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# Complex Algebraic Curves London

## Mathematical Society Student Texts

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Singular Points of Plane Curves  
Classical Algebraic Geometry  
Computational Algebraic Geometry  
The Cremona Group and Its Subgroups  
Recent Advances in Algebraic Geometry  
Undergraduate Algebraic Geometry  
Differential Analysis on Complex Manifolds  
Algebraic Curves  
Algebraic Geometry  
Rational Points on Modular Elliptic Curves  
Riemann Surfaces and Algebraic Curves  
Singularities of Plane Curves  
Riemann Surfaces  
Complex Multiplication  
Elliptic Curves in Cryptography

Rational Algebraic Curves  
An Introduction to Grobner Bases  
Algebraic Curves, the Brill and Noether Way  
Introduction to Algebraic Curves  
Algebraic Varieties  
Three-Dimensional Link Theory and Invariants of Plane Curve Singularities. (AM-110),  
Volume 110  
Introduction to Compact Riemann Surfaces and Dessins D'Enfants  
Complex Projective Geometry  
A Book of Curves  
Complex Algebraic Curves  
Algebraic Curves and Riemann Surfaces  
Introduction to Plane Algebraic Curves  
Moduli of Curves  
Complex Algebraic Surfaces  
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Applications of Algebraic Geometry to Coding Theory, Physics and Computation  
A First Course in Modular Forms  
Algebraic Curves and Riemann Surfaces for Undergraduates

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## **MATHEWS RIVAS**

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Singular Points of Plane  
Curves Cambridge  
University Press  
Algebraic geometry has  
benefited enormously  
from the powerful general  
machinery developed in

the latter half of the  
twentieth century. The  
cost has been that much  
of the research of  
previous generations is in  
a language unintelligible  
to modern workers, in  
particular, the rich legacy  
of classical algebraic  
geometry, such as plane  
algebraic curves of low  
degree, special algebraic  
surfaces, theta functions,

Cremona transformations,  
the theory of apolarity  
and the geometry of lines  
in projective spaces. The  
author's contemporary  
approach makes this  
legacy accessible to  
modern algebraic  
geometers and to others  
who are interested in  
applying classical results.  
The vast bibliography of  
over 600 references is

complemented by an array of exercises that extend or exemplify results given in the book.

**Classical Algebraic Geometry** Springer

Science & Business Media  
Describes the drawing of plane curves, cycloidal curves, spirals, glissettes and others.

Computational Algebraic Geometry American Mathematical Soc.

The book surveys some recent developments in the arithmetic of modular elliptic curves. It places a special emphasis on the construction of rational

points on elliptic curves, the Birch and Swinnerton-Dyer conjecture, and the crucial role played by modularity in shedding light on these two closely related issues. The main theme of the book is the theory of complex multiplication, Heegner points, and some conjectural variants. The first three chapters introduce the background and prerequisites: elliptic curves, modular forms and the Shimura-Taniyama-Weil conjecture, complex multiplication and the

Heegner point construction. The next three chapters introduce variants of modular parametrizations in which modular curves are replaced by Shimura curves attached to certain indefinite quaternion algebras. The main new contributions are found in Chapters 7-9, which survey the author's attempts to extend the theory of Heegner points and complex multiplication to situations where the base field is not a CM field. Chapter 10 explains the proof of

Kolyvagin's theorem, which relates Heegner points to the arithmetic of elliptic curves and leads to the best evidence so far for the Birch and Swinnerton-Dyer conjecture.

### **The Cremona Group and Its Subgroups**

Springer Science & Business Media

The book presents the central facts of the local, projective and intrinsic theories of complex algebraic plane curves, with complete proofs and starting from low-level prerequisites. It includes

Puiseux series, branches, intersection multiplicity, Bézout theorem, rational functions, Riemann-Roch theorem and rational maps. It is aimed at graduate and advanced undergraduate students, and also at anyone interested in algebraic curves or in an introduction to algebraic geometry via curves.

*Recent Advances in Algebraic Geometry* CUP Archive

The description for this book, *Meromorphic Functions and Analytic Curves*. (AM-12), will be

forthcoming.

