Rings Modules And Linear Algebra Mathematics Series Book

Insightful overview of many kinds of algebraic structures that are ubiquitous in mathematics. For researchers at graduate level and beyond.
Excellent textbook provides undergraduates with an accessible introduction to the basic concepts of abstract algebra and to the analysis of abstract algebraic systems. Features many examples and problems.
This is the first volume of a revised edition of P.M. Cohn's classic three-volume text Algebra, widely regarded as one of the most outstanding introductory algebra textbooks. This volume covers the important results of algebra. Readers should have some knowledge of linear algebra, groups and fields, although all the essential facts and definitions are recalled.
This volume provides a comprehensive introduction to module theory and the related part of ring theory, including original results as well as the most recent work. It is a useful and stimulating study for those new to the subject as well as for researchers and serves as a reference volume. Starting form a basic understanding of linear algebra, the theory is presented and accompanied by complete proofs. For a module M, the smallest Grothendieck category containing it is denoted by o[M] and module theory is developed in this category. Developing the techniques in o[M] is no more complicated than in full module categories and the higher generality yields significant advantages: for example, module theory may be developed for rings without units and also for non-associative rings. Numerous exercises are included in this volume to give further insight into the topics covered and to draw attention to related results in the literature.
Algebra
Algebras, Rings and Modules
A Guide to Groups, Rings, and Fields
Integral Closure of Ideals, Rings, and Modules
Lectures on Modules and Rings

There is no one best way for an undergraduate student to learn elementary algebra. Some kinds of presentations will please some learners and will disenchant others. This text presents elementary algebra organized accord ing to some principles of universal algebra. Many students find such a presentation of algebra appealing and easier to comprehend. The approach emphasizes the similarities and common concepts of the many algebraic structures. Such an approach to learning algebra must necessarily have its formal aspects, but we have tried in this presentation not to make abstraction a goal in itself. We have made great efforts to render the algebraic concepts intuitive and understandable. We have not hesitated to deviate from the form of the text when we feel it advisable for the learner. Often the presenta tions are concrete and may be regarded by some as out of fashion. How to present a particular topic is a subjective one dictated by the author's estima tion of what the student can best handle at this level. We do strive for consistent unifying terminology and notation. This means abandoning terms peculiar to one branch of algebra when there is available a more general term applicable to all of algebra. We hope that this text is readable by the student as well as the instructor. It is a goal of ours to free the instructor for more creative endeavors than reading the text to the students.

VI of Oregon lectures in 1962, Bass gave simplified proofs of a number of "Morita Theorems", incorporating ideas of Chase and Schanuel. One of the Morita theorems characterizes when there is an equivalence of categories mod-A R::! mod-B for two rings A and B. Morita's solution organizes ideas so efficiently that the classical Wedderburn-Artin theorem is a simple consequence, and moreover, a similarity class [AJ in the Brauer group Br(k) of Azumaya algebras over a commutative ring k consists of all algebras B such that the corresponding categories mod-A and mod-B consisting of k-linear morphisms are equivalent by a k-linear functor. (For fields, Br(k) consists of similarity classes of simple central algebras, and for arbitrary commutative k, this is subsumed under the Azumaya [51]1 and Auslander-Goldman [60J Brauer group.) Numerous other instances of a wedding of ring theory and category (albeit a shot gun wedding!) are contained in the text. Furthermore, in. my attempt to further simplify proofs, notably to eliminate the need for tensor products in Bass's exposition, I uncovered a vein of ideas and new theorems lying wholely within ring theory. This constitutes much of Chapter 4 -the Morita theorem is Theorem 4. 29-and the basis for it is a corre spondence theorem for projective modules (Theorem 4. 7) suggested by the Morita context. As a by-product, this provides foundation for a rather complete theory of simple Noetherian rings-but more about this in the introduction.

