Term Information

Effective Term	Spring 2023
Previous Value	*Summer 2015*

Course Change Information

What change is being proposed? (If more than one, what changes are being proposed?)

(1) Number change from 2052 to 4052

(2) Designation change from honors H2052, to non-honors 4052

(3) Name change

(4) Removing the course from the Legacy GE

What is the rationale for the proposed change(s)?

(1) Content of the course is more suitable for higher level course.

(2) Changing to a 4000 level course reflects the higher level content; We want the course to be available to all student populations.

(3) The proposed name is more concise and better reflects the content.

(4) We believe few students in the Legacy GE will take such a high level course to fill the GE category.

What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

There are no changes in content being proposed. The only change will be a modification of the Curricular Map in replacing H2052 with 4052.

Is approval of the requrest contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

General Information

Course Bulletin Listing/Subject Area	Linguistics
Fiscal Unit/Academic Org	Linguistics - D0566
College/Academic Group	Arts and Sciences
Level/Career	Undergraduate
Course Number/Catalog	4052
Previous Value	*2052H*
Course Title	Lingistics and the Scientific Method
Previous Value	*Theories of Linguistics: The Scientific Method for Abstractions and Unobservables*
Transcript Abbreviation	Scientific Method
Course Description	Provides a strong grounding in fundamental principles of scientific reasoning illustrated through concrete examples across the Natural and Social sciences with emphasis on Psychology and Linguistics. This course is suitable for students from all backgrounds including non-science majors. Students will gain understanding of what it means to "do science."
Semester Credit Hours/Units	Fixed: 3

Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade

Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites

Previous Value *Prereq: Honors standing.*

Exclusions

Electronically Enforced No

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code	16.0102
Subsidy Level	Baccalaureate Course
Intended Rank	Freshman, Sophomore, Junior, Senior

Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

Previous Value

General Education course:

Mathematical or Logical Analysis

The course is an elective (for this or other units) or is a service course for other units

Course Details

Course goals or learning objectives/outcomes

- to construct valid and logical arguments through use of deductive and inductive reasoning processes
- to practice and increase general problem solving skills
- to develop sophistication in evaluating scientific scholarship in any domain
- to gain a thorough understanding of the Scientific Method

Content Topic List

- Scientific Thinking
- Logical Systems and The Scientific Method
- The Science of the Mind
- Information Processing Models
- The Science of Language

Sought Concurrence No

Previous Value **Yes**

Attachments

- 4052Syllabus_Numbers_Theme(1).pdf: 4052 Syllabus (new)

  (Syllabus. Owner: McGory,Julia Tevis)

- 2052H-syll-final.docx: 2052H Syllabus (former)

  (Syllabus. Owner: McGory,Julia Tevis)

- Curricular Map 04-01-22.docx: Curriculum Map

  (Other Supporting Documentation. Owner: McGory,Julia Tevis)

Comments

- - Please change the effective term to SP23. It would be too late to implement the change from lower division to upper division for AU22.

  - Just checking whether you do indeed intend to keep the legacy GE Quantitative Reasoning-Mathematical or Logical Analysis for this course. (I am not indicating that this should or should not happen. I just wonder if the conversation has been had. The updated syllabus for the 4000-level course does not mention anything about the legacy status.) *(by Vankeerbergen,Bernadette Chantal on 04/11/2022 10:53 AM)*

- This course is also being proposed as being part of the Open Theme Nature, Number and Mind, and so part of the 4052 syllabus explains the relevance of content to the theme. This was not relevant in the former 2052H syllabus.

  Questions and concerns should be forwarded to Julia McGory.1@osu.edu *(by McGory,Julia Tevis on 04/01/2022 04:19 PM)*

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	McGory,Julia Tevis	04/01/2022 04:20 PM	Submitted for Approval
Approved	McGory,Julia Tevis	04/01/2022 04:20 PM	Unit Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	04/11/2022 10:56 AM	College Approval
Submitted	McGory,Julia Tevis	04/11/2022 03:48 PM	Submitted for Approval
Approved	McGory,Julia Tevis	04/11/2022 03:49 PM	Unit Approval
Pending Approval	Vankeerbergen,Bernadette Chantal	04/11/2022 03:49 PM	College Approval

LING 4052: Linguistics and the Scientific Method
Spring 20xx

Instructor: Dr. Becca Morley
morley.33@osu.edu
Oxley 310

Weekly Schedule: T R 11:10-12:20 Oxley 103

Office Hours: by appointment, email morley.33@osu.edu

Course Description

What does it really mean to 'do Science'? And what counts as a scientific discipline? How do we know that one theory is better than another? And what does it take to discredit a theory once and for all? 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. We will go on to investigate how these principles can be applied to the study of entities that cannot be directly observed or measured. The human mind is the ultimate 'black box' about which we can only make indirect inferences. This presents particular challenges for a science of the mind, of which Linguistics is considered to be one branch.