### **Undergraduate Algebraic Geometry**

Cambridge University Press

A volume of papers describing new methods in algebraic geometry.

[Differential Analysis on Complex Manifolds](#)

Springer Science & Business Media

An introduction to abstract algebraic geometry, with the only prerequisites being results from commutative algebra, which are stated as needed, and some elementary topology.

More than 400 exercises distributed throughout the book offer specific examples as well as more specialised topics not treated in the main text, while three appendices present brief accounts of some areas of current research. This book can thus be used as textbook for an introductory course in algebraic geometry following a basic graduate course in algebra. Robin Hartshorne studied algebraic geometry with Oscar Zariski and David Mumford at Harvard, and with J.-P. Serre and A.

Grothendieck in Paris. He is the author of "Residues and Duality", "Foundations of Projective Geometry", "Ample Subvarieties of Algebraic Varieties", and numerous research titles.

Algebraic Curves Springer Science & Business Media  
An introduction to the theory of algebraic functions on varieties from a sheaf theoretic standpoint.

**Algebraic Geometry**  
American Mathematical Soc.

This 2007 book is a self-contained account of the

subject of algebraic cycles and motives.

Rational Points on Modular Elliptic Curves  
American Mathematical Soc.

Publisher Description

**Riemann Surfaces and Algebraic Curves**

Springer Science & Business Media

This book summarizes knowledge built up within Hewlett-Packard over a number of years, and explains the mathematics behind practical implementations of elliptic curve systems. Due to the advanced nature of the

mathematics there is a high barrier to entry for individuals and companies to this technology. Hence this book will be invaluable not only to mathematicians wanting to see how pure mathematics can be applied but also to engineers and computer scientists wishing (or needing) to actually implement such systems. Singularities of Plane Curves American Mathematical Soc. In this book, Miranda takes the approach that algebraic curves are best

encountered for the first time over the complex numbers, where the reader's classical intuition about surfaces, integration, and other concepts can be brought into play. Therefore, many examples of algebraic curves are presented in the first chapters. In this way, the book begins as a primer on Riemann surfaces, with complex charts and meromorphic functions taking centre stage. But the main examples come from projective curves, and slowly but surely the

text moves toward the algebraic category. Proofs of the Riemann-Roch and Serre Duality Theorems are presented in an algebraic manner, via an adaptation of the adelic proof, expressed completely in terms of solving a Mittag-Leffler problem. Sheaves and cohomology are introduced as a unifying device in the later chapters, so that their utility and naturalness are immediately obvious. Requiring a background of one term of complex variable theory and a year

of abstract algebra, this is an excellent graduate textbook for a second-term course in complex variables or a year-long course in algebraic geometry.

Riemann Surfaces

Cambridge University Press

\* Employs proven conception of teaching topics in commutative algebra through a focus on their applications to algebraic geometry, a significant departure from other works on plane algebraic curves in which the topological-analytic

aspects are stressed \*Requires only a basic knowledge of algebra, with all necessary algebraic facts collected into several appendices \* Studies algebraic curves over an algebraically closed field  $K$  and those of prime characteristic, which can be applied to coding theory and cryptography \* Covers filtered algebras, the associated graded rings and Rees rings to deduce basic facts about intersection theory of plane curves, applications of which are standard

tools of computer algebra

\* Examples, exercises, figures and suggestions for further study round out this fairly self-contained textbook  
Complex Multiplication  
Cambridge University Press

The goal of this book is to present a portrait of the  $n$ -dimensional Cremona group with an emphasis on the 2-dimensional case. After recalling some crucial tools, the book describes a naturally defined infinite dimensional hyperbolic space on which the



Cremona group acts. This space plays a fundamental role in the study of Cremona groups, as it allows one to apply tools from geometric group theory to explore properties of the subgroups of the Cremona group as well as the degree growth and dynamical behavior of birational transformations. The book describes natural topologies on the Cremona group, codifies the notion of algebraic subgroups of the Cremona groups and finishes with a chapter on the dynamics

of their actions. This book is aimed at graduate students and researchers in algebraic geometry who are interested in birational geometry and its interactions with geometric group theory and dynamical systems.

