# CSE 4392: Special Topics: Natural Language Processing

Spring 2024

## Instructor Information

### Instructor(s)

Kenny Zhu

### Office Number

ERB-535

### Office Telephone Number

[(817) 272-3721](https://www.google.com/search?q=uta+cse&oq=uta+cse&gs_lcrp=EgZjaHJvbWUqBggAEEUYOzIGCAAQRRg7MgYIARBFGDsyBggCEEUYOzIGCAMQRRg7MgYIBBBFGEAyBggFEEUYPDIGCAYQRRg8MgYIBxBFGDzSAQc4ODJqMGo0qAIAsAIA&sourceid=chrome&ie=UTF-8)

### Email Address

kenny.zhu@uta.edu

### Faculty Profile

[Kenny Zhu](https://www.uta.edu/academics/faculty/profile?username=zhuk2) (<https://kenzhu2000.github.io/> )

### Office Hours

Wednesday 4-5 PM

## Course Information

### Section Information

CSE 4392 Natural Language Processing (Section 2)

### Time and Place of Class Meetings

Mon,Wed 2:30PM – 3:50 PM (On-campus, venue TBD)

### Description of Course Content

Natural language processing (NLP) is the ability of a computer program to understand and further generate (mostly) human language as it is spoken and written -- referred to as natural language. It is a key component of artificial intelligence (AI), and is considered a grand challenge in AI. NLP has existed for more than 50 years and has roots in the field of linguistics. This course introduces the both classical and contempory concepts in NLP especially from a statistical and machine learning approach. It aims to provide the students with a basic understanding and appreciation of key NLP theories such as lexicons, grammar, parsing and language modeling, as well as emerging NLP applications including text classification, information retrieval, machine translation, text summarization, question answering and dialogue systems. Students will practice the knowledge acquired in this course through a team project which aims at solving one particular NLP problem of their choice.

### Student Learning Outcomes

1．Understand the basic concepts and theories of NLP (quizzes, assignments, final exam)

2．Understand the classic computational linguistic tasks and tool chains (quizzes, assignments, final exam, project)

3．Understand the theory and implementation of popular NLP applications (assignments, quizzes, final exam and project)

4．Being able to implement a complete system to solve a typical or emerging NLP problem (project)

### Required Textbooks and Other Course Materials

Optional:

Speech and Language Processing by Dan Jurafsky and James Martin (3rd edition draft), Prentice Hall (Freely available online).

Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schutze, The MIT Press (Freely available online).

Introduction to Information Retrieval  by [Christopher D. Manning](https://www.amazon.com/Christopher-D-Manning/e/B001H6KI62/ref=dp_byline_cont_book_1), [Prabhakar Raghavan](https://www.amazon.com/Prabhakar-Raghavan/e/B001IQZ88O/ref=dp_byline_cont_book_2), [Hinrich Schütze](https://www.amazon.com/Hinrich-Sch%C3%BCtze/e/B001H6ENX6/ref=dp_byline_cont_book_3), Cambridge University Press (Freely available online).

Students: Additional materials for this course may range in cost depending on the project and or topic you choose to work on.

### Descriptions of major assignments and examinations

Typically there is an assignment that consists of 2-4 questions. Some of the questions will be short-answer questions; some may require some programming. The course project (to be completed in a group of 2-3 persons) involves the development of a system that solves an NLP task of choice. The project will due 1-2 weeks after the last lecture. The final examination will be a combination of multiple coice questions, short-answer questions and essay-style questions.

### Technology Requirements

### Programming-style questions in the assignments will be submitted electronically on Canvas; other assignments should be submitted either on Canvas or physically to the TA.

