# PHIL 2311: LOGIC THE UNIVERSITY OF TEXAS AT ARLINGTON

## Instructor Information

Dr. Jeremy Byrd
Online
Online via email Monday through Thursday 1:00 PM – 3:00 PM (CT)
(jeremy.byrd@uta.edu) or phone (817-515-4605)
Stan Baronett, Logic, 3rd Edition (Oxford: Oxford University Press). In
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(dashboard.oup.com) to gain access to online exercises and additional

## **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). In the course we will cover the following 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
- Predicate and Categorical Logic (statements and arguments involving universal and existential quantification)—natural deduction and axiomatic systems, truth-functional expansions for finite domains
- 4) Proof techniques (indirect proof, 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 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.

## Schedule

- Unit 1: What Logic Studies (Baronett, Ch. 1)
- Unit 2: Propositional Logic (Baronett, Ch. 7)
- Unit 3: Natural Deduction (Baronett, Ch. 8)
- Unit 4: Predicate Logic (Baronett, Ch. 9)

## Signature assignments

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

- 1. Each student will translate statements in ordinary language into the language of propositional logic [chapter 7.A.I Level 1 questions in Dashboard]. The student also assess the deductive validity of arguments using the assessment methods appropriate to propositional logic [chapter 8.C.I questions in Dashboard]. (Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills)
- 2. Each student will translate statements in ordinary language into the language of predicate logic *[chapter 9.A.Level I in Dashboard].* The student will also assess the deductive validity of arguments using the assessment methods appropriate to predicate logic *[chapter 9.C.II in Dashboard].* (Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills)

# Grading

Your grade in this course will be based on your performance on the graded exercises in Dashboard and your scores on the exams. I use a weighted average system, not a total points system. Your current grade is available through the Grades link at the left. In addition, practice exercises are provided in Dashboard. These do not count towards your grade, but Dashboard will show your score in its grade book, since this can be useful information.

Consult the calendar for a list of all the assignments for the course along with their due dates. Assignments must be completed by the end of the day on the due date provided. If you fail to complete an assignment, you will receive a 0 on that assignment. In general, there are no makeups. In addition, it is important to note that exams are not group projects. Any students working with others to complete an exam will be given a 0 for that exam and will be reported for academic dishonesty. This policy is strictly enforced.

## **Percentage Allocations**

- Graded Dashboard Exercises: 20% Total
- 4 Exams: 20% each / 20% Total

#### **Grade Distribution**

- A = 89.5% 100%
- B = 79.5% 89.49%
- C = 69.5% 79.49%
- D = 59.5% 69.49%
- F = 0% 59.49%

# **INSTRUCTOR/COURSE POLICIES**

#### **Communication Plan**

The primary method of communication for this course will be through UTA email. Please make sure to check your UTA email regularly, as not to miss any important communication about the course. I will check email regularly as well, and I will try to respond to any email communication within one business day. In addition, I am available for virtual office hours Monday through Thursday from 1:00 to 3:00. You can reach me during those hours by email (jeremy.byrd@uta.edu) or phone (817-515-4605). In person meetings may be available by appointment. Grading of assignments should occur within three business days of submitting any given assignment.

#### **Method of Instruction**

This course will be conducted entirely online. Students are expected to maintain contact with me as needed. Individual assistance is available in person or electronically, as noted in the Communication Plan.

#### **Attendance Policy**

Attendance in this course will be based on participation in the weekly assignments. Any student who does not complete any of the weekly assignments by the due date will be marked absent for that week.

#### **UNIVERSITY POLICIES**

#### Academic Integrity

Students enrolled all UT Arlington courses 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 in their courses by 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. Additional information is available at https://www.uta.edu/conduct/.

#### **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.

## **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 <a href="http://www.uta.edu/news/info/campus-carry/">http://www.uta.edu/news/info/campus-carry/</a>

## Student Feedback Survey

At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a 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 <u>http://www.uta.edu/sfs</u>.

