

Logic PHIL 2310

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Class schedule: MTWRF 10:00 - 11:50

Class location: Eng&Phil 153

Course Description:

Logic is the study of human reasoning. Some believe that studying logic makes us more rational and better at critical thinking. Others think that logic makes us explicitly aware of the rules of good reasoning that all of us in a sense already know. Yet others believe that logic is a tool – like mathematics – that makes communication clearer and more efficient. Logic is indispensable for both philosophy and the sciences. But logic is also very helpful for those whose jobs have to do with argumentation and convincing others, like lawyers, journalists, and politicians. And finally, logic is good for life. In this course, we will study a variety of topics in logic, focusing on deductive logic for the most part. Deductive logic is the study of those forms of reasoning in which the conclusion is guaranteed with certainty when the assumptions are true. We will also learn about inductive and “abductive” logic (important forms of reasoning with less certainty).

Course Objective from the TTU catalog:

“The objective of the mathematics component of the core curriculum is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-world problems.”

“Students graduating from Texas Tech University should be able to demonstrate the ability to apply quantitative and logical skills to solve problems.”

Learning Outcomes:

Upon successful completion of this course you will:

- improve your ability to think clearly, coherently, non-emotionally, and rigorously,
- learn how to evaluate various points of view, including your own, critically and rationally,
- use mathematical and logical reasoning to evaluate the validity of an argument,
- be able to make many more informed and rational choices, and understand how common it is to make a choice based on flawed reasoning, and

- look smart in front of your friends!

Assessment Methods:

Three exams, containing short answers, short essays, 2-page essays, calculations, and diagrams

Homework assignments, containing short answers, 2-page essays, long essays, calculations, and diagrams

Optional quizzes to make sure the student keeps up with the reading

Class participation and occasional group work

Requirements:

- 1- There will be **three exams**, each counting as **25% of your class grade**. You will have 2 **makeup opportunities** for exam 1 and 1 makeup opportunity for exam 2. Exam 3 will not have any makeup options. These makeup exams provide you with an opportunity to improve your grade if you are not satisfied with your previous performance. You can skip these exams if you *are* satisfied with your previous grades. In any case, if you do choose to take them, your grade on the previous exams, whether lower or higher, **will be replaced**.
- 2- **13 homework assignments** are designed to make sure you are keeping up with the material and have enough practice. **3 lowest grades will be dropped**. The rest will collectively count as **25% of your class grade**. (Some of your homework is done through the software LogiCola. I will give you further instructions in class.)
- 3- Class participation is extremely important in the following ways:
 - You'll **lose points from your class grade**: after 2 absences, one percentage point for each session you miss without proper justification.
 - You will find the readings and exercises far more accessible and understandable by attending the class. Don't skip class unless you already have a bachelor's in philosophy or logic or something.
 - There will be **occasional extra credit quizzes** at the beginning of some sessions. These quizzes are optional and designed to help you improve your grade.
 - As a result of your participation, I will be familiar with your abilities, thoughts, and personal style of talking which gets reflected in your writing, which in turn helps me understand you better when grading your test or homework.

Textbooks:

Your main textbook is the manuscript written by me that you'll receive in your email

→ *Logic: A Colorful Approach*, by Shahin Kaveh

Below you can see some supplementary textbooks. I suggest that you buy at least one of these textbooks, depending on which part of the material you are having difficulty with.

→ *Introduction to Logic*, by Harry J. Gensler, Routledge, 2002

This book is good as extra reading and practice for Chapters 3, 4 and 7.

→ *Introduction to Logic*, by Irving Copi, Carl Cohen, Kenneth McMahon, 2011

This book is good as extra reading for Chapters 1, 2, and 3.

→ *The Logic Book*, by Merrie Bergmann, James Moor, Jack Nelson, fifth ed., the McGraw-Hill Companies, 2009

This book is good as extra reading and practice for Chapters 5, 6, and 8.

→ *A Modern Formal Logic Primer*, by Paul Teller, available online at:
<http://tellerprimer.ucdavis.edu>

This book is good as extra reading and practice for Chapters 4, 5, 6, 7, and 8.

