SYLLABUS: CHROMATIC HOMOTOPY THEORY

INSTRUCTOR: D. CULVER

Time and Place. The course will be held on MWF from 9-10a in 1 Illini Hall

Prerequisites. The subject matter of this course is fairly advanced and due to time constraints I cannot cover all prerequisites. I will assume a working knowledge of homological algebra as well as some acquaintance with the stable homotopy category and spectral sequences as well as with K-theory.

References. I will draw from several references for this course. Most often I will draw from Ravenel's "Complex Cobordism and Stable Homotopy Groups of Spheres," also known as the *green book*. I will also use other various papers and notes. Some of the main ones I plan to use are the following.

(1) Periodic Phenomena in the Adams-Novikov spectral sequence, Miller-Ravenel-Wilson
(2) Localization with respect to certain periodic homology theories, Ravenel
(3) Nilpotence and Periodicity in Stable Homotopy Theory, Ravenel
(4) Complex oriented cohomology theories and the language of stacks, notes from a course by Hopkins
(5) Chromatic homotopy theory notes by Lurie
(6) Chromatic structures in stable homotopy theory, Barthels-Beaudry

Topics. Here is a list of topics I plan on covering.

(1) The classical Adams spectral sequence, calculating its E_2-term via the May spectral sequence, some computations.
(2) Complex oriented cohomology theories, complex cobordism, formal group laws, Quillen's theorem.
(3) Some beginning computations in the Adams-Novikov spectral sequence
(4) Construction of the chromatic resolution of BP_*, computation of the input of the resulting chromatic spectral sequence. Computations of Miller-Ravenel-Wilson. Applications
(5) Local structure, Morava-Change-Of-Rings, Ravenel's computation of the Morava stabilizer algebras.

This covers, roughly, sections 3-6 of Ravenel's green book. If time permits, I may select some of the following topics to lecture on.

(1) Morava E-theories, Lubin-Tate deformation space, action of the Morava stabilizer group,
(2) Some computations in $K(2)$-local homotopy theory,
(3) Computational features of topological modular forms

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