

Attention!

This is a representative syllabus.

The syllabus for the course you are enrolled in will likely be different.

Please refer to your instructor's syllabus for more information on specific requirements for a given semester.

LING H2052
Theories of Linguistics:
The Scientific Method for abstractions and unobservables

Instructor

XXX

1961 Tuttle Park Place
Ohio Stadium East

Course Meeting Times & Location

TuTh 3:55-5:15 PM
Bolz Hall 316

Office Hours

TBA, as well as by appointment

To get to my office: Come in through the glass doors in between Gates 22 and 24 of the Stadium (it will say Linguistics Dept.). Go up one set of stairs to first floor. Take the left branch of the hallway. My office is about halfway down on the left side.

Course Description

The aim of this course is to provide a strong grounding in some of the fundamental principles of scientific reasoning – illustrated through concrete examples across the Natural and Social sciences. There will be a particular focus on the “mentalistic” sciences of Psychology and Linguistics; however, this course is suitable for students from all backgrounds, and the material will be relevant not only across the sciences, but to non-science majors as well. Students will gain a deeper understanding of what it means to “do science”, and what, exactly is entailed by the Scientific Method. In the evaluation of original research there will be four main questions that are posed: 1) At what level of description is the theory being described? 2) What is the relationship between the theory and the model, 3) what is the linking hypothesis the author is assuming whereby their results can be interpreted as evidence for or against the given theory? and 4) is the proposed theory falsifiable, and if so, what type of evidence would falsify it?

The general aim of this course is to provide students with rigorous analytic and reasoning skills. Students will practice high level critiques of scientific articles that will allow them to assess the quality of the argumentation, the validity of the conclusions, and the relevance of the result, even in cases where they may be unfamiliar with certain details of the subject matter.

GE Quantitative and Logical Skills Requirement: Mathematical or Logical Analysis

The Goals of the Quantitative and Logical Skills GE are stated as follows *to develop skills in quantitative literacy and logical reasoning, including the ability to identify valid*

arguments, and use mathematical models. This course will stress logical reasoning and argumentation via discussion and careful analysis of theories across Philosophy, Biology, Physics, Psychology, and Linguistics. Students will learn how to interpret experimental and modeling results as tests of theoretical hypotheses.

Expected Learning Outcomes: Students are expected to learn how to construct valid arguments, understand inductive and deductive reasoning, increase their general problem solving skills, and develop sophistication in critiquing scientific scholarship in any domain.

Assignments & Grading

Students will read the rough equivalent of 2 journal papers each week, and will be required to prepare concise synopses of a subset of those readings. Only certain readings are eligible for synopsis (marked with ✓ in schedule; note that often synopses must include multiple related papers – the required set of papers can be inferred from the number of marks in the far lefthand column). Students must complete synopses on any 12 of the eligible readings/sets of readings. Synopses are due the day the reading is covered in class.

Synopses are NOT article summaries; they are to be clear descriptions of the argument structure of the article, explaining the reasoning of the author, the theoretical assumptions, the linking hypotheses between experiment and theory (as relevant), the type and quality of evidence used, the conclusions, links to other work, and any shortcomings or problematic issues in the claims of the paper. Example synopses will be provided as guidelines.

Synopses will be graded on the letter grade scale, using the OSU Standard Scheme for conversion with A corresponding to 93%, A- to 90%, B+ to 87%, B to 83%, B- to 80%, C+ to 77%, C to 73% C- to 70%, D+ to 67%, and D to 60%. Final grades will be computed with the corresponding ranges, e.g., A: 93%-100%. See the Grading Rubric for more details on how grades will be calculated.

Evaluation:

12 synopses: roughly 50% of the course grade.

In class participation in discussion: roughly 50% of the course grade

Academic Misconduct

“It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.”

Students with Disabilities

“Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.”

Readings:

Readings will be selections from the following list, organized by topic. All Readings will be available in pdf format on the Carmen site for this class.

Science & the Scientific Method

Cohen, Morris R., and Ernest Nagel. "An Introduction to Logic and scientific method: abridged edition." *London Routledge & Sons, Ltd.* (1934).

Hume, David. "1739. A treatise of human nature." *London: John Noon* (1978).

Mendel, Gregor. "Gregor Mendel's Experiments on plant hybrids: a guided study." Rutgers University Press, 1993.

Mill, John Stuart. "System of Logic: Ratiocinative and Inductive, Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation." Longmans, Green, 1898.

Popper, K. "The logic of scientific discovery." Routledge, 2005.

Popper, K., "Conjectures and refutations: The growth of scientific knowledge." Routledge, 2014.

Quine, W.V.O., 1995. "From stimulus to science." Harvard University Press.

Westaway, Frederic William. "Scientific method: Its philosophical basis and its modes of application." Hillman-Curl, 1937.

Psychology & Cognitive Science

Bechtel, William. "Levels of description and explanation in cognitive science." *Minds and Machines* 4.1 (1994): 1-25.

Broadbent, Donald. "A question of levels: Comment on McClelland and Rumelhart." (1985): 189.

