



# GEOMETRY SEMINAR

**Professor Michael Gekhtman**  
University of Notre Dame, USA

**December 14, 2016 (Wednesday), 3:00 – 5:15pm**  
**Room 210, Run Run Shaw Bldg., HKU**

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## **Lecture 1: Introduction to Cluster Algebras**

**3:00 – 4:00pm**

### **Abstract:**

We will give an introduction and brief survey on the recently developed theory of cluster algebras which has found applications in many areas of mathematics.

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## **Lecture 2: On higher pentagram maps, cluster dynamics and networks on surfaces**

**4:15 – 5:15pm**

### **Abstract:**

The pentagram map that associates to a projective polygon a new one formed by intersections of short diagonals was introduced by R. Schwartz and was shown to be integrable by V. Ovsienko, R. Schwartz and S. Tabachnikov. M. Glick demonstrated that the pentagram map can be put into the framework of the theory of cluster algebras, a new and rapidly developing area with many exciting connections to diverse fields of mathematics. In this talk I will explain that one possible family of higher-dimensional generalizations of the pentagram map is a family of discrete integrable systems intrinsic to a certain class of cluster algebras that are related to weighted directed networks on a torus and a cylinder. After presenting necessary background information on Poisson geometry of cluster algebras, I will show how all ingredients necessary for integrability – Poisson brackets, integrals of motion – can be recovered from combinatorics of a network. The talk is based on a joint project with M. Shapiro, S. Tabachnikov and A. Vainshtein.