MATHEMATICS DEPARTMENT SEMINAR SCHEDULE
August 19 – August 23, 2002

All seminars are held in Boyd Graduate Studies unless otherwise noted

MONDAY, August 19, 2002

Topology
2:15 p.m., Room 326
Topology Seminar will begin August 26, 2002

Group Representation and Cohomology
2:30 p.m., Room 410
Speaker: Dan Nakano, University of Georgia
Title of talk: *Organizational Meeting*

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea and Cookies

Departmental Meeting
3:30 p.m., Room 328

CATS
CATS will be meeting Mondays 4:40-5:30 PM in room 306 Boyd this semester, starting the second week of classes. The first talk will be announced later, and at the end of it organizational matters for the rest of the semester will be discussed.

Please note that due to the improvements recently made to room 306, there will be NO FOOD or DRINK allowed.

TUESDAY, August 20, 2002

VIGRE
2:00 p.m-3:15 p.m., Room 302
Speaker: Dino Lorenzini**,** University of Georgia
Title of talk: *The rank of an elliptic curve*
Abstract: Abstract: This talk will be an introduction to the VIGRE seminar on the same topic that I plan to run this fall. The talk has no prerequisite beyond the material found in a first course in algebra.

An elliptic curve is a smooth plane curve given by an equation of degree 3. The set of points on the curve that have rational coordinates form a finitely generated abelian group, that is, this set is the product of a finite abelian group by a free abelian group Z x... x Z. The number of copies of the integers Z appearing in the above product is called the rank r of the elliptic curve.

It is conjectured that the function r, as a function over all elliptic curves, is not bounded. But so far, the largest known value of r is 26. The rank r is one of the ingredients in the million-dollar problem called the Birch and Swinnerton-Dyer
Conjecture.

How can we compute the rank of an elliptic curve? There are programs which, given the equation of the curve, produce the rank r (although none of these programs can be proved to always compute r). In this seminar, we'll try to understand how these programs work, introducing all necessary concepts as we go along.

Research is done in two main steps: first a good question must be formulated, and then one ought to answer it, at least partially. The research done in a thesis is frequently of the second type: the question has often already been formulated by the thesis advisor. We will try in this seminar, among other things, to `ask ourselves questions' (that is, practice the first step of doing research), for instance, in considering what type of data is worth collecting using our programs and, if data has been collected, what patterns seem to emerge from the data.

Algebraic Geometry Seminar
3:30p.m., Room 326
Speaker: Daniele Arcara, University of Georgia
Title: *Rank two vector bundles and extension spaces on singular curves*

WEDNESDAY, August 21, 2002

Wavelet Analysis
10:10 – 11:00 a.m., Room 410
Speaker: Ming-Jun Lai, University of Georgia
Title of talk: *Organizational Meeting*

Teaching Seminar
2:30p.m., Room 303
Speaker: Clint McCrory, University of Georgia

Faculty and Graduate Social
3:00 p.m., Room 409
Coffee, Tea, Cookies

FRIDAY, August 23, 2002

Faculty and Graduate Social
Please note special time for tea.
2:00 p.m., Room 409
Coffee, Tea, Cookies

Colloquium
2:30 p.m., Room 304
Speaker: Dave Benson, University of Georgia
Title of talk: *"Groups, geometry and cohomology"*
Abstract: In this talk, I intend to give an overview of group cohomology, the geometric notions appropriate for studying it, and how these are connected with calculational methods.

I shall begin by describing in both algebraic and topological language what group cohomology is, and what it is good for. Then I shall give some examples to show what sort of graded commutative rings occur as cohomology rings.

Associated to any finitely generated graded commutative ring over a field, there is a projective variety. In the case of group cohomology, this variety was extensively studied by Quillen around 1970. He gave an description of the variety in terms of the subgroup structure. Jon Carlson discovered how to exploit Quillen's description in the case of a finite group, to get information about modular representation theory. His definition of rank variety has become a major tool in the area in the last twenty years.

If we try to do sheaf cohomology on the projective varieties arising from group cohomology, a rather subtle duality starts to appear. This duality leads to some very powerful restrictions on the possibilities for group cohomology. So powerful, in fact, that it gives rise to a method for calculating the cohomology of a finite group using only a finite part at the beginning of a resolution. This method was pioneered by Jon Carlson, and has been implemented to give computer calculations of the cohomology of all the 2-groups of order up to 64 in characteristic two. I shall endeavor to explain what the method has to do with the notion of Castelnuovo-Mumford regularity in algebraic geometry, but it is not clear to me that I can get this far in one hour without burning out both me and the audience.