### Other Requirements

N/A

## Grading Information

### Grading

1. In-class quizzes: 10%
2. Tutorial discussion participation: 5%
3. Assignments: 30%
4. Project: 25%
5. Final Exam: 30%

### Make-up Exams

N/A

## Course Schedule

| **Class Meeting** | **Topic** | **Assignment** | **Assessment** | **Student Learning Outcome #** |
| --- | --- | --- | --- | --- |
| Week 1 | Introduction & Linguistics Basics | Read MS Ch.3, J Ch. 17 , Hw 1 | Quiz 1 | 1,2 |
| Week 2 | N-gram Language Models | Read J Ch. 3 , Hw 2 | Quiz 2 | 1, 3, 4 |
| Week 3 | Naïve Bayes Model | Read J Ch 4, Hw 3 | Quiz 3 | 1, 3, 4 |
| Week 4 | Log-linear Models | Read J Ch 5 , Hw 4 | Quiz 4 | 1, 3, 4 |
| Week 5 | Word embedding | Read J Ch. 6 , Hw 5 | Quiz 5 | 1, 2, 3, 4 |
| Week 6 | Neural Network Basics | Read J Ch. 7 , Hw 6 | Quiz 6 | 1, 3, 4 |
| Week 7 | Sequence Models (HMMs) | Read J Ch. 8, Hw 7 | Quiz 7 | 1, 3, 4 |
| Week 8 | Expectation-Maximization (EM) | Read Manning Notes, Hw 8 | Quiz 8 | 1, 3, 4 |
| Week 9 | Project Proposal | General Readings | N/A | 4 |
| Week 10 | Neural Language Models (RNN, LSTM) | Read J Ch. 9, Hw 10 | Quiz 10 | 1, 3, 4 |
| Week 11 | Transformers and Large Language models | Read J Ch. 10-12 , Hw 11 | Quiz 11 | 1, 3, 4 |
| Week 12 | Text Classfication | Read MS Ch. 16, J Ch. 4, Hw 12 | Quiz 12 | 3, 4 |
| Week 13 | Information Retrieval & QA | Read MPH, J Ch. 14, Hw 13 | Quiz 13 | 3, 4 |
| Week 14 | Machine Translation | Read J Ch. 13, Hw 14 | Quiz 14 | 3, 4 |
| Week 15 | Text Summarization | Read papers and hand-outs , Hw 15 | Quiz 15 | 3, 4 |
| Week 16 | Dialogue Systems | Read J Ch. 15 , Hw 16 | Quiz 16 | 3, 4 |

## Institutional Information

UTA students are encouraged to review the below institutional policies and informational sections and reach out to the specific office with any questions. To view this institutional information, please visit the [Institutional Information](https://resources.uta.edu/provost/course-related-info/institutional-policies.php) page (https://resources.uta.edu/provost/course-related-info/institutional-policies.php) which includes the following policies among others:

* Drop Policy
* Disability Accommodations
* Title IX Policy
* Academic Integrity
* Student Feedback Survey
* Final Exam Schedule

## Additional Information

### Face Covering Policy

*Face coverings are not mandatory; all students and instructional staff are welcome to wear face coverings while they are on campus or in the classroom.*

### Attendance

Attending class sessions is a critical predictor and indicator of student success. The University of Texas at Arlington does not recognize a single attendance policy but encourages facultyto establish class-specific policies on attendance. As the instructor of this section, I will assess the attendance using the in-class quizzes, which will be released at every lecture.

The U.S. Department of Education requires that UT Arlington have a mechanism in place to verify Federal Student Aid recipients’ attendance in courses. UT Arlington instructors are expected to report the last date of attendance when submitting students’ final course grades; specifically, when a student earns a course grade of F, instructors must report the last date a student attended their class. For on-campus classes, last date of attendance can be based on attendance rosters or on academic engagements—a test, participation in a class project or presentation, or Canvas-based activity. Online or distance education courses require regular and substantive online interaction and participation. Students must participate in online course activities in Canvas to demonstrate attendance; logging into an online class is not sufficient by itself to demonstrate attendance. The last date of attendance is reported to the U.S. Department of Education for federal financial aid recipients.

### Lab Safety Training

**Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities.** Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., Fall through Summer II) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

### Emergency Exit Procedures

Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

### Academic Success Center

The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For additional information visit: [Academic Success Center](https://www.uta.edu/student-success/course-assistance) (https://www.uta.edu/student-success/course-assistance). To request disability accommodations for tutoring, please complete this [tutoring request form](https://www.uta.edu/student-success/course-assistance/tutoring/request) (https://www.uta.edu/student-success/course-assistance/tutoring/request).

**▲ The** [**IDEAS Center**](https://www.uta.edu/ideas/) (https://www.uta.edu/ideas/) **(**2nd Floor of Central Library) offers **FREE** [tutoring](https://www.uta.edu/ideas/services/tutoring/index.php) and [mentoring](https://www.uta.edu/ideas/services/mentoring/index.php) to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

## Emergency Phone Numbers

**▲** In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

## Library Information

### Research or General Library Help

Ask for Help

* [Academic Plaza Consultation Services](https://library.uta.edu/academic-plaza)(library.uta.edu/academic-plaza)
* [Ask Us](http://ask.uta.edu/)([ask.uta.edu/](http://ask.uta.edu/))
* [Research Coaches](https://library.uta.edu/subject-librarians) (http://libguides.uta.edu/researchcoach)

Resources

* [Library Tutorials](https://library.uta.edu/how-to) ([library.uta.edu/how-to](http://library.uta.edu/how-to))
* [Subject and Course Research Guides](https://libguides.uta.edu/) ([libguides.uta.edu](http://libguides.uta.edu/))
* [Librarians by Subject](https://library.uta.edu/subject-librarians) (library.uta.edu/subject-librarians)
* [A to Z List of Library Databases](https://libguides.uta.edu/az.php) (libguides.uta.edu/az.php)
* [Course Reserves](https://uta.summon.serialssolutions.com/#!/course_reserves)(https://uta.summon.serialssolutions.com/#!/course\_reserves)
* [Study Room Reservations](https://openroom.uta.edu/)(openroom.uta.edu/)

**#######**