

COURSE DESCRIPTION

Dept., Number	CS481	Course Title	Artificial Intelligence: Language Understanding
Semester hours	3	Course Coordinator	Dr. Shlomo Argamon, Associate Professor

Current Catalog Description

Theory and programming paradigms that enable systems to understand human language texts and extract useful information and knowledge. For example, extraction of structured event representations from news stories or discovering new research hypotheses by analyzing thousands of medical research articles. The course covers a variety of text analysis and text mining methods, with an emphasis on building working systems. Connections to information retrieval, data mining, and speech recognition will be discussed. (3-0-3) Prerequisite: MATH474 and (CS331 or CS401 or CS403)

Textbook

Foundations of Statistical Natural Language Processing by C. D. Manning and H. Schutze, MIT Press, 1999.

Articles placed on the web site: <http://courseinfo.iit.edu/>

References

Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, by Dan Jurafsky, James H. Martin, and Keith Vander Linden

Allen, J. (1995) Natural Language Understanding (2nd ed.).

The Internet Grammar of English: <http://www.ucl.ac.uk/internet-grammar/home.htm>

Course Outcomes

Students should be able to:

- Build systems that analyze unstructured natural language texts and extract useful information from them.
- Explain various natural language analysis methods, with a focus on hands-on experimentation and exploring real-world applications.
- Explain a variety of existing text analysis and text mining systems.
- Explain and implement the overarching text analysis task of information extraction including:
 - Part-of-speech tagging
 - Chunking

- Named-entity recognition
- Parsing
- Co-reference analysis
- Explain and understand the application of the following algorithms and techniques:
 - Hidden markov models
 - Instance-based learning
 - Lexical similarity measures
 - Semantic frame models
 - Clustering and classification learning techniques
 - Lexical chain analysis.

Relationship between Course Outcomes and Program Outcomes

The following Program Outcomes are supported by the above Course Outcomes:

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
- f. An ability to communicate effectively with a range of audiences.
- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices

Prerequisites by Topic

Algorithms, Probability

Major Topics Covered in the Course

1. Introduction and linguistic concepts, Practical issues in text processing, Overview of applications and architectures	3 hours
2. Part-of-speech (POS) tagging	4.5 hours
3. Shallow parsing	4.5 hours
4. Link parsing	4.5 hours
5. Dependency	4.5 hours
6. Lexical semantics	4.5 hours
7. Named-Entity Recognition	4.5 hours
8. Information Extraction	4.5 hours
9. Text Summarization	4.5 hours
10. Real-World Applications and Systems	1.5 hours
11. Text Classification	3 hours
Midterm Exam	1.5 hours
Final Exam	-
	45 hours

Assessment Plan for the Course

End of every semester Course Objective Assessments by CS department. End of semester Course Evaluations by IIT. Reviewed every Spring semester by CS Undergraduate Studies Committee for possible updates in the following Fall. Once every 4-5 years a detailed review of all materials for the course is made by the CS Undergraduate Studies Committee.

How Data in the Course is Used to Assess Program Outcomes (unless adequately covered already in the assessment discussion under Criterion 4)

See the assessment discussion under Criterion 4

For a computer science program

Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms		3	Software design		
Data structures			Concepts of programming languages		