Introduction to Algebraic Geometry

Thomas Dedieu

The goal of these lectures is to provide an accessible introduction to modern techniques in algebraic geometry. We shall follow rather closely the presentation given in [PAG], while in parallel presenting as many examples as possible from [JH]. The wonderful all time classic [FAC] is advertised for further reading.

Topics covered:
1. Affine algebraic sets;
2. Projective algebraic sets;
3. Sheaves and varieties;
4. Dimension;
5. Tangent spaces, singular points;
6. Bezout theorem;
7. Cohomology of sheaves;
8. Riemann-Roch theorem.

Prerequisites: Basic knowledge in commutative algebra and projective geometry are advisable (see, e.g., [Deb] and [PP, Partie I] respectively), but we'll quickly review the essential material.

References

[PAG] D. Perrin, Algebraic Geometry: An Introduction, Universitext, Springer. *In French:* Savoirs actuels, EDP sciences.

[PP] D. Perrin, Géométrie projective plane et applications aux géométries euclidienne et non euclidiennes, projet en ligne.

[Deb] O. Debarre, Algèbre 2, cours de M1, disponible en ligne.

[FAC] J.-P. Serre, Faisceaux algébriques cohérents, Ann. of Math. **61** (2), 1955.

[JH] J. Harris, AlgeBraic Geometry: A First Course, Graduate Texts in Mathematics **133**, Springer.