The course is divided into a series of connected modules. The first of these covers the philosophy of science, inductive and deductive reasoning, cause and effect, and the nature of knowledge. The second is focused on the logic of the scientific method itself, with special focus on the concept of falsifiability. From there, a number of different symbolic systems are introduced in simplified form, e.g., base-x numbering systems, Boolean Logic, set theory, alphabets, etc. We go on to consider the representations and algorithms that might be instantiated in both the brain (hardware), and the mind (software). The last module is an introduction to the study of the human capacity for language. Here all the strands are brought together and applied to an existing debate in the literature that hinges on the correct interpretation of specific linguistic data.

This course is suitable for students from all areas, including non-science majors. No background in linguistics is assumed. Through group discussion of assigned readings we will work as a class to assess and understand the arguments that are made both against, and for, specific theories. Students will practice high level critiques of the quality of the argumentation, the validity of the conclusions, and the relevance of the results, even in cases where they may be unfamiliar with certain details of the subject matter.

Required Reading
We will read excerpts from a number of sources, many of them original works. All readings will be available in pdf form on Carmen. See attached bibliography.

Grading & Evaluation

Numerical scores for this course will be calculated out of a total of 400 points. Grades will be calculated from those scores using the Standard OSU Grading Scheme (in percentages):

93–100: A
90–92.9: A-
87–89.9: B+
83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70 –72.9: C-
67 –69.9: D+
60 –66.9: D
Below 60: E

- **42%** Reading Assignments (168 points total)
  - **12%** Prep. Assignment 1 (~ 7 pts each): summary paragraph of reading + questions (7; first 8 weeks[1])
  - **12%** Prep. Assignment 2 (16 pts each): P.A. 1 + assessment of argumentation (3; weeks 9-11)
  - **18%** Prep. Assignment 3: (24 pts each): P.A. 2 + connections to previous readings; consideration of falsifiability (3; weeks 12-15)
- **34%** Synopses (135 points total): A synopsis for each of the three case studies. See attached rubric for more details. You will be developing the skills to complete these assignments as the semester progresses. Therefore, it is not expected that you will be (**P**)**roficient** in all aspects to start. To provide a more equitable and inclusive grading approach that does not penalize lack of experience, you will be graded only on reaching a certain level of proficiency by the end of the semester.
  - **100%**: To receive full credit for this set of assignments you will need to achieve a total of at least **10 Ps**. Out of that total, there must be **at least one P for every unique category**. Otherwise the P's can be distributed across the synopses in any configuration.
  - Any category for which you have 0 P's reduces your grade by **15%**. Each additional missing P lowers your grade by **5%.**

    Example grade:

    Synopsis 1: **P** for Organization
    Synopsis 2: **P** for Organization, **P** for Communication
    Synopsis 3: **P** for Concepts, **P** for Synthesis, **P** for Communication.
    Missing **4 P's**. No **P** for Evaluation (-15%); missing 3 additional **P**'s (-5%*3): Total grade: 70%.
  - An **Exemplary** can replace any P. Each **E** is worth **3% extra credit**.

[1] In weeks 1 and 2 you will only be asked to submit questions from the readings. Each of these two assignments will be scored as half a P.A. 1 assignment, i.e., around 4 points each.

- **24%** In-class (and take home) problem sets (about 7, each worth about 14 pts; 96 points total). We will start these assignments collaboratively in class; any material that is not completed will become a take-home assignment (typically due the following day).

