

**LING 255:**  
**Formal Semantics and Cognitive Science**  
**Syllabus**

Instructor: Lance Nathan

**1. COURSE DESCRIPTION**

This course introduces the components and formal mechanisms underlying meaning in human language and uses them as a window on the human mind, its psychological development and adult cognitive processes. Topics include: what kinds of concepts a noun or a determiner can encode; how children learn the meaning of words; how these “atoms” of meaning are combined in a mathematical procedure to yield the meaning of sentences; how semantic ambiguities are processed psychologically; and the development of a theory of mind. Formal tools from set theory and predicate logic will be introduced and applied both to the linguistic and to the cognitive characterization of meaning.

**2. READINGS AND TEXTS**

***Textbook:***

None. Lecture notes will be provided.

***Other Readings:***

Various papers, which will be linked from the course website.

**3. REQUIREMENTS AND GRADE**

Homework assignments	60% (total)
Class presentation of assigned reading	10%
One term paper	20%
Attendance and class participation	10%

***Violations of academic integrity will be taken seriously!***

It is your responsibility to understand the University’s policy.  
See your Class Handbook, the university’s website, etc.

**4. ORGANIZATION AND OUTLINE OF THE COURSE**

The course builds an interpretation procedure for natural language sentences in four stages. Each stage has two parts: it introduces new formal tools to compute the semantics of increasingly more complex sentences, and it applies the acquired theoretical notions to some topics in cognitive science. (See the next two pages for details.)

*Organization and Outline of the Course, part 1 (subject to change)*

**I. The meaning of open-class lexical items. Building simple sentences.**

<ul style="list-style-type: none"><li>• Set Theory</li><li>• Propositional and Predicate Logic</li><li>• Compositionality in the semantics of natural language</li><li>• Computing ambiguities from syntactic attachment</li></ul>	<ul style="list-style-type: none"><li>• Goodman's induction problem for lexical words.</li><li>• The child's learning of lexical words. Constraints on word meaning.</li></ul> <p><b>Readings</b></p> <p>Goodman, N. 1983. <i>Fact, fiction and forecast</i>. Harvard Univ. Press. Ch 3. pp. 59-83.</p> <p>Markman, E. 1994, Constraints children place on word meanings. In Bloom, ed., <i>Lg Acquisition. Core Readings</i>. MIT Press. pp. 154-173.</p> <p>Gleitman, L. and Gleitman, H. 1992. A picture is worth a thousand words -- but that's the problem. <i>Current Directions in Psychological Science 1</i>.</p>
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**II. The meaning of functional items: Quantifiers. Building more complex sentences.**

<ul style="list-style-type: none"><li>• Quantification and the sentence. Scope ambiguities.</li><li>• Quantifiers as relations between sets.</li><li>• Mathematical properties of quantifiers. Their impact on the grammar: Negative Polarity Items, <i>there</i>-sentences.</li></ul>	<ul style="list-style-type: none"><li>• Psycholinguistic processing of scope ambiguities.</li><li>• Children's meaning of every.</li><li>• Learnability and function words: constraints on the meaning of quantifiers.</li></ul> <p><b>Readings</b></p> <p>Crain, S., et al. 1996. Quantification without Qualification. <i>Language Acquisition 5.2</i>.</p> <p>Kurtzman, H. and MacDonald, M. 1993. Resolution of quantifier scope ambiguities, <i>Cognition 48</i>, pp. 243-279.</p>
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Organization and Outline of the Course, part 2 (subject to change)

**III. Intensionality. Building embedded clauses.**

<ul style="list-style-type: none"><li>• Modality.</li><li>• Conditionals.</li><li>• Attitude reports.</li></ul>	<ul style="list-style-type: none"><li>• Animal communication and levels on intensionality.</li><li>• Acquisition of Theory of Mind: intensionality in children.</li><li>• Language and thought.</li></ul> <p><b>Readings</b></p> <p>Cheney, D. and Seyfarth, R. 1990. <i>How monkeys see the world</i>. Univ. Chicago Press. Ch 7: Deception.</p> <p>Zuberbühler, K., Cheney, D. and Seyfarth, R. 1999. Conceptual Semantics in a Nonhuman Primate. <i>Journal of comparative psychology</i> 113.</p> <p>De Villiers, J. 2000. Language and Theory of Mind: What are the developmental relationships. In Baron-Cohen, S. et al., eds., <i>Understanding other minds: Perspective from developmental cognitive neuroscience</i>.</p> <p>Lucy, J. 1992. <i>Language diversity and thought. A reformulation of the linguistic relativity hypothesis</i>. Cambridge Univ. Press.</p>
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**IV. Other aspects of meaning.**

<ul style="list-style-type: none"><li>• Anaphora and discourse.</li><li>• Implicatures.</li><li>• Expressive tier</li></ul>	<ul style="list-style-type: none"><li>• Psycholinguistic processing of anaphora resolution.</li><li>• The development of implicatures in children.</li></ul> <p><b>Readings</b></p> <p>Arnold, J. et al. 2000. The rapid use of gender information: evidence of the time course of pronoun resolution from eyetracking, <i>Cognition</i> 76(1), pp. B13-B26.</p> <p>Chierchia, G. et al. 2001. The acquisition of disjunction: evidence for a grammatical view of scalar implicatures. 25th B.U. Conference.</p>
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## 5. OTHER ADMINISTRIVIA

**Course website:** <http://www.ling.upenn.edu/~nathanla/ling-255/>

**Homework:** to be mailed to [nathanla@ling.upenn.edu](mailto:nathanla@ling.upenn.edu) by the start of class on the due date.

- As a PDF (preferred)
- As a Word document (acceptable)
- As text (not too bad)
- As anything else (place your bets)

**Office Hours:** Wednesdays, 3-5pm or by appointment

## 6. TODAY IN CLASS...

A definition of terms. Discussion.

- Semantics  
(and: why we should care)
- Formal semantics  
(and: why we need it)
- Cognitive science  
(and: why the connection to formal semantics isn't easy/obvious)

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Name: \_\_\_\_\_ Year:  Fresh.  Soph.  Jr.  Sr.

Name you wish to be called: \_\_\_\_\_

Major: \_\_\_\_\_

Relevant background (e.g. other courses in linguistics, cogsci, math): \_\_\_\_\_

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Reasons for taking this course: \_\_\_\_\_

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Anything else about yourself: \_\_\_\_\_

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*(Please fill out and return by the end of the first class)*