

This textbook provides readers with a working knowledge of the modern theory of complex projective algebraic curves. Also known as compact Riemann surfaces, such curves shaped the development of algebraic geometry itself, making this theory essential background for anyone working in or using this discipline. Examples underpin the presentation throughout, illustrating techniques that range across classical geometric theory, modern commutative algebra, and moduli theory.

The book begins with two chapters covering basic ideas, including maps to projective space, invertible sheaves, and the Riemann–Roch theorem. Subsequent chapters alternate between a detailed study of curves up to genus six and more advanced topics such as Jacobians, Hilbert schemes, moduli spaces of curves, Severi varieties, dualizing sheaves, and linkage of curves in 3-space. Three chapters treat the refinements of the Brill–Noether theorem, including applications and a complete proof of the basic result. Two chapters on free resolutions, rational normal scrolls, and canonical curves build context for Green’s conjecture. The book culminates in a study of Hilbert schemes of curves through examples. A historical appendix by Jeremy Gray captures the early development of the theory of algebraic curves. Exercises, illustrations, and open problems accompany the text throughout.

The Practice of Algebraic Curves offers a masterclass in theory that has become essential in areas ranging from algebraic geometry itself to mathematical physics and other applications. Suitable for students and researchers alike, the text bridges the gap from a first course in algebraic geometry to advanced literature and active research.



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Algebraic Curves

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The Practice of Algebraic Curves

A Second Course in Algebraic Geometry

David Eisenbud
Joe Harris

