# Chapman University
**Spring 2022**

# PHIL300: Symbolic Logic
**Tuesday/Thursday 11.30-12:45 in Hashinger Science Center 111**

Instructor: Dr. Kelvin J. McQueen
Email: mcqueen@chapman.edu
Office hours: flexible, email me to schedule a meeting.

## Course Description
The subject of symbolic logic is part philosophy, part mathematics, and nowadays part computer science. It concerns rationality, truth, and methods to distinguish good and bad deductive reasoning. It is based on a formal, symbolic language designed to enable things to be said clearly and unambiguously, making it a vehicle for elucidation, analysis, and rigorous foundations relevant to a wide range of disciplines. Students will learn how to translate English sentences into the formal languages of sentential and predicate logic, to construct proofs in theses languages, and to critically assess and compare philosophical solutions to logical paradoxes. (3 credits. No restrictions.)

## Required Text:
Michael Hand and Colin Allen, Logic Primer, 2nd Ed. (MIT Press: Cambridge, 2001.)

At under $35.00, this text is a great buy. However, it is not a text intended for independent study. It assumes that you actually have an instructor to supply some explanations, discussions, enrichments, and the like. Thus, there is good reason to come to class.

## Web Support:
There is also web-based support related to this text (http://logic.tamu.edu/). In particular, you will find The Logic Daemon with which you can check your solutions to homework exercises, and a Quizmaster that will test how well you are understanding the material.

## Learning Outcomes:
1. Course Learning Outcomes: understand the formal languages of sentential and predicate logic, so that the student may a) Express reasoning problems formally/symbolically. b) Construct natural deduction proofs. c) Explain the relationship between rules of deduction and the semantics of logic. d) Analyze logical paradoxes.

2. Program Learning Outcomes: (PLO 2: Critical Reasoning): Ability to construct and analyze complex arguments, and distinguish good reasoning from bad. (PLO 3L: Logic): Ability to demonstrate knowledge about and skill in deductive or inductive reasoning.

3. General Education Learning Outcome (7QI/Quantitative Inquiry:): Students create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

## Schedule (numbers refer to textbook chapters)

| Week | Tuesday lecture | Thursday lecture |
|---|---|---|
| **1** | February 1<br>Introduction (1.1) | February 3<br>Connectives (1.1 & 1.2). |
| **2** | February 8<br>Well-formed formulae in sentential logic (1.2) | February 10<br>Translation of English to Sentential logic (1.3) |
| **3** | February 15<br>Conditionals and truth tables (2.1 & 2.2) | February 17<br>Truth tables and validity (2.2, 2.3, &2.4) |
| **4** | February 22<br>Revision for exam (1.1 - 1.3 & 2.1 - 2.4) | February 24<br>**In class exam 1** |
| **5** | March 1<br>Primitive rules of proof (1.4) | March 3<br>Primitive rules of proof (1.4) |
| **6** | March 8<br>Strategies for less simple proofs (1.5) | March 10<br>Derived rules (1.5) |
| **7** | March 15<br>Proving theorems (1.6) | March 17<br>Revision for exam (1.4, 1.5, 1.6) |
| **Spring Break March 21-26** | | |
| **8** | March 29<br>**In class exam 2** | March 31<br>Predicate logic (3.1) |
| **9** | April 5<br>Predicate logic: wffs and translations (3.1 & 3.2) | April 7<br>Predicate logic translations (3.2) |
| **10** | April 12<br>Nested quantifiers and simple proofs (3.2 & 3.3) | April 14<br>Proofs with ∃I, ∀E, and ∀I (3.3) |
| **11** | April 19-21<br>Proofs with existential elimination ∃E (3.3)<br>*This week I'm in Tucson presenting research. There will be one zoom lecture. I will announce closer to the time whether that will be Tuesday or Thursday (11.30-12.45).* | |
| **12** | April 26<br>The Sorites paradox | April 28<br>The Sorites paradox |
| **13** | May 3<br>The paradox of the material conditional | May 5<br>The paradox of the material conditional |
| **14** | May 10<br>Proofs with ∃E and derived rules (3.3 & 3.4) | May 12<br>Revision for final exam (comprehensive) |
| **Final exam: Friday May 20, 10:45am - 1:15pm** | | |

## Course Content Summary

The content for the course has four main components:
1) Learning formal languages for sentential (propositional) logic and predicate logic;
2) Learning how to translate English sentences into the formal languages;
3) Learning how to construct proofs for logical validity in the languages; and
4) Learning about some logical paradoxes and philosophical solutions to them.

## Methods of Evaluation:

Homework: 10%
Exam 1: 20%
Exam 2: 20%
Final Exam: 50%

**Homework**
Logic is a set of skills and learning it requires practice. To this end, homework sets will be assigned most Thursdays and must be submitted online. Homework sets are due by the next class period after the day it is assigned (i.e. Tuesday the following week). You get the grade for making a reasonable attempt at answering all questions. Answers are discussed in the Tuesday lecture. Late work will not be accepted. Missed homework cannot be made. I drop your lowest three grades.

Final grades will be assigned as follows:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 93 - 100 | | B+ | 87 - 89 | | C+ | 77 - 79 | | D+ | 67 - 69 |
| A- | 90 - 92 | | B | 83 - 86 | | C | 73 - 76 | | D | 60 - 66 |
| | | | B- | 80 - 82 | | C- | 70 - 72 | | F | 0 - 59 |

**Attendance**
Attendance is required. You are allowed three unexcused absences. Every subsequent unexcused absence will cost 1% (from your homework grades). You are responsible for notifying me in advance, if you are going to miss class, and for providing the proper documentation to excuse your absence.

**Laptops and Other Electronic Devices**
Due to their detrimental effect on learning, laptops, tablets, and similar devices are not permitted during class. You will be given one warning for use of such devices; further offenses may result in the loss of homework grades. If special circumstances require the use of such devices at some point during the semester, you must clear this with me in advance and provide the relevant documentation.

**Mask Policy**
N95 face coverings are required for faculty, staff and students in all indoor facilities (unless alone in a private office, or while actively eating or drinking). Until this policy changes, an approved accommodation is required to not wear a face covering during class.

**Syllabus Change Policy and Course Schedule**
Except for changes that substantially affect implementation of the evaluation (grading) statement, the above syllabus is a guide for the course and is subject to change with advance notice.

**Lectures are Recorded**
Software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded to assist those who cannot attend the live session, or to serve as

a resource for those who would like to review content that was presented. These recordings will be made available only to students who are enrolled in the class, and only during the period in which the course is offered.

**Academic Integrity Principle Statement**
Chapman University is a community of scholars that emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work, and academic dishonesty of any kind will be subject to sanction by the instructor/administrator and referral to the University's Academic Integrity Committee, which may impose additional sanctions up to and including expulsion. For further information see: chapman.edu/academics/academic-integrity/.

**Students with Disabilities**
In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class should inform the instructor at the beginning of the term. The University no longer makes the initial contact with professors--the student does. The University will determine what accommodations are suitable based on documentation and individual student needs, and students will email this information, in pdf form, to their teachers. For contact details see chapman.edu/students/health-and-safety/disability-services/. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.