Syllabus for G362 Invariant Theory. Fall 2006.

In this course I will give the basics of Geometric Invariant Theory. I will follow the historical development, first discussing Classical Invariant Theory, then the basic theorems of Hilbert and finally Geometric Invariant Theory. The general theory will be illiustrated with two families of examples: the moduli spaces of vector bundles over curves and semi-invariants of quivers.

The topics covered will be as follows.

1. Rings of invariants.
2. Examples and Classical Invariant Theory.
3. Reductive groups, Reynolds operator and Hilbert theorem.
4. Geometric Invariant Theory, stability and Hilbert-Mumford criterion.
5. Moduli spaces of vector bundles over curves.
6. Semi-invariants of quivers.

The useful textbooks:

1. Kraft, H.P. Geometrische Methoden in der Invarianttheorie, Friedr. Vieweg, Braunschweig, Wiesbaden, 1985,
2. Springer, T. Invariant Theory, Lecture Notes in Math, 585, 1977,
3. Mukai, S. An Introduction to Invariants and Moduli, Cambridge Studies in advanced mathematics, no. 81, Cambridge University Press, 2003.