Assignments

In-class problem sets can be turned in physically or submitted online. They will all be started collaboratively in class, but may be finished off-line. Your synopses and reading assignments should be submitted online. **All files submitted online must be in pdf format, but can be handwritten on a tablet, or handwritten on paper and scanned if you prefer (using an actual scanning app, please, and not your phone's camera!)**

The reading assignments will get progressively more complex. For the first 8 weeks they will consist of a summary paragraph of the reading, and any questions you had (P.A. 1). In weeks 9-11 you will be asked to add an assessment of the argument structure (P.A. 2). In weeks 12-15 you will add connections to previous readings, and consider the falsifiability of claims made in the reading (if relevant) (P.A. 3). This progression is designed to transition you to writing a full synopsis.

A grading rubric for the 3 synopsis assignments is provided at the end of this syllabus. We'll also go over this in class. **The most important thing about synopses is that they are NOT book reports.** They are to be clear descriptions of the argument structure of the reading, 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. Synopses should be between 1-3 pages in length. Example synopses will be provided as guidelines.

Class discussions should help to clarify the essential claims and arguments of the reading. They should also serve to answer questions about the content of the material. Students are expected to use the discussions as a jumping off point for their writing. **You will also have the option to submit a revised version of any synopsis within 1 week after it is returned to you**. Revised synopses are expected to address my written and oral comments, and will be re-graded, with the new grade substituting for the old.

Note Taking & Questions

I expect you to ask questions if you have them. I rely on you to let me know when what I'm saying doesn't make sense[2]. I will probably slip up and use a term that you don't know from time to time. Ask in class. If you're struggling with anything, or just have a few questions, email me to chat, or to set up a meeting (in person or virtual). Office hours are by appointment only because fixed office hours typically don't work for half the class. Holding office hours is part of my job, and you should take full advantage of them.

Note taking is something of a dying art. But being able to take good notes is a very useful skill. It will consolidate the material better for you in memory, and will help in completing your assignments – especially the synopses. Therefore, if I'm going too quickly for you to take good notes, please let me know. I am always happy to slow down, try a slightly different way of explaining something, or back track to the point where things stopped making sense.

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[2] Believe me, you will not be the only one.

Special Considerations & Late Work

In-class problem sets will be (for the most part) completed during class and collected then. If you miss class the day I assign the problem set you can do it on your own and turn it in online by the end of the following day. Otherwise, **I do not accept late work as a general rule**. Homework can be turned in early if you know that you will be absent that day. The exceptions to this policy are actual emergencies, health issues, family stuff, and maybe other things if you **let me know about them in advance, or as soon as you know about them.**

Accommodation

If you need, or think you might need, an accommodation, let me know now – not halfway through the semester. The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Health and Safety Requirements

All students, faculty and staff are required to comply with and stay up to date on all university safety and health guidance (https://safeandhealthy.osu.edu), which includes following university mask policies and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

Mental Health Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you, or someone you know, is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the **Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.**

Ethics

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/.

Respect

You should treat everyone in this classroom with respect. That means, among other things, using everyone's preferred name and preferred gender pronoun (PGP). You should also be aware of the norms of respectful address for your instructors. Don't use their first names unless you're given explicit permission. If you're not sure whether your instructor has a PhD or not, err on the side of caution; Professor and Doctor are always acceptable. If you *do* know that your instructor has a PhD *do not* use Mr., Mrs., Miss, or even Ms.

Learning Objectives

Goals of the Number, Nature and Mind Theme GE:

1. Successful students will analyze the nature of mathematics and/or mathematical reasoning at a more advanced and in-depth level than in the Foundations component.

2. Successful students will integrate approaches to number, nature, and mind by making connections to their own experience of mathematical thinking and its application in the world, and by making connections to work they have done in previous classes and/or anticipate doing in the future.

3. Successful students will experience and examine mathematics as an abstract formal system accessible to mental manipulation and/or mathematics as a tool for describing and understanding the natural world or human cognition.

Expected Learning Outcomes

Successful students are able to…

1.1 Engage in critical and logical thinking about the nature and/or application of mathematical reasoning.
1.2 Engage in an advanced, in-depth, scholarly exploration of the philosophical and/or cognitive foundations of mathematics and/or the application of mathematics in understanding the natural world or human cognition.
2.1 Identify, describe, and synthesize approaches to or experiences of the role of mathematics and mathematical reasoning in different academic and non-academic contexts.
2.2 Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.
3.1 Analyze and describe how mathematics functions as an idealized system that enables logical proof and/or as a tool for describing and understanding the natural world or human cognition.

