

# Topics in Geometry Seminar

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## Introduction to Complex K-Theory

Date: April 10, 2017

Time: 11:30 AM - 1:00 PM

Room: Math & Stat Lounge 307.20

### **Abstract:**

This will be an introductory lecture to complex K-theory. Our primary goal is to define  $K$ -groups for compact Hausdorff spaces  $X$ . (As well as the reduced  $K$ -groups for the based ones.) The spirit here is to regard the functor  $K^*$  as a generalized cohomology theory. We will begin by defining  $K^0$  and  $\tilde{K}^0$ . This requires an investigation of the semi-ring  $(Vect_{\mathbb{C}}(X), \oplus, \otimes)$ , and the Grothendieck group construction. We will then introduce the negative  $K$ -groups. Next we will prove the isomorphism  $\tilde{K}^0(X) \cong [X, BU \times \mathbb{Z}]$  for based spaces  $X$ . This result, together with the Bott Periodicity Theorem, will finally lead us to the definition of positive  $K$ -groups.