General note: If you decide to buy and use any of these books (which is a good idea), be aware that they often use different notations or in some cases different rules. So don't get confused!

Policies and Other Matters:

Students with Disabilities: Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office in 335 West Hall or 806-742-2405.

Religious Holidays: You can be excused from attending the class or other required activities for the observance of a religious holiday. You should, however, let me know in advance.

Academic Integrity: As a teacher, I am required to protect academic integrity by punishing the students who cheat or plagiarize. Please don't do such things as it will cost you a lot and cause a lot of hassle for both you and me. If you are not already familiar with the concepts and instances of cheating and plagiarism, please get yourself familiarized as soon as possible.

Note on copying: If I decide that an assignment has been wholly or partially copied from another, both students get a zero on the assignment. I reserve the right to reduce the share of the homework to 10% or cancel the policy of dropping the two lowest grades or both, in case I discover rampant cheating in a way that makes it difficult to find the culprits. So, be aware that your cheating might punish your innocent friends.

Sessions' contents:

Jun 5.

- Traditional personal introduction; Course syllabus; What is logic?
- Validity and Soundness – Read §1.1

Jun 6.

- Three kinds of reasoning: deduction, induction, and abduction – Read §1.2-1.3
- Introducing abductive reasoning – Read §2.1

Jun 7. HW1 due

- Abductive reasoning and criticism of it – Read §2.2-2.5
- Abductive reasoning – HW2 lab

Jun 8. HW2 due

- Abductive reasoning – HW3 lab
- Introducing inductive reasoning – Read §3.1-3.2

Jun 11. HW3 due

- Inductive reasoning and criticism of it – Read §3.3-3.5
- Inductive reasoning – HW4 lab

Jun 12. HW4 due

- Inductive reasoning – HW5 lab
- Review of the material

Jun 13. HW5 due

Exam 1 in class

Jun 14.

- LogiCola software; Propositional Logic translations – Read §4.1
- Propositional Logic translations cont'd – Read §4.2.1-4.2.5

Jun 15.

- Propositional Logic translations cont'd – Read §4.2.6-4.2.9
- Propositional Logic – HW6 lab

Jun 18. HW6 due

- Truth tables – Read §5.1
- Truth table test of logical truth – Read §5.2

Jun 19.

- Truth table test of logical equivalency – Read §5.3
- Truth tables – HW7 lab

Jun 20. HW7 due

- Truth table test for validity – Read §5.4
- Proofs in Propositional Logic (Conjunction Elimination and Conjunction Introduction) – Read §6.1-6.4

Jun 21. HW8 due

- Proofs in Propositional Logic (Conditional Elimination and Conditional Introduction) – Read §6.5-6.6
- Proofs in Propositional Logic – HW9 lab

Jun 22. HW9 due

- Proofs in Propositional Logic (Negation Elimination and Negation Introduction) – Read §6.7
- Proofs in Propositional Logic (Disjunction Elimination and Disjunction Introduction) – Read §6.8-6.9

Jun 25.

- Proofs in Propositional Logic – HW10 lab – Read §6.10
- Review of the material

Jun 26. HW10 due

Exam 2 in class

Jun 27.

- Quantificational Logic translations – Read §7.1

- Quantificational Logic translations cont'd – Read §7.2-7.4

Jun 28.

- Quantificational Logic translations cont'd – Read §7.5-7.6
- Quantificational Logic translations – HW11 lab

Jun 29. HW11 due

- Proofs in Quantificational Logic (Universal Elimination and Existential Introduction) – Read §8.1-8.3
- Proofs in Quantificational Logic (Universal Introduction) – Read §8.4

Jul 2.

- Proofs in Quantificational Logic – HW12 lab
- Proofs in Quantificational Logic (Existential Elimination) – Read §8.5

Jul 3. HW12 due

- Proofs in Quantificational Logic (Existential Elimination cont'd)
- Proofs in Quantificational Logic – HW13 lab

Jul 5.

- Optional review session

July 6. HW13 due

Final Exam in class (8:00 a.m.)