### **Elliptic Curves in Cryptography**

Cambridge University Press

This book is an introduction to the theory of complex manifolds and their deformations. Deformation of the complex structure of Riemann surfaces is an

idea which goes back to Riemann who, in his famous memoir on Abelian functions published in 1857, calculated the number of effective parameters on which the deformation depends. Since the publication of Riemann's memoir, questions concerning the deformation of the complex structure of Riemann surfaces have never lost their interest. The deformation of algebraic surfaces seems to have been considered first by Max Noether in

1888 (M. Noether: Anzahl der Modulen einer Classe algebraischer Fliichen, Sitz. K6niglich. Preuss. Akad. der Wiss. zu Berlin, erster Halbband, 1888, pp. 123-127). However, the deformation of higher dimensional complex manifolds had been curiously neglected for 100 years. In 1957, exactly 100 years after Riemann's memoir, Frolicher and Nijenhuis published a paper in which they studied deformation of higher dimensional complex manifolds by a differential

geometric method and obtained an important result. (A. Fr6licher and A. Nijenhuis: A theorem on stability of complex structures, Proc. Nat. Acad. Sci., U.S.A., 43 (1957), 239-241). Rational Algebraic Curves Springer Science & Business Media Developed over more than a century, and still an active area of research today, the classification of algebraic surfaces is an intricate and fascinating branch of mathematics. In this book Professor Beauville gives a lucid

and concise account of the subject, following the strategy of F. Enriques, but expressed simply in the language of modern topology and sheaf theory, so as to be accessible to any budding geometer. This volume is self contained and the exercises succeed both in giving the flavour of the extraordinary wealth of examples in the classical subject, and in equipping the reader with most of the techniques needed for research. An Introduction to Grobner Bases Princeton

University Press

The theory of elliptic curves is distinguished by its long history and by the diversity of the methods that have been used in its study. This book treats the arithmetic approach in its modern formulation, through the use of basic algebraic number theory and algebraic geometry. Following a brief discussion of the necessary algebro-geometric results, the book proceeds with an exposition of the geometry and the formal group of elliptic curves,

elliptic curves over finite fields, the complex numbers, local fields, and global fields. Final chapters deal with integral and rational points, including Siegel's theorem and explicit computations for the curve  $Y^2 = X^3 + DX$ , while three appendices conclude the whole: Elliptic Curves in Characteristics 2 and 3, Group Cohomology, and an overview of more advanced topics. *Algebraic Curves, the Brill and Noether Way* Oxford University Press

An authoritative but accessible text on one dimensional complex manifolds or Riemann surfaces. Dealing with the main results on Riemann surfaces from a variety of points of view; it pulls together material from global analysis, topology, and algebraic geometry, and covers the essential mathematical methods and tools.

### **Introduction to Algebraic Curves**

Cambridge University Press

The aim of these notes is to develop the theory of

algebraic curves from the viewpoint of modern algebraic geometry, but without excessive prerequisites. We have assumed that the reader is familiar with some basic properties of rings, ideals and polynomials, such as is often covered in a one-semester course in modern algebra; additional commutative algebra is developed in later sections.

### Algebraic Varieties

Cambridge University Press

The theory relating algebraic curves and

Riemann surfaces exhibits the unity of mathematics: topology, complex analysis, algebra and geometry all interact in a deep way. This textbook offers an elementary introduction to this beautiful theory for an undergraduate audience. At the heart of the subject is the theory of elliptic functions and elliptic curves. A complex torus (or “donut”) is both an abelian group and a Riemann surface. It is obtained by identifying points on the complex plane. At the same time,

it can be viewed as a complex algebraic curve, with addition of points given by a geometric “chord-and-tangent” method. This book carefully develops all of the tools necessary to make sense of this isomorphism. The exposition is kept as elementary as possible and frequently draws on familiar notions in calculus and algebra to motivate new concepts. Based on a capstone course given to senior undergraduates, this book is intended as a textbook

for courses at this level  
and includes a large  
number of class-tested

exercises. The  
prerequisites for using the  
book are familiarity with  
abstract algebra, calculus

and analysis, as covered  
in standard  
undergraduate courses.

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