POSSIBLE PROJECTS FOR MATH 869

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If you wish a grade for this course, you need to write a paper on some topic such as those listed below. You may suggest some topic other than those listed but should talk to me first before you begin work. In any case, that's advisable so that I can suggest surveys of the area. The paper is due May 8, 2003. It should be at least 10 pages.

1. The abc conjecture.
2. Fermat-like equations, e.g. $x^p + y^q = z^r$.
3. Diamond-Kramer (modularity of Frey curves in general).
4. Rubin-Silverberg (families of elliptic curves with given $\rho_{E,\ell}$).
5. Examples of Serre's conjecture and applications.
6. Further investigation of modular curves, e.g. rational points on $X_0(N)$.
7. Comparing different constructions of universal deformation rings.
8. Kummer's work on regular primes and cases of FLT.
9. Other approaches to FLT (e.g. Germain, Wieferich, ...).
10. More on Ribet's raising and lowering the level.
11. Abelian varieties.
12. Group schemes.
13. p-divisible groups (limits of group schemes) and the associated p-adic Galois representations.
14. Bloch-Kato conjecture.
15. Automorphic forms.
16. Fontaine-Mazur conjecture.
17. Motives.
18. Theory of profinite groups.
19. Complete local rings and their invariants.
20. Galois cohomology.