

Logic

043.071

Fall 2023

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Class: Mondays and Wednesdays 11:00 am – 12:15 pm, 7-101

Course Descriptions

Compare the following two arguments:

P1. Every rabbit is a gavagai.	P1. Some dog is a wug.
C. My rabbit is a gavagai.	C. My dog is a wug.

Intuitively, the first argument is a good one, but the second is not. To figure this out, we don't need to know what 'gavagai' or 'wug' means. This is because the goodness or badness of these arguments is determined by their logical forms. But what is the logical form of an argument? And what makes a good logical form? This is what logic is about. In this course, we will learn two logical systems: sentential logic (SL) and first-order predicate logic (PL). These logical systems will give students the ability to identify and evaluate the logical structure of an argument.

Course Objectives

Students will be able to:

1. Describe and explain the basic logical concepts such as argument, validity, soundness, truth-function, consistency, contradiction, quantifier, tautology, logical consequence, use/mention, deduction/induction, etc.
2. Distinguish between premises and the conclusion in an argument.
3. Translate complex natural language sentences (e.g., English, Korean) into the sentences of symbolic logic.
4. Carry out proofs in the formal systems presented in the course.

Required Texts

1. Handouts. All handouts will be uploaded to the course website in advance.

Optional Texts

1. M. Bergmann, J. Moore, & J. Nelson. 2014. *The Logic Book* (6th ed). McGrawHill
2. Peter Smith. 2020. *An Introduction to Formal Logic*. Logic Matters
3. P.D Magnus, T. Button, R. Trueman, & R. Zach. 2023. *forallx: An Introduction to Formal Logic*. Calgary

Evaluation

Problem Sets (2×10 = 20%): There will be 10 problem sets assigned over the course of the semester. These problem sets will not be graded; students will receive full credit for these assignments if they turn them in.

Mid-Term Exam (30%): The mid-term exam will be about the sentential logic (SL), which is the first part of the course. The mid-term exam will be on Wednesday of Week 8 (i.e., Wednesday, October 25). Prior to the exam, sample exams from previous semesters will be made available.

Final Exam (40%): The final exam will be mainly about the first order predicate logic, which is the second part of the course. However, since the predicate logic builds on the sentential logic, if you are not familiar with the sentential logic, it can be very difficult to prepare for the final exam. The final exam will be on Wednesday of Week 15 (i.e., Wednesday, December 13). Prior to the exam, sample exams from previous semesters will be made available.

Attendance (10%): Attendance is mandatory and will be checked starting in the second week, after the drop period. Students will have up to two absences without penalty for any reason. After that, each absence will be penalized by 0.5%. Students who need to miss class for a valid reason must contact me by email in advance.

Course Policies

Technology: You can use internet-enabled laptops or tablets for course-related purposes such as taking notes. Please silence all other electronic devices such as cell phones not to disrupt the class.

Accommodating Disabilities: It is essential for every student to have the same opportunity for success in the classroom, so I look forward to cooperating with any student who is registered with disability services to satisfy all recommended accommodations. In order for me to do so, you need to bring this registration to my attention at the beginning of the semester. If I don't know that you require special accommodations, I cannot arrange for them. If you are not registered with disability services and believe that you may have a legitimate need for some accommodation, you should contact them at <https://www.snu.ac.kr/campuslife/aid/disabled>.

Academic Honesty: Academic dishonesty in any form will not be tolerated. This means that the consequence of any form of plagiarism or cheating will result in an 'F' for the course, and students will be referred to student judicial affairs for possible further penalties. If you have any questions whatsoever about what constitutes plagiarism or academic dishonesty, you should ask me directly in office hours, before or after class, or by e-mail.

Course Schedule

Date	Topic
Part 1	Sentential Logic
Week 1	Overview, Basic Concepts in Logic
Week 2	Arguments, Validity, Soundness
Week 3	Logical Connectives

Week 4 Syntax of Sentential Logic and Translation into Sentential Logic

Week 5 Semantics of Sentential Logic

Week 6 Truth-Table Method for Validity Testing

Week 7 Natural Deduction for Validity Testing

Week 8 Review
Midterm Exam

Part 2 Predicate Logic

Week 9 Introduction to Quantification

Week 10 Syntax of Predicate Logic and Translation into Predicate Logic

Week 11 Semantics of Predicate Logic

Week 12 Natural Deduction for Predicate Logic

Week 13 Russell's Theory of Definite Descriptions

Week 14 Limitations and Extensions of Predicate Logic

Week 15 Review
Final Exam