

Logic

PHIL 2311 Sections 6 & 7

Spring, 2019

Instructor: Dr. Kenneth Williford

Meeting Times: MW, Sec. 6, 4:00-5:20; Sec. 7, 2:30-3:50

Meeting Place: Preston Hall (PH) 200

Office and Office Hours: 305 Carlisle Hall
M-W 1:00-3:20PM & By Appointment

Course Dates
January 14-May 3, 2019

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Course Description

This is a course in formal (or symbolic) logic. Logic is one of the foundations of mathematics (as well as being foundational for other disciplines—e.g., philosophy, linguistics, computer science). It is also a necessary subject matter for anyone who wants to be able to think critically and rationally. In the course we will cover the following topics (starred topics (*) are covered in less detail than the non-starred topics):

- (1) Translating sentences and arguments stated in ordinary language into logical symbolism
- (2) Propositional Logic (statements and arguments involving the Boolean connectives, and, or, not, if-then, if and only if)—natural deduction and axiomatic systems, truth-tables, tautologies, contradictions, logical independence, logical equivalence, inconsistency and consistency
- (3) Predicate and Categorical Logic (statements and arguments involving universal and existential quantification)—natural deduction and axiomatic systems, truth-functional expansions for finite domains, Venn diagrams, the Square of Opposition (from Aristotelian and Boolean points of view)
- (4) Proof techniques (proof by contradiction, conditional proof)
- (5) Common formal fallacies (e.g., denying the antecedent, affirming the consequent)
- (6) The logic of relations (identity and equivalence relations, transitivity, symmetry, reflexivity, orderings)
- *(7) The rudiments of set theory, second-order logic, and alternative logics
- *(8) The paradoxes of logic, semantics, and set theory (e.g., the Liar Paradox, Russell's Paradox, Cantor's Paradox, Curry's Paradox, and Mirimanoff's Paradox)
- *(9) The history of logic and its important place in the development of philosophy, mathematics, science, and computer science

This course satisfies the UT Arlington core curriculum requirement in mathematics.

Learning Outcomes

Successful students will demonstrably increase their ability to understand the logical forms of sentences and arguments and sharpen their analytical and argumentative skills. The course is essentially a course in deductive formal reasoning methods. Successful students will be able to formalize statements and argument and test arguments for deductive validity using the formal techniques learned in class. They will be able to test sets of statements for consistency, equivalence, and independence. They will be able to determine if individual statements are tautologies, contradictions, or contingent. They will be able to derive the logical consequences of sets of statements using a variety of formal deductive systems. These skills will be tested via a combination of exams, quizzes, homework assignments, and in-class activities.

Core Curriculum Objectives

- Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information;
- Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication;
- Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

Signature Assignments

The following assignments (among others) may be used to assess the student's level of achievement of the Core Curriculum Objectives:

1. Each student will analyze an argumentative passage pertaining to a contemporary controversy in order to determine which proposition functions as the conclusion of the argument and which propositions function as the premises. The student will then translate the ordinary language argument into formal logic and assess the argument for deductive validity using the assessment methods appropriate to logic (propositional or predicate) the argument displays. (Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills)

2. Each student will participate in an individual project in which the objective is (a) work out a proposed solution to a classic logical or set theoretical paradox (e.g., the Liar Paradox, Curry's Paradox, Russell's Paradox); and (b) write an essay setting forth the solution, formalizing the proposed solution and the principles operative in the proposal, formally demonstrating how the proposed solution circumvents the paradox, and assessing the counterintuitive consequences of the solution (there will definitely be some). The essay will involve both a display of formal logical skills and natural language articulation of the meaning of the formalism. (Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills)

Required Text

Symbolic Logic 4th edition by Irving M. Copi

We will attempt to get through the first 5 chapters of this book.

(The 5th edition may also be used, but it is much more expensive. **Do not confuse this book with *other* books with similar but distinct titles also written by Copi or Copi with co-authors. Look for the exact title!**)

The book has *not* been ordered through the UTA bookstore. Look for it online (Amazon, etc.). Also look in the Course Materials folders on Blackboard for more information on the textbook.

NB: This website will be very helpful: <https://legacy.earlham.edu/~peters/courses/log/loghome.htm>

Evaluation

- (1) Attendance, participation (25%)
- (2) Homework and quizzes (25%)
- (3) Midterm take-home exam (25%)
- (4) In-class final exam (25%)

Attendance and Participation

Attendance will be taken everyday; a student may have up to two unexcused absences without this affecting his or her grade adversely. For each further unexcused absence the attendance/participation score will be reduced by 10 points. Participation will be noted throughout the session. Sometimes participation will be mandatory; you may be called at random to do an exercise on the board or answer a question. The more you participate in discussions, raise questions about the material, volunteer for in-class exercises, etc., the higher your participation grade.

Quizzes and Homework

There will be a quiz at the end of each class week over the material covered that week. In addition, homework exercises will be assigned as the instructor sees fit. Your cumulative Quiz & Homework grade will count for 25% of your course grade. All homework assignments must be written out in a legible and non-sloppy way. Some of the assignments may be graded in class collectively. On those occasions, you will not put your name on the assignment but your 1000 number so that other students who will be grading your homework in class and under my direction can't identify you.

Take-home Midterm Exam

Near the middle of the semester I will assign a take-home examination. You will have at least a week to do it. Most likely, you will write out your answers in a blue book or on sheets of paper (stapled or paper clipped together). It must be need a legible or you will be docked up to a letter grade for sloppiness (which eats up my time and causes me headaches and eye aches).

