1014-08-434 **Jianjun Paul Tian*** (tianjj@mbi.ohio-state.edu), Mathematical Biosciences Institute, The Ohio State University, Columbus, OH 43210. *Markov chains and evolution algebras.* Preliminary report.

Behind the phenomena of genetics and stochastic processes, we find there is an intrinsic algebraic structure. We call it — evolution algebra. Evolution algebras are non-associative Banach algebras and have many connections with other mathematical fields including graph theory, Markov chains, dynamic systems, 3-manifold. In this talk, I will give a brief introduction to the foundation of evolution algebra theory, and focus on Markov chains and evolution algebras. One of the unusual features of evolution algebras is that they possess evolution operators. This evolution operator reveals the dynamic information of evolution algebras. However, what makes the theory of evolution algebras different from the classical algebra theory is that in evolution algebras, there are two different kinds of generators: algebraically persistent generators and algebraically transient generators. These notions lead to a hierarchical structure on evolution algebras. When applying our structure theorem to evolution algebras induced by Markov chains, we see that any general Markov chain has a dynamic hierarchy and the probabilistic flow is moving with invariance on this hierarchy, and that all general Markov chains can be classified by the skeleton-shape classification of their evolution algebras. (Received September 15, 2005)