This book introduces a new point-set level approach to stable homotopy theory that has already had many applications and promises to have a lasting impact on the subject. Given the sphere spectrum S, the authors construct an associative, commutative, and unital smash product in a complete and cocomplete category of ``$S$-modules'' whose derived category is equivalent to the classical stable homotopy category. This construction allows for a simple and algebraically manageable definition of ``S-algebras'' and ``commutative S-algebras'' in terms of associative, or associative and commutative, products $R\wedge _SR \longrightarrow R$. These notions are essentially equivalent to the earlier notions of $A_{\infty }$ and $E_{\infty }$ ring spectra, and the older notions feed naturally into the new framework to provide plentiful examples. There is an equally simple definition of R-modules in terms of maps $R\wedge _SM\longrightarrow M$. When R is commutative, the category of R-modules also has an associative, commutative, and unital smash product, and its derived category has properties just like the stable homotopy category. These constructions allow the importation into stable homotopy theory of a great deal of point-set level algebra.

Classic monograph covers sets and maps, monoids and groups, unique factorization domains, localization and tensor products, applications of fundamental theorem, algebraic field extension, Dedekind domains, and much more. 1974 edition.
Groups, Rings And Modules With Applications
Exercises in Basic Ring Theory
Abstract Algebra
Foundations of Module and Ring Theory
Rings, Modules and Radicals

This textbook is designed for students with at least one solid semester of abstract algebra,some linear algebra background, and no previous knowledge of module theory. Modulesand the Structure of Rings details the use of modules over a ring as a means of consideringthe structure of the ring itself--explainin and "inductivereasoning" used in working on ring theory challenges and emphasizing modules insteadof rings.Stressing the inductive aspect of mathematical research underlying the formal deductivestyle of the literature, this volume offers vital background on current methods for solvinghard classification prob structures. Written in an informal butcompletely rigorous style, Modules and the Structure of Rings clarifies sophisticatedproofs ... avoids the formalism of category theory ... aids independent study or seminarwork ... and supplies end-of-chapter problems.This book serves as an excellent primary.text for upper-undergraduate and graduatestudents in one-semester courses on ring or module theory-laying a foundation formore advanced study of homological algebra or module theory.

This new book can be read independently from the first volume and may be used for lecturing, seminar- and self-study, or for general reference. It focuses more on specific topics in order to introduce readers to a wealth of basic and useful ideas without the hindrance of heavy machinery or undue abstractions. its abundance of examples illustrating the theory at virtually every step, the volume contains a large number of carefully chosen exercises to provide newcomers with practice, while offering a rich additional source of information to experts. A direct approach is used in order to present the material in an efficient way, thereby introducing readers to a considerable amount of interesting ring theory without being dragged through endless preparatory material.

This book is a self-contained elementary introduction to rings and modules, and should be useful for courses on Algebra. The emphasis is on concept development with adequate examples and counter-examples drawn from topics such as analysis, topology, etc. The entire material, including exercises, is fully

This textbook is designed for students with at least one solid semester of abstract algebra, some linear algebra background, and no previous knowledge of module theory. Modulesand the Structure of Rings details the use of modules over a ring as a means of consideringthe structure of the ring itself--explainin and "inductivereasoning" used in working on ring theory challenges and emphasizing modules insteadof rings.Stressing the inductive aspect of mathematical research underlying the formal deductivestyle of the literature, this volume offers vital background on current methods for solvinghard classification prob structures. Written in an informal butcompletely rigorous style, Modules and the Structure of Rings clarifies sophisticatedproofs ... avoids the formalism of category theory ... aids independent study or seminarwork ... and supplies end-of-chapter problems.This book serves as an excellent primary.text for upper-undergraduate and graduatestudents in one-semester courses on ring or module theory-laying a foundation formore advanced study of homological algebra or module theory

Rings, Modules, Algebras, and Abelian Groups
Rings and Their Modules
Advanced Algebra
Module Theory
Non-commutative Algebras and Rings

Basic Algebra and Advanced Algebra systematically develop concepts and tools in algebra that are vital to every mathematician, whether pure or applied, aspiring or established. Advanced Algebra includes chapters on modern algebra which treat various topics in commutative and noncommutative algebra and provide introductions to the theory of associative algebras, homological algebras, algebraic number theory, and algebraic geometry. Many examples and hundreds of problems are included, along with hints or complete solutions for most of the problems. Together the two books give the reader a global view of algebra and its role in mathematics as a whole.

