

# Commutative Algebra With A View Toward Algebraic G

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*Commutative Algebra With A View  
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## CHAVEZ HODGES

*Noncommutative View* Cambridge University Press

This volume collects contributions by leading experts in the area of commutative algebra related to the INdAM meeting "Homological and Computational Methods in Commutative Algebra" held in Cortona (Italy) from May 30 to June 3, 2016. The conference and this volume are dedicated to Winfried Bruns on the occasion of his 70th birthday. In particular, the topics of this book strongly reflect the variety of Winfried Bruns' research interests and his great impact on commutative algebra as well as its applications to related fields. The authors discuss recent and relevant developments in algebraic geometry, commutative algebra, computational algebra, discrete geometry and homological algebra. The book offers a unique resource, both for young and more experienced researchers seeking comprehensive overviews and extensive bibliographic references.

**Constructive Commutative Algebra** Springer

This is a comprehensive review of commutative algebra, from localization and primary decomposition through dimension theory, homological methods, free resolutions and duality, emphasizing the origins of the ideas and their connections with other parts of mathematics. The book gives a concise treatment of Grobner basis theory and the constructive methods in commutative algebra and algebraic geometry that flow from it. Many exercises included.

*Commutative Algebra* Walter de Gruyter GmbH & Co KG

Algebraic Geometry and Commutative Algebra in Honor of Masayoshi Nagata presents a collection of papers on algebraic geometry and commutative algebra in honor of Masayoshi Nagata for his significant contributions to commutative algebra. Topics covered range from power series rings and rings of invariants of finite linear groups to the convolution algebra of distributions on totally disconnected locally compact groups. The discussion begins with a description of several formulas for enumerating certain types of objects, which may be tabular arrangements of integers called Young tableaux or some types of monomials. The next chapter explains how to establish these enumerative formulas, with emphasis on the role played by transformations of determinantal polynomials and recurrence relations satisfied by them. The book then turns to several applications of the enumerative formulas and universal identity, including including enumerative proofs of the straightening law of Doubilet-Rota-Stein and computations of Hilbert functions of polynomial ideals of certain determinantal loci. Invariant differentials and quaternion extensions are also examined, along with the moduli of Todorov surfaces and the classification problem of embedded lines in characteristic  $p$ . This monograph

will be a useful resource for practitioners and researchers in algebra and geometry.

*Dedicated to Winfried Bruns on the Occasion of his 70th Birthday* Springer Science & Business Media

Introductory account of commutative algebra, aimed at students with a background in basic algebra.

**Commutative Ring Theory** Springer Science & Business Media

This book presents algorithmic tools for algebraic geometry, with experimental applications. It also introduces Macaulay 2, a computer algebra system supporting research in algebraic geometry, commutative algebra, and their applications. The algorithmic tools presented here are designed to serve readers wishing to bring such tools to bear on their own problems. The first part of the book covers Macaulay 2 using concrete applications; the second emphasizes details of the mathematics. *with a View Toward Algebraic Geometry* Springer Science & Business Media

Exploring ultraproducts of Noetherian local rings from an algebraic perspective, this volume illustrates the many ways they can be used in commutative algebra. The text includes an introduction to tight closure in characteristic zero, a survey of flatness criteria, and more.

Springer Science & Business Media

The aim of the Expositions is to present new and important developments in pure and applied mathematics. Well established in the community over more than two decades, the series offers a large library of mathematical works, including several important classics. The volumes supply thorough and detailed expositions of the methods and ideas essential to the topics in question. In addition, they convey their relationships to other parts of mathematics. The series is addressed to advanced readers interested in a thorough study of the subject. Editorial Board Lev Birbrair, Universidade Federal do Ceará, Fortaleza, Brasil Walter D. Neumann, Columbia University, New York, USA Markus J. Pflaum, University of Colorado, Boulder, USA Dierk Schleicher, Aix-Marseille Université, France Katrin Wendland, University of Freiburg, Germany Honorary Editor Victor P. Maslov, Russian Academy of Sciences, Moscow, Russia Titles in planning include Yuri A. Bahturin, *Identical Relations in Lie Algebras* (2019) Yakov G. Berkovich, Lev G. Kazarin, and Emmanuel M. Zhmud', *Characters of Finite Groups, Volume 2* (2019) Jorge Herbert Soares de Lira, *Variational Problems for Hypersurfaces in Riemannian Manifolds* (2019) Volker Mayer, Mariusz Urbański, and Anna Zdunik, *Random and Conformal Dynamical Systems* (2021) Ioannis Diamantis, Bostjan Gabrovsek, Sofia Lambropoulou, and Maciej Mroczkowski, *Knot Theory of Lens Spaces* (2021)

