

CS5384 Logic for Computer Scientists

Fall 2022

Instructor

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- Office: Engineering Center, Room 313
- Office hours: 4:00pm – 5:00pm MW, or by Appointment.
- TA: TBD, email: [TBD](#)

Course Information

- Required textbook:
Logic for applications, by Anil Nerode and Richard A. Shore, Springer, 2nd Edition, **ISBN-13:** 978-0387948935

Course description and purpose

Logic has been an essential tool to represent and reason with a variety of tasks from the foundation of computing to the computational understanding of intelligence. This course will cover the part of the logic that is widely used in computer science: propositional logic and predicate logic. It also aims to offer training opportunities for rigorous reasoning (e.g., definition and proof techniques).

Content (tentative)

W1

08/26 Introduction

W2

08/29 Propositional language: syntax - 1

08/31 Propositional language: syntax -2

09/02 Propositional language: syntax -3

W3

09/05 Propositional language: semantics -1

09/07 Propositional language: semantics -2

09/09 Propositional language: semantics -3

W4

09/12 Practice 1 (HW1)

09/14 Adequacy of logical connectives - 1

09/16 Adequacy of logical connectives -2

W5

09/19 Consequences of a set of propositions – 1

09/21 Consequences of a set of propositions – 2

09/22 Consequences of a set of propositions – 3

W6

09/26 Practice 2 (HW2)

09/28 Automated reasoning – Tableau Proof – 1

09/30 Automated reasoning – Tableau Proof – 2

W7

10/03 Automated reasoning – Deduction from premises – 1

10/05 Automated reasoning – Deduction from premises – 2
 10/07 Automated reasoning – Deduction from premises – 3
 W8
 10/10 Practice 3 (HW 3) / review
 10/12 Midterm
 10/14 Compactness result - 1
 W9
 10/17 Compactness result – 2
 10/19 Automated reasoning – Resolution proof – 1
 10/21 Automated reasoning – Resolution proof – 2
 W10
 10/24 Automated reasoning – Resolution proof – 3
 10/26 Automated reasoning – Linear resolution and PROLOG – 1
 10/28 Automated reasoning – Linear resolution and PROLOG – 2
 W11
 10/31 Practice 4 (HW4)
 11/02 Predicate Logic Language: the syntax – 1
 11/04 Predicate Logic Language: the syntax – 2
 W12
 11/07 Predicate Logic Language: the syntax – 3
 11/09 Predicate Logic Language: the semantics – 1
 11/11 Predicate Logic Language: the semantics – 2
 W13
 11/14 Practice 5 (HW5)
 11/16 Predicate Logic Language: the semantics – 3
 11/18 Automated reasoning – resolution proof – 1
 W14
 11/21 Automated reasoning – resolution proof – 2
 11/23 [Thanksgiving]
 11/25 [Thanksgiving]
 W15
 11/28 Automated reasoning – resolution proof – 3
 11/30 Automated reasoning – resolution proof – 4
 12/02 Automated reasoning – resolution proof – 5
 W16
 12/05 Practice 6 (HW6) / review

 12/10 Saturday (7:30pm to 10pm) Final exam

Learning outcomes

- Have a thorough understanding of basic definition and proof skills. [Msc:(5), MSSE(5), PhD(5)]
- Get familiar with the propositional logic, predicate logic, proof procedures, and the properties of these procedures. [Msc:(1,2), MSSE(1), PhD(1)]
- Be able to apply the ideas and knowledge on logic to solve some application problems (mainly through the project). [Msc: (5), MSSE(5), PhD(5)]

Methods of Assessment

- Homework (30%), Class Participation (attendance 10%, question asking and answering presentation: 5%. Each absence will lead to -1% until 0), Project (10%), midterm (20%), final exam (25%). The grading scale: A (90-100), B (80-89), C (70-79), D (60-69), F (0-59).
- No submission will be accepted after the due date.
- The rules governing **academic conduct and Honesty** by TTU (<http://www.depts.ttu.edu/opmanual/OP34.12.pdf>) and College of Engineering should be strictly obeyed.
- Student evaluation of course learning outcomes.
- Zero tolerance for academic dishonesty. **Everyone involved in an academically dishonest event, once found, will get an F for this course immediately.** Need to sign the form at <https://forms.gle/EZRNcWq2TWXaJkZDA>
Everything you do for credit in this subject is supposed to be your own work. Whenever you have doubts about the problems in homework and assignment, **discussions** with other students and the instructor are **encouraged**. However, you need to write the solution **yourself** and list the contributions from other people.

Students with disabilities

- I would appreciate hearing from anyone who has a disability that may require special accommodations. I am sure we can work out whatever arrangements are necessary. Please see me during my office hours.
- 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.

Student Absence for Observance of Religious Holy Day

- University rules (<http://www.depts.ttu.edu/opmanual/OP34.19.pdf>) should be followed.

DISCRIMINATION, HARASSMENT, AND SEXUAL VIOLENCE STATEMENT:

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233) or file a report online at titleix.ttu.edu/students. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: TTU Student Counseling Center, 806-742-3674, <https://www.depts.ttu.edu/scc/> (Provides confidential support on campus.) TTU 24-hour Crisis Helpline, 806-742-5555, (Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.) Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, voiceofhopelubbock.org (24-hour hotline that provides support for survivors of sexual violence.) The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, <https://www.depts.ttu.edu/rise/> (Provides a range of resources and support options focused on prevention education and student wellness.) Texas Tech Police Department, 806-742-3931, <http://www.depts.ttu.edu/tpd/> (To report criminal activity that occurs on or near Texas Tech campus.)

CIVILITY IN THE CLASSROOM STATEMENT:

Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student-student and student-faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking

should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php).

LGBTQIA SUPPORT STATEMENT*:

I identify as an ally to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community, and I am available to listen and support you in an affirming manner. I can assist in connecting you with resources on campus to address problems you may face pertaining to sexual orientation and/or gender identity that could interfere with your success at Texas Tech. Please note that additional resources are available through the Office of LGBTQIA within the Center for Campus Life, Student Union Building Room 201, www.lgbtqia.ttu.edu, 806.742.5433.”