

There will be a working seminar in number theory in the spring semester of 2004, which will read in detail the paper

“On a theorem of Jordan” by J-P. Serre (Bull AMS 40 (2003) 429-440) .

This paper starts from simple questions on the distribution of the number  $N_p(f)$  of zeros modulo a prime  $p$  of an irreducible integer polynomial  $f$  of degree  $d \geq 2$ . One result is that there are infinitely many primes for which there are no roots modulo  $p$ , and that the density of such primes is at least the reciprocal of the degree of the polynomial. Try it yourself for the polynomial  $x^2 + 1$  to see what happens in the simplest case.

The paper is short and has the advantage of having a manageable list of references, so it is possible to understand the results in depth. It is also written by a master of mathematics exposition and research, so serves as a good model of exposition.

The results involve the number theory of modular forms and the representation theory of groups, but we will assume only a familiarity with the basic properties of number fields (such as provided in mathematics 571). Students will give the lectures in the seminar, and the required material will be developed in lectures or through readings as needed. The paper involves numerical questions as well as open problems, so there is plenty to investigate.

See the web site [math.rutgers.edu/~tunnell/working.html](http://math.rutgers.edu/~tunnell/working.html) for a link to the paper and references and more details about the seminar. Send email to [tunnell@math](mailto:tunnell@math) if you wish to participate and a time will be arranged to suit interested students.

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