*Graduate Algebra* Commutative Algebra with a View Toward Algebraic Geometry

This volume contains papers presented at the International

Conference on Commutative Algebra, Algebraic geometry, and Computational methods held in Hanoi in 1996, as well as papers written subsequently. It features both expository articles as well as research papers on a range of currently active areas in commutative algebra, algebraic geometry (particularly surveys on intersection theory) and combinatorics. In addition, a special feature is a section on the life and work of Wolfgang Vogel, who was an organiser of the conference.

**An Introduction to Homological Algebra** Springer Science & Business Media

This book stems from lectures on commutative algebra for 4th-year university students at two French universities (Paris and Rennes). At that level, students have already followed a basic course in linear algebra and are essentially fluent with the language of vector spaces over fields. The topics introduced include arithmetic of rings, modules, especially principal ideal rings and the classification of modules over such rings, Galois theory, as well as an introduction to more advanced topics such as homological algebra, tensor products, and algebraic concepts involved in algebraic geometry. More than 300 exercises will allow the reader to deepen his understanding of the subject. The book also includes 11 historical vignettes about mathematicians who contributed to commutative algebra.

**Commutative Algebra, Volume I** Springer Science & Business Media

This book is the first to be devoted entirely to fuzzy abstract algebra. It presents an up-to-date version of fuzzy commutative algebra, and focuses on the connection between  $L$ -subgroups of a group, and  $L$ -subfields of a field. In particular, an up-to-date treatment of nonlinear systems of fuzzy intersection equations is given. Contents:  $L$ -Subsets and  $L$ -Subgroups,  $L$ -Subgroups of Abelian Groups,  $L$ -Subrings and  $L$ -Ideals,  $L$ -Submodules,  $L$ -Subfields, Structure of  $L$ -Subrings and  $L$ -Ideals, Algebraic  $L$ -Varieties and Intersection Equations,  $L$ -Subspaces, Galois Theory and Group  $L$ -Subalgebras. Readership: Pure mathematicians. Keywords: Fuzzy Subsets; Fuzzy Subgroups; Fuzzy Subrings; Fuzzy Ideals; Fuzzy Submodules; Fuzzy Subfields; Fuzzy Varieties; Fuzzy Subspaces; Fuzzy Galois Theory; Fuzzy Group Subalgebras. Reviews: "The book is self-contained ... This will serve as a nice reference book for researchers in the field. It may also be used as a good text for an advanced graduate course. There are a good number of exercises at the end of each chapter of the book." Mathematical Reviews

*Algebraic Geometry and Commutative Algebra* Springer

This textbook, set for a one or two semester course in commutative algebra, provides an introduction to commutative algebra at the postgraduate and research levels. The main prerequisites are familiarity with groups, rings and fields. Proofs are self-contained. The book will be useful to beginners and experienced researchers alike. The material is so arranged that the beginner can learn through self-study or by attending a course. For the experienced researcher, the book may serve to present new perspectives on some well-known results, or as a reference.

*Commutative Algebra* Springer

For those looking for an introduction to the area of commutative algebra, this book opens all the right doors and provides a clarity of understanding that all will welcome.

**Methods of Homological Algebra** Cambridge University Press  
Grothendieck's beautiful theory of schemes permeates modern algebraic geometry and underlies its applications to number theory, physics, and applied mathematics. This simple account of that theory emphasizes and explains the universal geometric concepts behind the definitions. In the book, concepts are illustrated with fundamental examples, and explicit calculations

show how the constructions of scheme theory are carried out in practice.

*Finite Projective Modules* Springer Science & Business Media

This unique book on commutative algebra is divided into two parts in order to facilitate its use in several types of courses. The first introductory part covers the basic theory, connections with algebraic geometry, computational aspects, and extensions to module theory. The more advanced second part covers material such as associated primes and primary decomposition, local rings,  $M$ -sequences and Cohen-Macaulay modules, and homological methods.