Each undergraduate course of algebra begins with basic notions and results concerning groups, rings, modules and linear algebra. That is, it begins with simple notions and simple results. Our intention was to provide a collection of exercises which cover only the easy part of ring theory, what we have named the "Basics of Ring Theory". This seems to be the part each student or beginner in ring theory (or even algebra) should know - but surely trying to solve as many of these exercises as possible independently. As difficult (or impossible) as this may seem, we have made every effort to avoid modules, lattices and field extensions in this collection and to remain in the ring area as much as possible. A brief look at the bibliography obviously shows that we don't claim much originality (one could name this the folklore of ring theory) for the statements of the exercises we have chosen (but this was a difficult task: indeed, the 28 titles contain approximatively 15.000 problems and our collection contains only 346). The real value of our book is the part which contains all the solutions of these exercises. We have tried to draw up these solutions as detailed as possible, so that each beginner can progress without skilled help. The book is divided in two parts each consisting of seventeen chapters, the first part containing the exercises and the second part the solutions.

This Guide offers a concise overview of the theory of groups, rings, and fields at the graduate level, emphasizing those aspects that are useful in other parts of mathematics. It focuses on the main ideas and how they hang together. It will be useful to both students and professionals. In addition to the standard material on groups, rings, modules, fields, and Galois theory, the book includes discussions of other important topics that are often omitted in the standard graduate course, including linear groups, group representations, the structure of Artinian rings, projective, injective and flat modules, Dedekind domains, and central simple algebras. All of the important theorems are discussed, without proofs but often with a discussion of the intuitive ideas behind those proofs. Those looking for a way to review and refresh their basic algebra will benefit from reading this Guide, and it will also serve as a ready reference for mathematicians who make use of algebra in their work.

This monograph arose from lectures at the University of Oklahoma on topics related to linear algebra over commutative rings. It provides an introduction of matrix theory over commutative rings. The monograph discusses the structure theory of a projective module.

An Approach to Linear Algebra
Vol. 2: Ring Theory
Introduction to Rings and Modules
An Approach Via Module Theory
Determinantal Rings

Determinantal rings and varieties have been a central topic of commutative algebra and algebraic geometry. Their study has attracted many prominent researchers and has motivated the creation of theories which may now be considered part of general commutative ring theory. The book gives a first coherent treatment of the structure of determinantal rings. The main approach is via the theory of algebras with straightening law. This approach suggest (and is simplified by) the simultaneous treatment of the Schubert subvarieties of Grassmannian. Other methods have not been neglected, however. Principal radical systems are discussed in detail, and one section is devoted to each of invariant and representation theory. While the book is primarily a research monograph, it serves also as a reference source and the reader requires only the basics of commutative algebra together with some supplementary material found in the appendix. The text may be useful for seminars following a course in commutative ring theory since a vast number of notions, results, and techniques can be illustrated significantly by applying them to determinantal rings.
A clear and structured introduction to the subject. After a chapter on the definition of rings and modules there are brief accounts of Artinian rings, commutative Noetherian rings and ring constructions, such as the direct product, Tensor product and rings of fractions, followed by a description of free rings. Readers are assumed to have a basic understanding of set theory, group theory and vector spaces. Over two hundred carefully selected exercises are included, most with outline solutions.
This textbook provides a self-contained course on the basic properties of modules and their importance in the theory of linear algebra. The first 11 chapters introduce the central results and applications of the theory of modules. Subsequent chapters deal with advanced linear algebra, including multilinear and tensor algebra, and explore such topics as the exterior product approach to the determinants of matrices, a module-theoretic approach to the structure of finitely generated Abelian groups, canonical forms, and normal transformations. Suitable for undergraduate courses, the text now includes a proof of the celebrated Wedderburn-Artin theorem which determines the structure of simple Artinian rings.
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.
Advanced Modern Algebra: Third Edition, Part 2
A Further Course in Algebra Describing the Structure of Abelian Groups and Canonical Forms of Matrices Through the Study of Rings and Modules
A Further Course in Algebra, Describing the Structure of Abelian Groups and and Canonical Forms of Matrices Through the Study of Rings and Modules
Rings, Modules, and Algebras in Stable Homotopy Theory
Modules and the Structure of Rings

