



MAT 615

Topics in Algebraic Geometry

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Schedule:

TuTh 12:50pm-2:10pm Physics P129 (**first class on 02/03**)

About the course

Curves - Geometry and moduli: The course aims to provide an introduction to moduli spaces of curves, deformation theory and Geometric Invariant Theory. Possible/tentative topics are the following:

- Curves: Riemann-Roch, Serre duality, Riemann-Hurwitz formula (crash course)
- Hyperelliptic curves, the canonical embedding, Clifford's theorem
- Curves of low genus. Rudiments of Brill-Noether theory.
- Parameter spaces, moduli spaces, Hilbert scheme
- Tangent space, dimension of the Hilbert scheme
- Deformation theory, Kodaira-Spencer maps
- Constructions of the moduli space of curves
- The ring of tautological classes
- Background on GIT
- The Deligne-Mumford compactification of the moduli space
- Moduli spaces of stable maps, quantum cohomology, Gromov-Witten invariants

References

Basic references for the course are

- [Moduli of Curves](#), J. Harris and I. Morrison, GTM 187, Springer
- Geometric invariant theory, D. Mumford, J. Fogarty, and F. Kirwan, 3rd ed. Springer

- Geometry of algebraic curves, Geometry of Algebraic Curves, E. Arbarello, M. Cornalba, Ph. Griffiths, J. Harris.

Among other useful references

- Lectures on invariant theory, I. Dolgachev, Cambridge 2003.
Download [PDF](#) version.
- An Introduction to Invariants and Moduli, Sh. Mukai, Cambridge 2003.
- A conjectural description of the tautological ring of the moduli space of curves, C. Faber, [math.AG/9711218](https://mathoverflow.net/questions/9711218)
- The geometry of moduli spaces of sheaves, D. Huybrechts, M. Lehn, Aspects of Math. 31, Vieweg

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