Hofstadter, Douglas R. *Godel, Escher, Bach: An eternal golden braid* (1979).

Marr, D. "Vision, 1982." *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*.

McClelland, James L., and David E. Rumelhart. "Distributed memory and the representation of general and specific information." *Journal of Experimental Psychology: General* 114.2 (1985): 159.

Newell, Allen. "Physical Symbol Systems." *Cognitive science* 4.2 (1980): 135-183.

Rumelhart, David E., and James L. McClelland. "Levels indeed! A response to Broadbent." (1985): 193.

Searle, John R. "The explanation of cognition." *Royal Institute of Philosophy Supplement* 42 (1997): 103-126.

Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

Language & Linguistics

Baker, C. Carl Lee, and John Joseph MacCarthy, eds. *The logical problem of language acquisition*. MIT Press (MA), 1981.

Carnie, Andrew. *Syntax: A generative introduction*. Vol. 19. John Wiley & Sons, 2012.

Chomsky, Noam. "A review of BF Skinner's Verbal Behavior." *Language* 35.1 (1959): 26-58.

Chomsky, Noam. *Aspects of the Theory of Syntax*. No. 11. MIT press, 1965.

Cohen, David. *Explaining linguistic phenomena*. Halsted Press, 1974.

Cohen, David, and Jessica R. Wirth, eds. *Testing linguistic hypotheses*. Halsted Press, 1975.

Croft, William. *Typology and universals*. Cambridge University Press, 2003.

Givón, Talmy. *On understanding grammar*. New York: Academic Press, 1979.

Jensen, John T. *Principles of generative phonology: an introduction*. Vol. 250. John Benjamins Publishing, 2004.

Sapir, Edward. *Language: An introduction to the study of speech*. Courier Dover Publications, 2004.

De Saussure, Ferdinand. *Course in general linguistics*. Columbia University Press, 2013. (reconstruction of lectures given between 1906- 1911, from student notes)

Syllabus

Scientific Thinking

- Week 1 1/12 Introduction
1/14 Selections from Mill's *Systems of Logic* Vol II. Book V. On Fallacies
- Of Fallacies in General pp. 291-296
 - Classification of Fallacies pp. 297-304
 - Fallacies of Generalization pp. 352-372
- Week 2 1/19 Selections from Mill's *Systems of Logic* Vol I.
- Ch 11. Of the Deductive Method pp. 299- 305
 - Ch. 4: Of Laws of Nature pp. 206-211
 - Ch. 8: Of the Four methods of experimental inquiry pp. 253-266
- Selections from Hume's *Treatise of Human Nature* Book I.Part III. Of Knowledge & Probability pp.125-174
- Of Knowledge
 - Of Probability; and of the idea of cause and effect
- 1/21 Con't
- Why a Cause is always necessary
 - Of the component parts of our reasonings concerning cause and effect
 - Of the impressions of the senses and memory
 - Of the inference from the impression to the idea
 - Of the nature of the idea or belief
- ### Logical Systems & The Scientific Method
- Week 3 1/26 Hume's *Treatise of Human Nature* Book I.Part III. Of Knowledge & Probability: On the causes of belief pp.175-189
- Mill's *Systems of Logic* Vol II. Ch 25: Of the grounds of Disbelief pp.158-168
- 1/28 Popper, K. Conjectures & Refutations: The Growth of Scientific Knowledge
- Ch 3: Three Views Concerning Human Knowledge. Pp. 97-119
 - Ch 10: Truth, Rationality and the Growth of Scientific Knowledge pp. 215-222
- The Logic of Scientific Discovery
- Levels of Universality: the modus tollens pp.75-77
 - CH. 4: Falsifiability pp.78-92
 - CH 7: Simplicity pp.136-145

- Week 4 2/2 Quine, W.V. *From Stimulus to Science*.
- Ch 2: Naturalism pp 15-26
 - Ch 3: Reification pp. 27-42
 - Ch 5: Logic & Mathematics pp. 51-58



2/4 Westaway (1937) ch2 . The Nature of a Logical or Mathematical System
pp. 21-42



TBA

- Week 5 2/9 -2/11 Case Study
- Excerpts from Corcos & Monaghan (1993):
Gregor Mendel's Experiments on Plant Hybrids



The Science of the Mind

- Week 6 Behaviorism
- 2/16 excerpts from Skinner (1957)
2/18 Chomsky, Noam. "A review of BF Skinner's Verbal Behavior." *Language*
35.1 (1959): 26-58.



- Week 7 Cognitive Science
- 2/23 excerpts from Hofstadter (1979)
- 2/25 Excerpts from Newell, Allen. "Physical Symbol Systems." *Cognitive science* 4.2 (1980): 135-183.



Information Processing Models

- Week 8 Levels of Description
- 3/1 & 3/3 Readings from Marr (1982)
General Introduction
The Philosophy & The Approach
In Defense of the Approach
- Week 9 3/8 Bechtel, William. "Levels of description and explanation in cognitive
science." *Minds and Machines* 4.1 (1994): 1-25.
3/10 Searle, John R. "The explanation of cognition." *Royal Institute of
Philosophy Supplement* 42 (1997): 103-126.