*Trends in Commutative Algebra* Springer Science & Business Media

The landscape of homological algebra has evolved over the last half-century into a fundamental tool for the working mathematician. This book provides a unified account of homological algebra as it exists today. The historical connection with topology, regular local rings, and semi-simple Lie algebras are also described. This book is suitable for second or third year graduate students. The first half of the book takes as its subject the canonical topics in homological algebra: derived functors, Tor and Ext, projective dimensions and spectral sequences. Homology of group and Lie algebras illustrate these topics. Intermingled are less canonical topics, such as the derived inverse limit functor  $\lim^1$ , local cohomology, Galois cohomology, and affine Lie algebras. The last part of the book covers less traditional topics that are a vital part of the modern homological toolkit: simplicial methods, Hochschild and cyclic homology, derived categories and total derived functors. By making these tools more accessible, the book helps to break down the technological barrier between experts and casual users of homological algebra.

**From the Viewpoint of Normalization** Cambridge University Press

First textbook-level account of basic examples and techniques in this area. Suitable for self-study by a reader who knows a little commutative algebra and algebraic geometry already. David Eisenbud is a well-known mathematician and current president of the American Mathematical Society, as well as a successful Springer author.

*Introduction To Commutative Algebra* Courier Dover Publications

The main goal of this book is to find the constructive content hidden in abstract proofs of concrete theorems in Commutative Algebra, especially in well-known theorems concerning projective modules over polynomial rings (mainly the Quillen-Suslin theorem) and syzygies of multivariate polynomials with coefficients in a valuation ring. Simple and constructive proofs of some results in the theory of projective modules over polynomial rings are also given, and light is cast upon recent progress on the Hermite ring and Gröbner ring conjectures. New conjectures on unimodular completion arising from our constructive approach to the unimodular completion problem are presented. Constructive algebra can be understood as a first preprocessing step for computer algebra that leads to the discovery of general algorithms, even if they are sometimes not efficient. From a logical point of view, the dynamical evaluation gives a constructive substitute for two highly nonconstructive tools of abstract algebra: the Law of Excluded Middle and Zorn's Lemma. For instance, these tools are required in order to construct the complete prime factorization of an ideal in a Dedekind ring, whereas the dynamical method reveals the computational content of this construction. These lecture notes follow this dynamical philosophy.

*Commutative Algebra With A View Toward Alg* Springer Science & Business Media

This volume offers a compendium of exercises of varying degree of difficulty in the theory of modules and rings. It is the companion volume to GTM 189. All exercises are solved in full detail. Each section begins with an introduction giving the general background and the theoretical basis for the problems that follow.

A Homological Algebra Point of View American Mathematical Soc.

This book is a companion volume to Graduate Algebra: Commutative View (published as volume 73 in this series). The main and most important feature of the book is that it presents a unified approach to many important topics, such as group theory, ring theory, Lie algebras, and gives conceptual proofs of many basic results of noncommutative algebra. There are also a number of major results in noncommutative algebra that are usually found only in technical works, such as Zelmanov's proof of the restricted Burnside problem in group theory, word problems in groups, Tits's alternative in algebraic groups, PI algebras, and many of the roles that Coxeter diagrams play in algebra. The first half of the book can serve as a one-semester course on noncommutative algebra, whereas the remaining part

of the book describes some of the major directions of research in the past 100 years. The main text is extended through several appendices, which permits the inclusion of more advanced material, and numerous exercises. The only prerequisite for using the book is an undergraduate course in algebra; whenever necessary, results are quoted from Graduate Algebra: Commutative View.

**Basic Commutative Algebra** CRC Press

The theory of algebras, rings, and modules is one of the fundamental domains of modern mathematics. General algebra, more specifically non-commutative algebra, is poised for major advances in the twenty-first century (together with and in interaction with combinatorics), just as topology, analysis, and probability experienced in the twentieth century. This volume is a continuation and an in-depth study, stressing the non-commutative nature of the first two volumes of Algebras, Rings and Modules by M. Hazewinkel, N. Gubareni, and V. V. Kirichenko. It is largely independent of the other volumes. The relevant constructions and results from earlier volumes have been presented in this volume.