Under the "Number, Nature, and Mind" GE, this course will examine the "cognitive and linguistic aspects of mathematics and logic" as well as "the philosophical foundations of mathematics, logic, and natural science". You will be introduced to the information-processing view of the human mind and the three levels of description (computational, algorithmic, and implementational) developed for analyzing information-processing systems. You will learn how to apply logical and mathematical models to theories of the mind, beginning with data from more "concrete" domains such as biology and ethology. By learning to manipulate unfamiliar symbol systems, such as non-base-10 arithmetic, non-alphabetic writing, and phonetic transcriptions of speech, you will see that the symbols we normally take for granted are only one way to represent abstract concepts like number and language. This course is designed to teach you how to develop, test, and critically assess theoretical work, uncovering implicit assumptions in the work of others, as well as in your own thinking.

Week	Topics/Readings	Assignments
	Introduction	
Scientific Thinking		
Week 1	Selections from Mill's *Systems of Logic* Vol II. Book V. On Fallacies • Of Fallacies in General pp. 481-484 • Classification of Fallacies pp. 484-488 • Fallacies of Generalization pp. 514-526	Reading questions
Week 2	Selections from Mill's *Systems of Logic* Vol I. • Book III. Of Induction. Ch 1. pp.185-188 • Ch.3: Of the Ground of Induction pp.200-206 • Ch 11. Of the Deductive Method pp. 299- 305	In-class problem set
	Selections from Hume's *Treatise of Human Nature* Book I. Part III. Of Knowledge & Probability pp.151-174 • 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	Reading questions
Mathematical Reasoning & The Scientific Method		
Week 3	Boole, G. An Investigation of the Laws of Thought. Ch 1. Nature and Design of this work. pp.1-23	P.A. 1
	Popper, K. Conjectures & Refutations: The Growth of Scientific Knowledge • Ch 3: Three Views Concerning Human Knowledge. pp. 97-114 • Ch 10: Truth, Rationality and the Growth of Scientific Knowledge pp. 215-222 In Klee, Robert (Ed). "Scientific inquiry: Readings in the philosophy of science." (1999) • Popper, K. Falsificationism. pp 65-71	P.A. 1
Week 4	Poincare, H. Science & Method (1921). • Ch. 1 The Selection of Facts pp. 15-24 • Ch. 2 The Future of Mathematics pp. 25-31 Poincare, H. Science & Hypothesis (1905). o Part I Ch I: on the nature of mathematical reasoning. pp 1-16	P.A. 1

	Adler, Irving. "Thinking machines, a layman's introduction to logic, Boolean algebra, and computers." (1961). • Ch. 4 Numbers and Numerals pp.32-42 • Ch. 5 Algebra of Numbers pp.43-49 • Ch 8 Algebra of Classes pp.76-86	In class problem set
Case Study 1		
Week 5	*Gregor Mendel's Experiments on Plant Hybrids* • Background Reading (Corcos & Monaghan (1993): • Translation by Abbot & Fairbanks (2016) pp .407-422 o Skip p. 415 second column – p.416 middle first column "…combination of characters united through fertilization" o Skip Section: "Experiments on Hybrids of Other Plant Species" • Skip p. 421, middle of first column "In conclusion, special mention is deserved…" - end	Synopsis 1
Brain & Behavior		
Week 6	• Adler, Irving. "Thinking machines, a layman's introduction to logic, Boolean algebra, and computers." (1961). • Ch 8 Algebra of Classes pp 87-101	In class problem set
	• Rosenblatt, Frank. "The perceptron: a probabilistic model for information storage and organization in the brain." *Psychological review* 65.6 (1958). Pp.386-391 • Hebb, Donald O. The Organization of Behavior (2005). Ch.2 Summation and Learning in Perception pp.17-18; and 31- 37	P.A. 1
Representations and Symbols		
Week 7	• Churchland, P.S., and T.J. Sejnowski. *The Computational Brain* o Pp. 141-148 o Pp. 157-167 • Gallistel, Charles R., and Adam Philip King. *Memory and the computational brain: Why cognitive science will transform neuroscience*. Vol. 6. John Wiley & Sons, 2011. o Ch. 11 The Nature of Learning pp.187-197 only; Skip "Distributed Coding"	P.A. 1
	Readings from Marr (1982) • *General Introduction*	P.A. 1