In-class Final Exam

There will be a cumulative in-class final exam. It will be on the scheduled exam day for this course:

Section 6, Friday, May 10, 2:00-4:30 in PH 200

Section 7, Wednesday, May 8, 2:00-4:30 in PH 200

NB: Let me know as soon as possible if you would like tutoring. I also strongly recommend setting up your own independent study groups that meet regularly. If you fall behind in this course, it is not likely that you will catch up. So please be on top of this.

Tentative Course Schedule

('Copi 1.1' means 'Copi, Chapter 1, Section 1', 'Copi 3.4' means 'Copi Chapter 3, Section 4', and so on.)

1/14 Introduction to Logic

1/16 Introduction to Logic

1/21—MLK Day, No Class

1/23 Copi 1.1-1.3, Argument, Truth, Validity

1/28 Copi 1.4, Symbolic Logic

1/30 Copi 2.1, Simple and Compound Statments

2/4 Copi 2.2, Conditional Statements

2/6 Copi 2.3, Argument Forms and Truth Tables

2/11 Copi 2.4, Statement Forms

2/13 Review of Copi Chapters 1&2

2/18 Copi 3.1, Formal Proof of Validity

2/20 Copi 3.2, The Rule of Replacement

2/25 Copi 3.3, Proving Invalidity

2/27 Copi 3.5, The Rule of Conditional Proof (NB: This is 3.4 in the 5th edition.)

Likely date midterm will be assigned.

3/4 Copi 3.6, The Rule of Indirect Proof (NB: This is 3.5 in the 5th edition.)

3/6 Copi 3.7, Proofs of Tautologies (NB: This is 3.6 in the 5th edition.)

Likely date midterm will be due.

3/11-3/16—Spring Break, No Class

3/18 Copi 3.8 & 3.9, Strengthened Rule of Conditional Proof & Shorter Truth Table Technique
(NB: These are 3.7 & 3.8, respectively, in the 5th edition.)

3/20 Review of Copi Chapter 3

3/25 Copi 4.1, Singular and General Propositions

3/27 Copi 4.2, Proving Validity: Preliminary Quantification Rules

NB: March 29 Last day to drop classes; submit requests to advisor prior to 4:00 pm.

4/1 Copi 4.3, Proving Invalidity

4/3 Copi 4.4, Multiply General Propositions

4/8 Copi 4.5, Quantification Rules

4/10 Copi 4.6, Logical Truths Involving Quantifiers (NB: This is 4.7 in the 5th edition.)

4/15 Review of Copi Chapter 4

4/17 Copi 5.1, Symbolizing Relations

4/22 Copi 5.2, Arguments Involving Relations

2/24 Copi 5.3, Some Attributes of Relations

4/29 Copi 5.4, Identity and Definite Descriptions

5/1 Copi 5.5, Predicate Variables and Attributes of Attributes

We may have a few review sessions between 5/1 and 5/8. These will be scheduled later.

Final Exams:

Section 6, Friday, May 10, 2:00-4:30 in PH 200

Section 7, Wednesday, May 8, 2:00-4:30 in PH 200

IMPORTANT POLICIES OF MINE

Blackboard: I will be using Blackboard in this class to post the syllabus, handouts, announcements, links, any supplementary readings, slides, class notes, and any class recordings. Be sure to check it regularly.
(<https://elearn.uta.edu/>)

Late Work: All late work will be docked a full letter grade for every day that it is late. Note that homework assignments that are graded in class and quizzes that are given in class will not be allowed to be made up or taken later. We will have enough homework assignments and quizzes that if you miss one or two it should not affect your grade too adversely. The only exception to this policy will be if you become gravely ill or have to otherwise miss a substantial portion of the course for a well documented, acceptable reason.

Laptops and Phones: In my class I do not allow students to use laptops, smartphones, or other electronic devices without special permission. Any note taking must be done the old fashioned way. If I see laptops or smart phones out during class, I will ask you to put them up. If you won't put your device away, I will ask you to leave class. The only general exception to this will be if you need to have the textbook out and you are using an electronic version of the textbook.

Homework for Other Courses: Students are not allowed to read for or do homework for other courses while in my class.

Incompletes: I will not give a student a grade of Incomplete (I), unless he or she has a compelling, and documented, reason (e.g., a medical emergency).

Plagiarism: No student should have any doubt about what counts as plagiarism. I will assume that every student in this class has seen this tutorial provided by the UTA library and have taken the quiz embedded in it: <http://library.uta.edu/plagiarism/index.php>. All cases of plagiarism will be turned over to the Office of Student Conduct.

Office Hours: I am happy to answer your specific questions and do some limited reviewing during office hours, but I will not go over a whole course lesson during office hours. That is what is class is for.

UNIVERSITY POLICIES & OTHER USEFUL PIECES OF INFORMATION

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will follow the policy outlined above. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Blackboard. This date is reported to the Department of Education for federal financial aid recipients.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or

withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: *The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos. For information regarding Title IX, visit www.uta.edu/titleIX.*

Academic Integrity: Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at

<http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit

<http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

The English Writing Center (411LIBR): Hours are 9 am to 8 pm Mondays-Thursdays, 9 am to 3 pm Fridays and Noon to 5 pm Saturdays and Sundays. Walk In Quick Hits sessions during all open hours Mon-Thurs. Register and make appointments online at <http://uta.mywconline.com>. Classroom Visits, Workshops, and advanced services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information.

Library Info:

Library Home Page	http://www.uta.edu/library
Subject Guides	http://libguides.uta.edu
Subject Librarians	http://www.uta.edu/library/help/subject-librarians.php
Library Tutorials	http://www.uta.edu/library/help/tutorials.php
Connect Off- Campus	http://libguides.uta.edu/offcampus
Ask A Librarian	http://ask.uta.edu

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit <http://www.uta.edu/news/info/campus-carry/>

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency,

one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number **817-272-3381**.