, logical construction, appropriate comments and being error free.
6. Written assignment 15%: **Personal Code of Ethics** essay described below.
7. Class Participation 10%: *Class participation is not free credit. If students do not contribute, they will not receive class participation credit.*

## Writing Assignment

A portion of the final grade will be determined by the quality and completeness of a 900-to-1200-word ***essay concerning a personal code of conduct for using natural language processing ethically in business***. For professionals in the class, this may mean articulating a justification for moral business applications using this technology, identifying aspects of the technology one is not comfortable with and identifying possible objections to demonstrate robust thoughtfulness. For students without significant professional experience, this essay may demonstrate introspection of how society is shaped by this technology and its possible missteps.

Example questions to spur creative reflection include (but are not limited to):

* Is using a text model to predict candidate expertise in resumes acceptable to save time and money recruiting or does it reinforce historical hiring patterns that are biased?
* Is the technology behind smart speakers that employ natural language analysis helpful or intrusive? Would you as a professional want to work on a project to create this technology in other areas such as smart speakers in the workplace? If these devices are placed in a workplace, could they result in liability or bad actors listening in?
* Ethical implications of conversational AI and NLP systems

While defining an ethical framework can be a personal matter, the organization and robustness of your argument along with supporting statements to the argument are subject to evaluation. It is not the case that all ethical actions are relative or that ethical considerations are incapable of objective evaluation. Further the level of sophistication you demonstrate in understanding the issue discussed, addressing applicable opposing viewpoints, actions stakeholders can take to mitigate issues and the logical structure of your essay will impact your grade. Lastly, primary source philosophical paradigms, not mere opinions should be used as a foundation for your logical construction of what is ethical in a data mining and business context.

Each page should have a header with a clear label including the author, date, page number and title. As a personal reflection paper concerning ethics, APA or similar citation method is *not* necessary.

## Case Presentations

Each student will work on 2 case studies individually. Cases will involve using text to apply various methods and draw out insights and conclusions. Each case will have the following work artifacts:

1. Case I:
   1. Maximum 10min voice recorded slide presentation uploaded to YouTube, or a voice over in the slide file, screenshare i.e., loom.com or shared in a similarly appropriate manner.
   2. The presentation will describe and explore data, the problem statement, prior expectations, and any insights identified
   3. Slide presentation uploaded to canvas
   4. R script, markdown or notebook supporting the creation of any visuals, models or insights made during the presentation.
2. Case II:
   1. Maximum 10min voice recorded slide presentation uploaded to YouTube, or a voice over in the slide file, or shared in a similarly appropriate manner.
   2. The presentation will outline the text used, the problem statement, prior expectations and any insights identified
   3. Slide presentation uploaded to canvas
   4. R script, markdown or notebook supporting the creation of any visuals, models or insights made during the presentation.

Essentially all supporting material including scripts, documents, visuals and/or presentation slides will need to be turned in for review. *Like all assignments, the cases are due at 5pm on the data in the classes table below. Late assignments are accepted up to 24hrs late with a 1 letter grade deduction. Assignments submitted more than 24hrs after the due date will automatically be assigned an F.*

## Classes

Refer to the Canvas and Check the ‘Modules’. This is subject to change per class pace. Intrsutor will keep you updated.

## Guest Lectures

Beginning second week of the class, we will invite Guest speakers from different fields of expertise. The objective of this session is to provide exposure to wide array of industry problems and use cases through different angles – engineering, data science, NLP, product management etc.

## Grading Scale

You earn the grade based on assignments according to the scale below. Grades are not curved to fit a predetermined distribution. A student’s degree, certificate candidacy, or funding status will not have any impact on a course grade. “Needing an A” for any reason is not sufficient to earn an A grade.

|  |  |  |
| --- | --- | --- |
| Max | Min | Grade |
| 100 | 90 | A |
| 86.9 | 80 | B |
| 76.9 | 70 | C |
| 66.9 | 60 | D |
| 59.9 | 0 | F |