Week 8	• *The Philosophy & The Approach* • *In Defense of the Approach*	
	• Turing, A.M., 1950. Computing machinery and intelligence. *Mind*, *59*(236), pp.433-460. • Adler, Irving. "Thinking machines, a layman's introduction to logic, Boolean algebra, and computers." (1961). Ch 3 Getting an Idiot to Think Pp. 21- 31	In-class problem set
Week 9	• Gallistel, Charles R., and Adam Philip King. *Memory and the computational brain: Why cognitive science will transform neuroscience*. o Pp. 107-120 • Haugeland, *Artificial Intelligence* pp.65-71	P.A. 2
	• Adler, Irving. "Thinking machines, a layman's introduction to logic, Boolean algebra, and computers." (1961). o Ch 9 Algebra of Propositions pp 115-134 • Fodor, J.A. & Z.W. Pylyshyn. Connectionism and cognitive architecture: a critical analysis. pp. 33-50	In-class problem set
Week 10	**Case Study 2**	
	Frisch, Karl von. *Bees: Their vision, chemical senses and language*. (1971). Chapter 3: Bottom of page 84-115	Synopsis 2
	Simon, H. A., & Newell, A. (1971). Human problem solving: The state of the theory in 1970. *American Psychologist*, *26*(2)	P.A. 2

Week 11	• Bechtel, W., & Abrahamsen, A. (1991). *Connectionism and the mind: An introduction to parallel processing in networks*.
	  ○ Ch. 1: Pp.1-12
	  ○ Ch. 3: pp.54-58
	  ○ Ch. 4: pp. 106-109
	• Cummins, Robert, and Denise D. Cummins. "Minds, brains, and computers: An historical introduction to the foundations of cognitive science." (2000).
	  ○ Part II Introduction. Pp.171-177
	  ○ Smolensky: pp. 286-290
		P.A. 2

	Readings from De Saussure. "Course in General Linguistics." (1911/2013). • pp. 65-83 • pp101-122	P.A. 3
Week 12	• Readings from Sapir (1921/2004) I: Introductory; Language Defined pp.3-23 http://www.gutenberg.org/ebooks/12629 • Readings from Sweet, H. "A Primer of Phonetics." (1906). pp 1-6 • Readings from Bell. "English Visible Speech in 12 Lessons. (1899) pp. VI-VIII; Lesson III p.22	In class problem set
	• Readings from De Saussure. "Course in General Linguistics." (1911/2013). Pp. 38-49 • Readings from "The Indispensable Foundation." E.J.A. Henderson (Ed). (1971). pp.228-236	P.A. 3
Week 13	Chomsky, N. & M. Halle. *The Sound Pattern of English* (1968) • Ch 1. Setting pp. 3-14 • Ch 8. Principles of Phonology pp.330-340	In-class problem set
Case Study 3		
Week 14	Everett, D., 2005. Cultural constraints on grammar and cognition in Pirahã. *Current Anthropology*, *46*(4), pp.621-646.	Synopsis 3
	Nevins, A., Pesetsky, D. and Rodrigues, C., 2009. Pirahã exceptionality: A reassessment. *Language*, *85*(2) • pp. 355-376 only	
Week 15	Chomsky, N. *Aspects of the Theory of Syntax*. Ch 1 pp. 3-46 http://quod.lib.umich.edu.proxy.lib.ohio-state.edu/cgi/t/text/text-idx?c=acls;idno=heb08421.0001.001	P.A. 3

Bibliography by Topic

Science & the Scientific Method

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.

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

Popper, Karl. *Conjectures and refutations: The growth of scientific knowledge*. Routledge, 2014.

Popper, Karl R. "Falsificationism." In Klee, R. (Ed). *Scientific Inquiry: Readings in the Philosophy of Science*. *London: Hutchinson* (1959). Pp. 65-71.

Mathematical Reasoning

Boole, George. *An investigation of the laws of thought: on which are founded the mathematical theories of logic and probabilities*. Dover Publications, 1854.

Poincaré, Henri. *Science and Method*. Courier Corporation, 2013.

Poincaré, Henri. *Science and Hypothesis*. Science Press, 1905.