#### **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.

#### 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, attendance in this course will be based on participation in the weekly assignments. Any student who does not complete any of the weekly assignments by the due date will be marked absent for that week.

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://wweb.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).\_ Only those students who have officially documented a need for an accommodation will have their request honored. 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:

<u>The Office for Students with Disabilities, (OSD)</u> www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

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

available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

#### **Non-Discrimination Policy**

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 <u>uta.edu/eos</u>.

## **Title IX Policy**

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

#### **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 <u>tutoring</u>, <u>major-based learning centers</u>, developmental education, <u>advising and mentoring</u>, personal counseling, and <u>federally funded programs</u>. 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 <u>resources@uta.edu</u>, or view the information at http://www.uta.edu/universitycollege/resources/index.php.

#### **The Writing Center**

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, and they offer online services. 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. **On the pages to follow, you will find information on the alignment of IRA, NCATE, TESOL, and TExES standards and how each are aligned to the objectives in this course** 

# ALIGNMENT TABLE

Course Objective	Unit Number and Objective(s)	Assessment Item
Formalize statements and arguments	Unit 1: Identify arguments along with their premises and conclusions.	Exercises for Chapter 1 Sections B and C Assignment: Exam 1
	Unit 1: Provide missing premises and conclusions in enthymemes.	Exercises for Chapter 1 Section H Assignment: Exam 1
	Unit 2: Translate ordinary language statements into statements in propositional logic.	Exercises for Chapter 7 Sections A, B, and C Assignment: Exam 2
	Unit 4: Translate statements from ordinary language into predicate logic.	Exercises for Chapter 9 Section A Assignment: Exam 4

Course Objective	Unit Number and Objective(s)	Assessment Item
Test arguments for deductive validity using the formal techniques learned in class	Unit 1: Define deductive validity and soundness and inductive strength and cogency.	Exercises for Chapter 1 Section E Assignment: Exam 1
	Unit 1: Identify inductively weak and deductively invalid arguments.	Exercises for Chapter 1 Sections F and G Assignment: Exam 1
	Unit 2: Identify the main operator of a compound statement.	Exercises for Chapter 7 Section D Assignment: Exam 2
	Unit 2: Construct truth tables, including indirect truth tables, to evaluate statements for consistency and arguments for validity.	Exercises for Chapter 7 Sections G and H Assignment: Exam 2

Course Objective	Unit Number and Objective(s)	Assessment Item
Test sets of statements for consistency, equivalence, and independence	Unit 2: Construct truth tables to evaluate whether statements are contingent, tautologous, contradictory, or logically equivalent.	Exercises for Chapter 7 Section F Assignment: Exam 2
	Unit 2: Construct truth tables, including indirect truth tables, to evaluate statements for consistency and arguments for validity.	Exercises for Chapter 7 Sections F and H Assignment: Exam 2
Determine if individual	Unit 2: Construct truth	Exercises for Chapter 7
contradictions, or contingent	statements are contingent, tautologous, contradictory, or logically equivalent.	Assignment: Exam 2
Derive the logical consequences of sets of	Unit 2: Identify necessary and sufficient conditions.	Exercises for Chapter 7 Section G
statements using a variety of formal deductive systems		Assignment: Exams 2
	Unit 3: Construct proofs using the implication and replacement rules of propositional logic.	Exercises for Chapter 8 Sections B-F Assignment: Exams 3

Course Objective	Unit Number and Objective(s)	Assessment Item
	Unit 3: Use the conditional and indirect proof methods.	Exercises for Chapter 8 Sections G and H Assignment: Exams 3
	Unit 3: Prove logical truths.	Exercises for Chapter 8 Section I Assignment: Exams 3
	Unit 4: Construct proofs using the rules of inference of predicate logic.	Exercises for Chapter 9 Sections B and C Assignment: Exams 4
	Unit 4: Use the conditional and indirect proof methods.	Exercises for Chapter 9 Section D Assignment: Exams 4
	Unit 4: Construct proofs involving relations, including the relation of identity.	Exercises for Chapter 9 Sections F and G Assignment: Exams 4