



## Deep Learning for Natural Language Processing

### Description

This course aims to train students to NLP approaches such as Named Entity Recognition, Syntactic Parsing, Part-of-Speech Tagging, which are key feature to information extraction. These approaches are the very first brick of many applications such as Search Engines, Machine Translation, anonymization of document, classification of documents, etc.

With the recent advances in Machine Learning et especially in Deep Learning (Artificial Intelligence), this course proposes an introduction to Deep Learning applied to NLP. We will explore word embeddings, document embeddings and how to use these representations into NLP applications.

### Learning Objectives and Outcomes

- NLP
- Deep Learning
- Applications: NER, PoS Tagging, Machine Translations, Speech Recognition

### Course Schedule and Contents

Session#1 3 hours	<ul style="list-style-type: none"><li>• Introduction to NLP</li><li>• NLP Applications</li></ul>
Session#2 3 hours	<ul style="list-style-type: none"><li>• Formal Grammar</li></ul>
Session#3 3 hours	<ul style="list-style-type: none"><li>• Introduction to Probabilities</li><li>• Markov Chains<ul style="list-style-type: none"><li>○ Demo #1 – Introduction to command line</li></ul></li></ul>
Session#3 3 hours	<ul style="list-style-type: none"><li>• Introduction to Probabilities</li><li>• Hidden Markov Model</li><li>• Markov Random fields</li><li>• Conditional Random fields</li></ul>
Session#4 3 hours	<ul style="list-style-type: none"><li>• Part-of-Speech Tagging<ul style="list-style-type: none"><li>○ Demo #2 – PoS tagging using Finite State Machines</li></ul></li></ul>
Session#5 3 hours	<ul style="list-style-type: none"><li>○ Demo #3 – PoS tagging using Conditional Random Fields</li></ul>
Session#6 3 hours	<ul style="list-style-type: none"><li>• Deep Learning for NLP</li><li>• Word Embeddings</li></ul>



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- Demo #4 – Word Embeddings

Session#7  
3 hours

- Classification
  - Demo #5 – Sentiment Analysis

Session#8  
3 hours

- Machine Translation
  - Demo #6 – Neural Machine Translation

Session#9  
3 hours

- Speech Recognition
  - Demo #7 – Deep Speech Recognition

Session#10  
3 hours

- Text and Image representation
  - Demo #8 – Image retrieval

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### Grading

Demos: 60%

Quiz: 40%

### Policies

- I expect you to turn-in your reports on time to receive proper credit/grade.
- Any work submitted must be your own.
- I expect everyone to contribute equally to group assignments
- Attendance in every class is expected and class participation and discussion is strongly encouraged.
- Late work will be accepted with penalties unless prior arrangements have been made directly with me.

Good Luck!