Adler, Irving. "Thinking machines, a layman's introduction to logic, Boolean algebra, and computers." (1961).

Brain & Behavior

Churchland, P. S., & Sejnowski, T. J. (2016). *The computational brain*. MIT press.

Rosenblatt, Frank. "The perceptron: a probabilistic model for information storage and organization in the brain." *Psychological review* 65.6 (1958): 386.

Hebb, Donald Olding. *The organization of behavior: A neuropsychological theory*. Psychology Press, 2005.

Gallistel, Charles R., and Adam Philip King. *Memory and the computational brain: Why cognitive science will transform neuroscience*. Vol. 6. John Wiley & Sons, 2011.

Psychology & Cognitive Science

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

Turing, A.M., 1950. Computing machinery and intelligence. *Mind*, *59*(236), pp.433-460

Pinker, S., & Mehler, J. (Eds.). (1988). *Connections and symbols* (Vol. 28). MIT Press.

Bechtel, W., & Abrahamsen, A. (1991). *Connectionism and the mind: An introduction to parallel processing in networks*. Basil Blackwell.

Simon, H. A., & Newell, A. (1971). Human problem solving: The state of the theory in 1970. *American Psychologist*, *26*(2), 145.

Cummins, Robert, and Denise D. Cummins. "Minds, brains, and computers: An historical introduction to the foundations of cognitive science." (2000).

Language & Linguistics

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

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

Sweet, Henry. *A Primer of Phonetics*. Clarendon Press, Oxford. 1906.

Sweet, Henry. *The Indispensable Foundation: A Selection from the writings of Henry Sweet*. Henderson, E.J.A (Ed). Oxford University Press, London. 1971

Bell, Melville A. *English Visible Speech in Twelve Lessons*. The Volta Bureau, Washington, D.C. 1899.

Chomsky, N. and Halle, M. *The Sound Pattern of English*. Harper & Row. 1968

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

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

Everett, D., 2005. Cultural constraints on grammar and cognition in Pirahã. *Current anthropology*, *46*(4), pp.621-646.

Nevins, A., Pesetsky, D. and Rodrigues, C., 2009. Pirahã exceptionality: A reassessment. *Language*, *85*(2), pp.355-404

Biology and Ethology

Abbott, S., & Fairbanks, D. J. (2016). Experiments on plant hybrids by Gregor Mendel. *Genetics*, *204*(2), 407.

Frisch, Karl von. *Bees: Their vision, chemical senses and language*. (1971).

Assessment of Synopsis Scoring Template

A "synopsis" is a clear description of the argument structure in an article. It explains (1) the reasoning structure of the author, (2) the theoretical assumptions, (3) the type and quality of evidence used, (4) the conclusions made, (5) how the article relates to other course materials and (6) an assessment of the strengths and weaknesses of the argument. This last element requires that you formulate and express an opinion about the reading. This opinion should be based on **specific** aspects of the experimental methodology, evidence, analysis and/or theoretical claims. You should also keep in mind that the synopsis, as with the traditional essay, should begin with a thesis statement that is subsequently elaborated in the following paragraphs. All technical terms you use must be defined, and you should avoid using direct quotes from the reading whenever possible. Your job is to translate what you have read into your own words.

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

Performance Element	Exemplary	Proficient	Developing	Emerging	Not Present
I. Organization	Contains a thesis statement; is coherently and logically ordered; all terms are adequately defined; sufficient supporting details and examples are provided.	Contains a thesis statement, but relationship between ideas is not always clear; some terms not clearly defined or explained.	There is no explicit thesis statement, but the ideas are ordered in a reasonable way. There are some examples.	No main idea is identified; concepts, terms, and evidence are not organized in any discernible way.	Lacks any sort of structure; provides no explanation of terms, or elaborating details.
II. Communication	Writing is clear and concise; sentences are not overly long; statements are not unnecessarily repeated; but connections between ideas and paragraphs are made clear; language is exact and not vague	Writing is easy to follow; vague language is avoided; statements are not unnecessarily repeated.	Writing is more or less understandable, although vague in places	The writing is difficult to understand and circuitous; sentences typically contain too many different ideas	The writing is almost impossible to follow and words and phrases are mis-used
III. Concepts	Correctly identifies main argument versus peripheral arguments; accurately describes critical elements of chain of reasoning; Describes conclusions and evidence.	Identifies main argument; describes most of the critical steps of reasoning, the conclusion, and the most important evidence.	Identifies only peripheral rather than main arguments; describes part of the evidence and conclusions. (Records parts of the text verbatim, rather than paraphrasing)	Identifies a part of the argument; incorrectly describes the reasoning, or not at all. (Excessive use of quotations from the text)	Mis-characterizes the argument, conclusions, reasoning and/or evidence.
IV. Evaluation	Insightfully interprets the evidence and conclusions; identifies overt as well as hidden assumptions; identifies possible shortcomings	Offers a personal interpretation of the data; Identifies overt assumptions; identifies a possible shortcoming	Provides a superficial interpretation; expresses an opinion on the reading	Provides little to no interpretation; incorrectly identifies shortcomings, or fails to do so.	Provides no evaluation of the work at all.