Spring Break March 14-18

- Week 10 Case Study: Memory Representations
- 3/22 McClelland, James L., and David E. Rumelhart. "Distributed memory and
the representation of general and specific information." *Journal of
Experimental Psychology: General* 114.2 (1985): 159.

✓ 3/24 Broadbent, Donald. "A question of levels: Comment on McClelland and Rumelhart." (1985): 189.

Rumelhart, David E., and James L. McClelland. "Levels indeed! A response to Broadbent." (1985): 193.

The Science of Language

What is Linguistics?

Week 11

✓ 3/29 Readings from Sapir (1921/2004)

3/31 Readings from De Saussure (1911/2013)

Week 12 4/5 Chomsky, N. *Aspects of the Theory of Syntax*. Ch 1

✓
✗ 4/7 Introduction to Syntax: Excerpts from Carnie (2012)

Week 13 4/12 Introduction to Phonology: Excerpts from Jensen (2004)

✗
✓ Chomsky, N. & M. Halle. *The Sound Pattern of English* (1968)

• Ch 1. Setting pp.3-14

• Ch 8. Principles of Phonology pp.330-399

✓ Universals: Readings from Croft (2003):

Chapter 9: Typology as an approach to language

✓ 4/14 Acquisition: Readings from Baker & McCarthy (1981)

Learnability, restrictiveness, and the evaluation metric H. Lasnik

On the learnability of Abstract Phonology B.E. Dresher

Week 14

Theory Evaluation & Falsification

4/19 Readings from Cohen & Wirth (1975)

When does a test test a hypothesis, or, What counts as evidence? V.A.

Fromkin

✓ *Competence and indeterminacy* S.P. Stich

4/21 Readings from Cohen (1974)

✓ *What explanation is and isn't* R.C. Dougherty

Explanatory Inadequacy E. Bach

Readings from Givon (1979)

Chapter 1: Methodology: *on the crypto-structuralist nature of transformational grammar*

Assessment of Synopsis Scoring Template

A “synopsis” is a clear description of the argument structure in a reading. It explains (1) the reasoning structure of the author, (2) the theoretical background, (3) the hypotheses that connect the described work/experiment to a particular theory, (4) the type and quality of evidence used, (5) the conclusions made, (6) the links to similar work, and (7) shortcomings within the claims of the paper.

The following rubric will be used to grade each synopsis that you write.

| Performance Element | Exemplary (4) | Proficient (3) | Developing (2) | Emerging (1) | Not Present (0) |
|--|---|---|---|---|---|
| I. Communication <i>Relevant information (synopsis elements (1), (2), and (4)) is provided in a clear and organized manner.</i> | Identifies all three elements and includes supporting details and examples which are organized <u>logically</u> and <u>coherently</u> . | Identifies 2 of the three elements and provides <u>some</u> supporting details and examples in an <u>organized</u> manner. | Identifies 2 of the three elements with little detail or explanation. | Identifies only 1 of the elements with few or no details or states information without explanation verbatim from the text. <u>Organization</u> is <u>difficult</u> to follow. | Identifies 0 of the components of a synopsis and provides <u>no</u> detail or examples. <u>Organization</u> is <u>illogical</u> |
| II. Evaluation <i>Concepts and data provided in article are clearly stated and interpreted. Synopsis elements (3) and (5).</i> | <u>Insightfully</u> interprets data or information; identifies <u>obvious</u> as well as <u>hidden</u> assumptions; distinguishes <u>central</u> arguments from peripheral elements; <u>accurately</u> identifies chain of reasoning. | <u>records</u> data or information verbatim from the text; identifies <u>obvious</u> assumptions; distinguishes <u>central</u> arguments from peripheral elements; <u>accurately</u> identifies chain of reasoning. | Makes some errors in data or information interpretation; does not distinguish the <u>central</u> arguments; identifies <u>some</u> of the chain of reasoning. | Interprets data or information <u>incorrectly</u> ; does not include the <u>central</u> argument; <u>Incomplete</u> or <u>incoherent</u> chain of reasoning. | <u>Does not</u> evaluate data, information, or evidence; does not provide reasoning. |
| III. Synthesis <i>Identify connections between information presented in article and previously read material. Synopsis elements (6) and (7).</i> | <u>Insightfully</u> relates concepts and ideas from multiple sources; <u>recognizes</u> <u>missing</u> information; <u>identifies</u> alternative explanations, and possible <u>confounds</u> . | makes superficial reference to concepts from other sources; <u>recognizes</u> <u>some</u> <u>missing</u> information; <u>identifies</u> possible <u>confounds</u> . | <u>Inaccurately</u> or <u>incompletely</u> relates concepts and ideas from multiple sources; identifies <u>obvious</u> <u>confounds</u> . | Poorly integrates information from more than one source; <u>Superficially</u> assesses conclusions. | <u>Does not</u> integrate information from other sources; <u>fails</u> to assess conclusions. |