

Title: "Geometric Invariant Theory and Moduli Problems"

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Topics to be covered include:

Group actions in algebraic geometry
Linearizations and stabilities
Quotients in algebraic geometry
Moment maps
Relation with symplectic quotients
Moduli of (Calabi-Yau) hypersurfaces
Stability of vector bundles
Stability of algebraic curves

Learning outcome: Students should be able to describe the moduli space of n points on P^m , at least for small n when $m=1$; further, know some basics about the moduli of stable curves (especially, of genus zero).

Schedule:

weeks 1-4: linearizations and stabilities

weeks 5-8: GIT quotients, symplectic quotients, and applications.

last few weeks: moduli of vector bundles over curves and moduli of curves, and, time permitting, perhaps more.

Prerequisite: one-semester course in algebraic geometry

Text: my lecture notes (to be distributed);

References: Geometric Invariant Theory by Mumford and Kirwan

An introduction to invariants and moduli, by Mukai

Lectures on geometric invariant theory, by Dolgachev