LING H2052
Theories of Linguistics:
The Scientific Method for Abstractions and Unobservables

Instructor
Dr. Becca Morley
Oxley 212
morley@ling.osu.edu

Course Meeting Times & Location
TBA

Office Hours
TBA, as well as by appointment

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 is a particular focus on the "mentalistic" sciences of Psychology and Linguistics; however, this course is suitable for students from all backgrounds, and the material is relevant not only across the sciences, but to non-science majors as well. Students will gain understanding of what it means to "do science", and what is entailed by the Scientific Method. In the evaluation of original research there are 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 Reasoning: Mathematical or Logical Analysis
The Goals of the Quantitative Reasoning GE are stated as follows: *Students comprehend mathematical concepts and methods adequate to construct valid arguments, understand inductive and deductive reasoning, and increase their general problem solving skills.*

This course stresses 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 roughly 2 papers each week, and be required to prepare concise synopses of at least 12 of these readings of their choosing. 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%.

In Class Participation

Evaluation:
12 synopses: 50% of the course final grade.
In class participation in discussion: 50% of the final 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. In compliance with copyright laws, not more than 20% of course readings are taken from one source.

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).

Landau, Larry. "Progress & its Problems." (1977).

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.

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)

Weekly Schedule

HW Assignments: You must write 12 synopses of assigned readings (your choice) throughout the entirety of this course. These are due on the same day the article (or set of articles) is discussed in class. Late work is not accepted except in very rare instances.

Scientific Thinking

Week 1
- Introduction
- Readings from Westaway (1937)
  Chapter 9.1-9.7 Bacon
  Chapter 10.1-10.9 Descartes
  Chapter 11.1-11.11 Locke

Week 2
- Selections from Hume's *Treatise of Human Nature*
- Selections from Mill's *Systems of Logic*

Logical Systems & The Scientific Method

Week 3 Reading from Cohen & Nagel (1934)
- Chapter 2: The Nature of a logical or mathematical system
  Chapter 5: Logic and the Method of Science
  Chapter 12: Fallacies

- Chapter 6: Hypotheses and the Scientific Method
  Chapter 7: Classification & Definition

Week 4
- Readings from Laudan (1977)
  Chapter 1: The role of empirical problems
  Chapter 2: Conceptual problems

Case Studies

- Excerpts from Corcos & Monaghan (1993):
  Gregor Mendel's Experiments on Plant Hybrids

Week 5
- Excerpts from Westaway (1937)
  pp. 308-311: Darwin on *The Sensitiveness of Worms to Light*
  pp.311-314: Lord Avebury on *The Power of Communication Amongst Ants*
  pp. 314-316: Harvey on *The Circulation of the Blood*
- pp.371-382: *The Structure of the Atom*

The Science of the Mind

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

Week 7 Cognitive Science

- excerpts from Hofstadter (1979)
- Excerpts from Newell, Allen. "Physical Symbol Systems." *Cognitive science* 4.2 (1980): 135-183.

Information Processing Models

Week 8 — Levels of Description

- Readings from Marr (1982)
  General Introduction
  The Philosophy & The Approach
  In Defense of the Approach

Week 9

- Bechtel, William. "Levels of description and explanation in cognitive science." *Minds and Machines* 4.1 (1994): 1-25.
- Searle, John R. "The explanation of cognition." *Royal Institute of Philosophy Supplement* 42 (1997): 103-126.

Week 10 — Case Study: Memory Representations

- 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.

