Math 773 Computability Theory Spring 2018

Course webpage: http://www.math.wisc.edu/~msoskova/teaching/Math773.html
Time: MWF 1:20PM—2:10PM
Place: Van Vleck Hall B235

This is an introductory course in computability (or recursion) theory, covering the following topics:
- Computable sets and (partial) computable functions
- The Recursion Theorem
- Computably enumerable sets; the halting problem
- Relativization; Turing reducibility (relative computability); the Turing degrees
- The Turing jump
- Strong reducibilities; the arithmetical hierarchy; its relationship to the jump
- Complexity of index sets
- Low and high degrees; Martin's high domination theorem; other jump classes
- Forcing the jump; Friedberg and Shoenfield jump inversion
- Minimal pairs; exact pairs; degrees without a meet
- 1-generic, hyperimmune, and hyperimmune-free degrees
- Minimal degrees
- Immune, simple, hypersimple, cohesive, and maximal sets
- Diagonally non-computable functions; Arslanov's completeness criterion
- Π^0_1-classes; PA degrees; the low and hyperimmune-free basis theorems
- Finite Injury; simple permitting; the Friedberg-Muchnik theorem; cone avoidance; Sacks splitting theorem
- Priority trees; infinite injury; Sacks jump inversion
- Computable well-orderings; constructive ordinals; Kleene's O
- Hyperarithmetical hierarchy; the analytical hierarchy; the Harrison linear order

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Course textbook: "Lecture notes for a first course in computability theory", by Uri Andrews and Joseph Miller.

Homework: Assigned every week on Friday. Due a week after assigned at the beginning of class. Determines final grade. A strict level of rigor is necessary in your solutions. Pictures are never proofs, but are always encouraged along with proofs. Your solution should not be just a sequence of equations and formulas, write in complete sentences. Late homework will not be accepted except in case of illness or family emergency.