PHL245 Notes

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'25 Fall

Contents

§1 Day 1: Welcome (Sept 2 2025)

> **Remark 1.1.** I know why you're all here. I do follow the UofT subreddit - Alex Koo

TLDR: First class of the school year! **Nothing is due until the third friday of September** (the first test). Otherwise quizzes due every Friday at midnight.

- Everything about this course is on **Quercus**, you can complete the entire course's content ahead of time if you want.
- **Piazza** is the discussion board, which supports fancy math notation.
- **Crowdmark** is where you will be able to see your marked tests
- **Logic2010** is where all weekly quizzes will be assigned (apart from the first one which is on Quercus)
- **Mentimeter** is a way to stay engaged in class (?)

There are 4 in class tests, worth 55% total. The final exam is worth 35%. This means that 90% of the mark are assessments taking place in class.[1] On tests, you will feel the time crunch, according to the Professor (Alex Koo). You can read through the syllabus to get a more detailed breakdown.

Generally, there is no class on Friday, because that's when tests happen. The lecture on Tuesday is for practice.

There are **readings**, but there is nothing in them that will jumpscare you on the test. In fact, there may be things in the readings that are completely useless.

The philosophy department runs a logic lab, with 5 TAs, with 20 hours of support per week (!) They're a mix of undergrad and grad students, and are extremely talented.

> **Remark 1.2.** Logic2010 is the first time many of you will download an executable and run it yourself, and I know this may be a challenge, especially for you *Mac users*. You're gonna be like: "Wait, this isn't an app!" - Prof Koo 2025

You will need to register in the right section, but since our section is the default I doubt this will be an issue. **On Logic2010, you will need to submit each question individually.**

[1] I think this is new, last yr wasn't like this

§2 Day 2: Arguments (Sept 5, 2025)

In this class units do not correspond to weeks.

Arguments are made of statements, which are either true (T) or false (F). In this class, 'sentences' are equivalent to statements, and all arguments here are deductive. Deductive arguments are certain, meaning the conclusion must follow.

Validity is about form and structure, and is a property unique to arguments. To show validity, suppose all premises are true and prove the conclusion follows.

An argument is **sound** if and only if it is both valid and all premises are true statements.

§2.1 Symbols for Sentiential Logic

Atomic Statements capital letters P-Z

Logical Connectives $\sim$ or $\neg, \rightarrow, \leftrightarrow, \wedge, \vee$

Organization (), []

§2.2 Well Formed Formulae

Formal Notation Rules:

Sentence Letters P-Z by themselves

Unary Connectives only applies to $\sim$ or $\neg$, you cannot have parentheses

Binary Connectives must be in parentheses

Informal Notation Rules:

1. Parentheses over some connectives
2. Since $\wedge$ and $\vee$ commute, you don't need parentheses for chains of them
3. Use the hierarchy of connectives to disambiguate
4. For strings of $\wedge$ and $\vee$, the rightmost one is the main connective[2]

Definition 2.1 (Consistent)**.** For a set of statements, there exists a truth value assignment such that all statements are true.

Definition 2.2 (Tautology)**.** A sentence that is always true.

Definition 2.3 (Contradiction)**.** A sentence that is always false.

There exist *contingent* statements, that are neither always true nor always false.

[2] We evaluate symbols left to right, which results in the rightmost one being evaluated last

§3 Day 3: Conditional (Sept 9, 2025)

In a conditional,

$$P \to Q$$

P is called the *antecedent*, and Q is called the *consequent*. The conditional is false if and only if the antecedent is true, yet the consequent is false.

Having 'chains' of $\to$ and $\leftrightarrow$ is not a part of official nor informal notation, even though $\leftrightarrow$ commutes with itself.

Statement		Set of Statements	
Tautology	All TVAs true	Consistent	At least one TVA is true for all
Contradiction	All TVAs false	Inconsistent	No TVAs is true for all
Contingent	Some TVA true and some TVA false	Logically Equivalent	All TVAs same for all
Argument			
Valid	Every TVA with all premises true has conclusion true	Invalid	At least one TVA has all premises true and conclusion false

Consistency and *inconsistency* are properties of sets of statements. *Validity* and its negation are properties of arguments.

§3.1 Truth Tables

A truth value assignment (TVA) is a row in the truth table, where you try every combination of the atomics' truth values.