- 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

Week 11 — What is Linguistics?

- Readings from Sapir (1921/2004)
- Readings from De Saussure (1911/2013)

Week 12

- Deep Structure: Readings from Chomsky (1965)
- Introduction to Syntax: Excerpts from Carnie (2012)

Week 13

- Introduction to Phonology: Excerpts from Jensen (2004)
  Universals: Readings from Croft (2003):
  Chapter 9: Typology as an approach to language
- 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

- 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

- 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*

CURRICULAR MAP for the UNDERGRADUATE MAJOR IN LINGUISTICS, BA PROGRAM (Updated 4-1-22)

Goal 1: *Comprehend the fundamental analytical components needed for linguistic analysis for multiple linguistics sub disciplines.*	**Goal 2:** *Apply the relevant analytical method(s) to uncover the characteristics of a particular linguistic situation or form.*	**Goal 3:** *Formulate a well-organized, well-supported argument.*	**Goal 4:** *Use multiple methods of linguistics inquiry to evaluate the relationship between Lang and society.*	**Goal 5:** *Engage in original research.*	**Goal 6:** *Recognize how various uses and applications of linguistics apply to real world phenomena and events.*
Beginning 2000 Intro to Lang in the Humanities	**Beginning** 2000 Intro to Lang in the Humanities	**Beginning** 2000 Intro to Lang in the Humanities	**Beginning** 2000 Intro to Lang in the Humanities	**Beginning** 2000 Intro to Lang in the Humanities 2051 Analyzing the Sounds of Lang 3701 Lang & the Mind	**Beginning** 2000 Intro to Lang in the Humanities
Intermediate 3401 Words & Meanings 3502 ConLangs 3901 Lang Evolution & Lang Change 3701 Lang & the Mind 3802 Lang & Computers	**Intermediate** Ling2001 Lang & Formal Reasoning Ling2051 Analyzing Sounds of Lang 3191 Internship in Linguistics 3502 ConLangs 3801 Codes & Code-Breaking 3801 Codes & Code-Breaking 3901 Lang Evolution & Lang Change	**Intermediate** Lang, Sex, & Gender 2367.02 Lang & Advertising 3701 Lang & the Mind 3601 Lang, Race, & Ethnicity in the US 3602 Lang & Social Identity 3603 Lang Across Cultures 3604 Conducting Sociolinguistic Research	**Intermediate** 2367.01 Lang, Sex, & Gender 3501 American Indigenous Languages 3601 Lang, Race, & Ethnicity in the US 3602 Lang & Social Identity 3603 Lang Across Cultures 3604 Conducting Sociolinguistic Research 3901 Lang Evolution & Lang Change	**Intermediate** 3191 Internship in Linguistics 3601 Lang, Race, & Ethnicity in the US 3602 Lang & Social Identity 3603 Lang Across Cultures 3604 Conducting Sociolinguistic Research 3701 Lang & the Mind	**Intermediate** 2367.02 Lang & Advertising Ling3801 Codes & Code-Breaking 3802 Lang & Computers 3191 Internship in Linguistics
Advanced 4052 Linguistics and the Scientific Method 4100 Phonetics 4200 Syntax 4300 Phonology 4350 Morphology 4400 Lang & Meaning	**Advanced** 4052 Linguistics and the Scientific Method 4100 Phonetics 4200 Syntax 4300 Phonology 4350 Morphology 4400 Lang & Meaning 4550 Field Methods 4780 Research Seminar 4998 Research 4999 Thesis Research	**Advanced** 4052 Linguistics and the Scientific Method 4100 Phonetics 4200 Syntax 4300 Phonology 4350 Morphology 4400 Lang & Meaning 4780 Undergrad Research Seminar 4998 Research 4999 Thesis Research	**Advanced** 4597.01 Lang Endangerment & Death 4597.02 Lang & the Law 4601 Lang & the Black Experience 5601Introduction to Sociolinguistics 5901 Introduction to Historical Linguistics	**Advanced** 4780 Undergrad Research Seminar 4998 Undergraduate Research 4999 Undergraduate Thesis Research 4550 Field Methods	**Advanced** 4052 Linguistics and the Scientific Method 4780 Undergrad Research Seminar 4597.01 Lang Endangerment & Death 4597.02 Lang & the Law