# 第 6 回　茨城工業高等専門学校数学セミナー

　以下の要領で，第 6 回茨城工業高等専門学校数学セミナーを開催致します．皆様のお越しをお待ちしております．

日時: 2017 年 2 月 11 日（土）13:00-17:15

場所: 茨城工業高等専門学校　専攻科棟 A-1 講義室

**13:00-13:30　山本 桃果（首都大学東京）**

**Title.**
ある楕円曲面の Mordell-Weil 群の生成元とその応用

**Abstract.**
有理関数体上定義された楕円曲線の Mordell-Weil 群は有限生成アーベル群となることが知られており，その生成元は Mordell-Weil 群の格子構造を元に決定することができる．今回は，生成元の決定について，楕円曲面論・Hirzebruch 曲面の 2 次被覆・Height pairing などの理論を使い，紹介する．また，そこで得られた生成元を利用した，Zariski N-plet の構成についても紹介する．

**13:45-14:45　Khulan Tumenbayar（首都大学東京）**

**Title.**
Geometry of weak contact conics to an irreducible quartics with 2 nodes and 1 cusp via rational elliptic surfaces and Zariski pairs

**Abstract.**
Let $\mathcal{Q}$ be an irreducible quartic with two nodes and one cusp as its singularities and let $\mathcal{C}$ be a conic such that the intersection multiplicity at each point of $\mathcal{C} \cap \mathcal{Q}$ is even and $\mathcal{C} \cap \mathcal{Q}$ contain at least one smooth point $z_o$ of $\mathcal{Q}$. In this talk, for every $\mathcal{Q}$ we find all conics $\mathcal{C}$ as above via studying geometry of $\mathcal{C}$ and $\mathcal{Q}$ through that of integral sections of a rational elliptic surface which canonically arises from $\mathcal{Q}$ and $z_o \in \mathcal{C} \cap \mathcal{Q}$. As an application, we construct Zariski pairs of degree 7 and 8, whose irreducible components consist of $\mathcal{Q}, \mathcal{C}$ and line passing through two of the singular points of $\mathcal{Q}$.

**15:00-16:00　瀬戸 樹（名古屋大学大学院多元数理科学研究科）**

**Title.**
An index theorem for Toeplitz operators on partitioned manifolds

**Abstract.**
The Atiyah-Singer index theorem for Dirac operators on closed manifolds of even dimension is an important theorem since it contains the Gauss-Bonnet theorem, for instance. However, it is not interesting on closed manifolds of odd dimension. Baum-Douglas proved that Toeplitz operators give an interesting index formula on that of odd dimension. On the other hand, there are many generalizations of the index theorem under various settings by using Noncommutative Geometry. An index theorem for partitioned manifolds is also one of such generalizations. We also have to choose Dirac operators (Roe-Higson) or Toeplitz operators (Seto) depending on the parity of manifolds. In this talk, I firstly talk about invariants that appears index theorems by using the index theorem on the unit circle. After that, I talk about an overview of the index theorem on closed manifolds and introduce an index theorem on partitioned manifolds.

**16:15-17:15 佐藤 宏平（秋田工業高等専門学校）**

**Title.**
On modified tropical hyperfield and the zero sets of polynomials

**Abstract.**
Tropical hyperfield is a triple which consists of complex numbers, tropical addition and usual multiplication. We modify this hyper field so that the resulting set endowed with the addition and the multiplication is doubly distributive. Moreover, we show that the modified tropical hyperfield is "algebraically closed". These results are joint work with Shinsuke Odagiri.

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