Logic

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GET1028
Mon 2-4pm, LT9, Fall 2022
Office hours: Tues 12-1pm and by appt, AS3-05 04

Course Description

Arguing is one of the most important activities in which humans engage. We form arguments for the ideas, beliefs, and views which we have. We argue against alternative ideas, beliefs, and views. But what makes some arguments good, and other arguments bad? What distinguishes good arguments from bad ones?

In this course, students will learn two theories of that distinction: propositional logic, and first-order logic. We will focus on natural language arguments, formal language arguments, formal and informal characterizations of validity, some characterizations of soundness, and techniques for extracting arguments from texts.

To motivate the study of logic, this course connects propositional logic and first-order logic to various social and political issues. To bring change the world for the better, it is important that you be able to evaluate the arguments given by politicians, lawyers, lobbyists, CEOs, billionaires, journalists, media personalities, religious leaders, and others in positions of power. Propositional logic, and first-order logic, are tools for doing just that.

Here is a short summary of the more detailed schedule at the end of this syllabus. This summary should help convey the general structure of the course.

- Week 1: natural language arguments; the basis for everything else.
- Weeks 2-6: propositional logic.
- Week 7: midterm.
- Week 8: problems with propositional logic.
- Weeks 9-12: first-order logic.
- Week 13: final.

And here is a list of the tutorials, along with their meeting times, locations, and the instructor assigned to them.

- TD1: Fri 2-4pm, AS3-0304, Yong Teck.
- TD2: Mon 4-6pm, AS3-0302, Isaac Wilhelm.
- TD3: Tues 4-6pm, AS3-0204, Yong Teck.
- TD4: Tues 2-4pm, AS3-0523, Yong Teck.
- TD5: Fri 4-6pm, AS3-0302, Yong Teck.

Course Requirements

1. Participation (50 points).
    - Students are expected to ask questions, attend all lectures and tutorials, and occasionally work together in small groups.
    - See the course website for the rubric which I use to grade participation.
2. Homework (50 points each).
    - Homework will be assigned for each of weeks 2-6 and weeks 9-12.
    - Each week, you must submit your completed homework problems by Monday at 2pm, that is, at the start of class.
3. Midterm exam (250 points).
    - The midterm exam will be held at 2pm on Sept 26, during normal class time.
4. Final exam (250 points).
    - The final exam will be held at 2pm on Nov 7, during normal class time.

For information about various course policies—for instance, the late assignment policy, the grade appeals policy, and the make-up work policy—see the course websites.

1. LumiNUS course website: https://luminus.nus.edu.sg/modules/15ce509e-a2c1-4cc2-9324-4abf1e4abc27
2. My course website: isaacwilhelm.com/teaching.htm

Learning outcomes

By this course's conclusion, you should be able to

- translate natural language arguments into arguments in propositional logic and first-order logic,
- distinguish valid arguments from invalid arguments,
- extract arguments from texts, and
- discuss complex philosophical ideas respectfully.

Plagiarism and Academic Integrity

Please adhere to the NUS policies on plagiarism and academic integrity. Penalties for violations of these policies can be severe: they include an automatic failing grade for the course, and possibly worse. A comprehensive overview of these policies can be found here:

https://www.nus.edu.sg/celc/programmes/plagiarism.html

Accessibility

This class should be a great, fun, and educational experience for everyone. And of course, everyone deserves equal access to all educational opportunities at NUS. Those with disabilities are encouraged to speak with me if that would be helpful, and to avail themselves of the services provided by the Disability Support Office

https://nus.edu.sg/osa/student-services/student-accessibility-unit

Schedule

The readings will be drawn from two textbooks, both of which are free and posted to the course's LumiNUS website: *Logic and Justice* (Wilhelm), and *forallx: Calgary Remix* (Magnus, Button). The former will be the primary textbook for the course; assigned readings from it are required. The latter will serve as a secondary source; assigned readings from it are optional. Be sure to finish any given reading, listed under a given week in the schedule below, by the start of that week's class – that is, by Monday at 2pm in that week.

In the schedule below, I list the main requirements for each week. The homework listed under a given week—which is always due by the start of that week's class—features problems based on the topic of the previous week's lecture. The reading listed under a given week—which should be completed by the start of that week's class—covers the topic of the previous week's lecture too: so the reading listed, under a given week, acts as a guide to the homework which is due on that week. The lecture listed under a given week covers the topics which will be relevant to the homework, and the reading, which is due in the next week.

In addition, note that each student has been assigned a tutorial, and attendance at your tutorial—which meets once every two weeks—is required. For a list of the tutorial dates, meeting times, locations, and instructors, see the Course Description section above.

Finally, the main textbook for this course—*Logic and Justice* (Wilhelm), the relevant chunks of which will be made available on the course LumiNUS website—is currently in press, and so not officially published. Because of that, *Logic and Justice* may contain more typos than logic textbooks usually do. So for the time being at least, I am adopting the following extra credit policy: if you are the first to find a typo and tell me about it, then you will receive one extra credit point (on a homework assignment, for instance). If this policy ends up awarding way too many extra credit points for students, then I will end it. But until then, at least, this is a way for you to earn extra credit on your assignments.

Week 1: Introduction, and Natural Language Arguments

Aug 8

- Lecture.

Readings

- *Logic and Justice*, chapter 1 (required).

Week 2: the Language of Propositional Logic

Aug 15

- Lecture.
- Homework 1 due by 2pm.

Readings

- *Logic and Justice*, chapter 2 (required).
- *forallx*, chapters 1-3 (optional).

Week 3: Truth in Propositional Logic

Aug 22

- Lecture.
- Homework 2 due by 2pm.

Readings

- *Logic and Justice*, chapter 3 (required).
- *forallx*, chapters 5-7 (optional).

Week 4: Validity in Propositional Logic

Aug 29

- Lecture.
- Homework 3 due by 2pm.

Readings

- *Logic and Justice*, chapter 4 (required).
- *forallx*, chapters 8-12 (optional).

Week 5: Propositional Logic and Validity in English

Sept 5

- Lecture.
- Homework 4 due by 2pm.

Readings

- *Logic and Justice*, review chapter 4 (required).
- *forallx*, review chapters 8-12 (optional).

Week 6: Midterm

Sept 12

- Midterm exam during classtime.

Readings

- *Logic and Justice*, chapter 5 (recommended).

Week 7: Extraction

Sept 26

- Lecture.

Readings

- *Logic and Justice*, chapter 5 (required).

Week 8: Problems with Propositional Logic

Oct 3

- Lecture.
- Homework 5 due by 2pm.

Readings

- None.

Week 9: the Language of First-Order Logic

Oct 10

- Lecture.
- Homework 6 due by 2pm.

Readings

- *Logic and Justice*, chapters 6 and 7 (required).

Week 10: Truth, Validity, and Proof Trees in First-Order Logic

Oct 17

- Lecture.
- Homework 7 due by 2pm.

Readings

- *Logic and Justice*, chapter 8 (required).
- *forallx*, chapters 21-23 (optional).

Week 11: First-Order Logic and Validity in English

Oct 24

- Lecture.
- Homework 8 due by 2pm.

Readings

- *Logic and Justice*, chapter 9 (required).
- *forallx*, chapters 21-23 and chapter 26 (optional).

Week 12: Review

Oct 31

- Lecture.
- Homework 9 due by 2pm.

Readings

- *Logic and Justice*, chapter 10 (required).

Week 13: Final Exam

Nov 7

- Final exam during classtime.

Readings

- None.