PHI 220-01: Metalogic

Meeting Time: Mon. and Thurs. 4:00-5:20
Instructor: Jimmy Martin (jvmartin@princeton.edu)
Required Text: None (I will provide handouts and photocopies as needed)

29 Aug: Introduction, Mathematical Induction
5 Sept: Functions and Enumerations
9 Sept: Basic Set Theory
12 Sept: Formal Languages and Interpretations
16 Sept: A Deductive Apparatus
19 Sept: Soundness of Propositional Logic
23 Sept: Completeness of Propositional Logic (Model-Theoretic Proof)
26 Sept: Completeness of Propositional Logic (Proof-Theoretic Proof)
30 Sept: First-order Languages and Interpretations
3 Oct: Structures, Satisfaction, and Truth
7 Oct: Definability
10 Oct: Soundness of First-order Logic
14 Oct: MIDTERM EXAM
17 Oct: Lindenbaum’s Lemma
21 Oct: The Henkin Construction and the Completeness of First-order Logic
24 Oct: Equivalence Relations and the Completeness of First-order Logic with Identity
31 Oct: The Compactness Theorem
4 Nov: The Löwenheim-Skolem Theorem
7 Nov: Computable Functions and the Unlimited Register Machine
11 Nov: Generating Computable Functions
14 Nov: Numbering Computable Functions
18 Nov: Undecidability of First-order Logic
21 Nov: Peano Arithmetic
25 Nov: Gödel’s First Incompleteness Theorem
2 Dec: Gödel’s First Incompleteness Theorem (continued)
5 Dec: Review (Take-home FINAL EXAM Distributed)
Grading: Exams 20% each
Weekly Homework 60%

I expect to assign a few homework problems per class. I will only collect these once a week though.
Late homework will not be accepted.
Your lowest homework grade will be dropped.

Learning Outcomes: Students completing this course will gain further competence with some of the fundamental tools of scientific and philosophical reasoning. They will also continue to hone other valuable skills—including the ability to analyze and evaluate an argument’s formal structure—for understanding and critiquing arguments wherever they may appear. Additionally, completing this course will allow students to become familiar with some of the more advanced methods employed in logical analysis that are prerequisite for engaging with the results of mathematical logic that have been thought to have important philosophical consequences. The students’ ability to think in terms of, translate into, and calculate with symbolic languages will also be strengthened significantly. The concepts and methods learned in this course (e.g., comprehending and constructing precise, abstract, valid arguments) will, more generally, also help students engage in much finer written and oral communication, where perspicuity and logicality are so crucially important.

Policy Stuff: This course will be conducted in accordance with all of the College and School policies that are, at the present time, valid and in full force and effect.

Academic Integrity Policy: Examples of conduct considered academically dishonest, as well as a statement of adherence to TCNJ’s academic integrity policy can be found at the following website. http://policies.tcnj.edu/policies/digest.php?docId=7642

ADA Policy: This course complies with College policies regarding students with differing abilities. A statement of adherence to TCNJ’s Americans with Disabilities Act (ADA) policy can be found here: http://policies.tcnj.edu/policies/digest.php?docId=8082