Phil 514 — Mathematical Logic II

Spring 2015 – Prof. Kevin C. Klement (Please call me "Kevin.")
Mondays, **Wednesdays and Fridays 11:15am–12:05pm** in 374 Bartlett

Course description: Introduction to and comparative study of various logical foundations of mathematics, including classical set-theoretical foundations (ZF, NBG), Quine's "New Foundations" and related systems, higher-order logic and type theory, Frege arithmetic, and others, as well as related logical meta-theory and philosophical issues concerning mathematical and logical entities.

Prerequisites: Phil 310 (Intermediate Logic) or equivalent, or consent of instructor. You must also be prepared for a lot of challenging work. Fair warning: most students find this course much more difficult than their previous logic courses.

Contact info: My office is 358 Bartlett. My office hours are Mondays 4–5pm and Wednesdays 12:15–1:15pm and by appointment. My office phone is (413) 545-5784. My email address is klement@philos.umass.edu.

Web pages: Our "public" website is http://courses.umass.edu/phil514-klement/. More useful is our Moodle page, where you can download lecture notes, electronic copies of the readings and more, and even view your grades. Moodle is available at https://moodle.umass.edu/.

Readings: We shall be drawing upon various short readings, as well as several chapters of the book *The Logical Foundations of Mathematics*, by William S. Hatcher (Pergamon Press, 1982). Readings will be made available electronically on our Moodle page.

Requirements and grading: Your course grade is determined by the following requirements:

Homework packet 1:	10%	(Due February 27th)
Homework packet 2:	10%	(Due April 3rd)
Homework packet 3:	10%	(Due May 7th)
Take-home exam 1:	20%	(Due March 4th)
Take-home exam 2:	20%	(Due April 8th)
Final exam or term paper:	30%	(Due May 7th)
Total	100%	

Homework: Homework will be assigned almost every class period. You should try to complete each assignment by the next class period, though if you get stuck, you may ask for help during the next class. On the days indicated above, I will collect all the homework assigned that has not yet been collected, and assign a grade to the packet as a whole. In general, your grade on your homework will be determined as much by depth of engagement, diligence and comprehensiveness as by getting the correct answer.

Take-home exams: Twice during the semester you will be given a take-home exam covering the material discussed in class prior to the exam. Typically, the exams will contain a number of questions, some essay questions, some asking for a proof, derivation or solution to a logical problem. Typically, you will be given some choice regarding which questions to answer.

Final exam or term paper: You will be given the choice of either completing a final comprehensive take-home exam (with a format similar to the other exams, only longer), or writing a 12–18 page term paper, which should constitute critical and original discussion of one of the topics covered in the course (especially the more philosophical aspects). The amount of outside research done for the paper is left to your discretion, but a careful search of the relevant secondary material is strongly recommended.

Policies: Homework and exams may be handwritten. You may collaborate with your peers on *homework* assignments provided you do not *copy* from them. You may *not* collaborate with your peers on *exams*.

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Course Schedule
Subject to change!

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Unit One:

January 21	Course introduction
January 23 – January 30	Review of first-order logic and metatheory
February 2 – February 9	Naïve foundations; Frege's project
February 11 – February 13	Textbook type-theory
February 16	President's day. Class moved to Tuesday.
TUE February 17	Textbook type-theory, continued.
February 18 – February 25	Higher-order logic; historical type-theory

Unit 1 homework due February 27
Unit 1 take-home exam due March 4

Unit Two:

February 27 – March 13	Classical set theory (Z, ZF)
March 16 – March 20	Spring break. No class.
March 23	Classical set theory, continued (ZFC, etc.)
March 25 – April 1	Other varieties of standard set theory (NBG, MKM, etc.)

Unit 2 homework due April 3
Unit 2 take-home exam due April 8

Unit Three:

April 3 – April 8	Quine's systems (NF, ML)
April 10 – April 15	Cocchiarella's systems (λ-HST*, etc.)
April 17	Abstractionist systems (Boolos's New V, Frege Arithmetic, etc.)
April 20	Patriot's Day. No class.
April 22 – April 24	Abstractionist systems, continued
April 27 – April 29	Paraconsistent/inconsistent mathematics, other discussion

Unit 3 homework due by 5pm on Thursday, May 7th (the end of finals week)
Final exam or term paper due by 5pm on Thursday, May 7th (the end of finals week)

Graduate students may request incompletes only if opting to write a term paper. Graduate students in philosophy must complete term papers before the start of Fall semester in order to count credit for this course towards a graduate degree in philosophy.