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פרופ' אמנון יקותיאלי
המחלקה למתמטיקה

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Advanced Courses 2011/2 – Preliminary Announcement

I intend to offer two advanced courses next academic year. These are:

- **Algebraic Geometry – Schemes** (first semester)
- **Derived Categories** (second semester)

See proposed topics and prerequisites below. (The courses are independent of each other.)

The target audience is graduate students and post-docs from BGU and elsewhere in Israel (research mathematicians are also welcome). There is **no formal registration** requirement, but I will expect pretty regular attendance. The lectures will probably be in English.

If you are interested in participating in one or both courses, please write to me.

The courses will only open if there is significant potential attendance. Please feel free to distribute this announcement to relevant parties.

Details on the courses:

Algebraic Geometry – Schemes. The prerequisite is the course "Introduction to Algebraic Geometry", or equivalent knowledge of algebra and geometry. Topics: sheaves, schemes and their morphisms, separated and proper morphisms, quasi-coherent sheaves, vector bundles, smooth morphisms, differential forms, sheaf cohomology. The topics might change due to requests from the participants; thus we could include limited material about group schemes, étale cohomology, arithmetic geometry, formal schemes, adèles, residues, deformations, or moduli problems and stacks.

Derived Categories. Prerequisite: the course "Commutative and Homological Algebra" or equivalent. Topics: we'll start with the standard construction of the derived category of an abelian category, and of derived functors. Next we will learn about geometric derived categories (sheaves on spaces). We will discuss Grothendieck Duality (in algebraic geometry), Poicaré-Verdier Duality (in topology) and the Riemann-Hilbert Correspondence (in complex geometry). Next we will study derived categories associated to noncommutative rings (including dualizing complexes, tilting complexes and derived Morita theory). Finally there will be a discussion of derived categories in modern algebraic geometry and modern string theory.