

## MINI CURSO SOBRE CURVAS Y ESPACIOS DE MODULI

*“When [Oscar Zariski] spoke the words algebraic variety, there was a certain resonance in his voice that said distinctly that he was looking into a secret garden. I immediately wanted to be able to do this too ... Especially, I became obsessed with a kind of passion flower in this garden, the moduli spaces of Riemann.”*

**David Mumford**

Curvas algebraicas son un objeto de estudio clásico en geometría algebraica que todavía atrae mucha investigación e interés, en particular la geometría de sus espacios de moduli. Mi intención es hacer una introducción básica sobre curvas algebraicas y sus espacios de moduli enfocada en ejemplos, preguntas y ojalá discusión abierta. Estudiantes terminando el pregrado o en etapa temprana del posgrado están particularmente invitados.

El curso consiste en 5 sesiones de 1 hora.

- Sesión 1: Weil/Cartier divisors on curves, linear series, line bundles, morphisms to projective spaces, Riemann-Roch, and Geometric Riemann-Roch.
- Sesión 2: Ramification, Riemann-Hurwitz and monodromy. Positivity of line bundles on curves. Generic curves of low genus. Examples.
- Sesión 3: First approach to  $\mathcal{M}_g$ , dimension, rationality/unirationality/uniruledness, and Severi's theorem.
- Sesión 4: Stable curves, divisors on  $\overline{\mathcal{M}}_g$ , and the Brill-Noether locus.
- Sesión 5: Grothendieck-Riemann-Roch, the canonical class of  $\overline{\mathcal{M}}_g$ , and Harris-Mumford Theorem.

Referencias sugeridas:

### REFERENCES

- [AC] E. Arbarello and M. Cornalba, *Footnotes to a paper of Beniamino Segre*, *Mathematische Annalen* **256** (1981), 341–362.
- [ACGH] E. Arbarello, M. Cornalba, P. Griffiths and J. Harris, *Geometry of algebraic curves*, *Grundlehren der mathematischen Wissenschaften* **267**, Springer.
- [F] G. Farkas, *Aspects of the birational geometry of  $\mathcal{M}_g$* , in: *Geometry of Riemann surfaces and their moduli spaces*, *Surveys in Differential Geometry* Vol. 14 (2010), 57–111.
- [HM] J. Harris and D. Mumford, *On the Kodaira dimension of the moduli space of curves*, *Inventiones Math.* **67** (1982), 23–88.
- [Ha] R. Hartshorne, *Algebraic Geometry*, *Graduate Texts in Mathematics*. Springer-Verlag, New York 1977.