A first-year graduate text or reference for advanced undergraduates on noncommutative aspects of rings and modules.
Ideal for graduate students and researchers, this book presents a unified treatment of the central notions of integral closure.
This undergraduate text presents extensive coverage of set theory, groups, rings, modules, vector spaces, and fields. It offers numerous examples, definitions, theorems, proofs, and practice exercises. 1991 edition.
This book is an introduction to module theory for the reader who knows something about linear algebra and ring theory. Its main aim is the derivation of the structure theory of modules over Euclidean domains. This theory is applied to obtain the structure of abelian groups and the rational canonical and Jordan normal forms of matrices. The basic facts about rings and modules are given in full generality, so that some further topics can be discussed, including projective modules and the connection between modules and representations of groups. The book is intended to serve as supplementary reading for the third or fourth year undergraduate who is taking a course in module theory. The further topics point the way to some projects that might be attempted in conjunction with a taught course. Contents:Rings and IdealsEuclidean DomainsModules and SubmodulesHomomorphismsFree ModulesQuotient Modules and Cyclic ModulesDirect Sums of ModulesTorsion and the Primary DecompositionPresentationsDiagonalizing and Inverting MatricesFitting IdealsThe Decomposition of ModulesNormal Forms for MatricesProjective Modules Readership: Final year undergraduates and new graduate students in pure mathematics. Keywords:Module;Commutative Ring;Euclidean Domain;Fitting Ideal;Matrix Diagonalization;Invariant Factor;Elementary Divisor;Rational Canonical Form;Jordan Normal Form
Basic Algebra
Linear Algebra over Commutative Rings
Algebra II Ring Theory
Groups, Rings, Modules

Rings, Modules and Linear AlgebraChapman and Hall/CRC

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.

An account of how a certain fundamental algebraic concept can be introduced, developed, and applied to solve some concrete algebraic problems.

This book is an introduction to the theory of rings and modules that goes beyond what one normally obtains in a graduate course in abstract algebra. In addition to the presentation of standard topics in ring and module theory, it also covers category theory, homological algebra and even more specialized topics like injective envelopes and projective covers, reflexive modules and quasi-Frobenius rings, and graded rings and modules. The book is a self-contained volume written in a very systematic style: all proofs are clear and easy for the reader to understand and all arguments are based on materials contained in the book. A problem sets follow each section. It is suitable for graduate and PhD students who have chosen ring theory for their research subject.

Groups, Rings and Fields
Rings, Modules and Categories I
(Mostly) Commutative Algebra
A Primer
Rings, Modules and Linear Algebra

This volume consists of refereed research and expository articles by both plenary and other speakers at the International Conference on Algebra and Applications held at Ohio University in June 2008, to honor S.K. Jain on his 70th birthday. The articles are on a wide variety of areas in classical ring theory and module theory, such as rings satisfying polynomial identities, rings of quotients, group rings, homological algebra, injectivity and its generalizations, etc. Included are also applications of ring theory to problems in coding theory and in linear algebra.
This book is the second part of the new edition of Advanced Modern Algebra (the first part published as Graduate Studies in Mathematics, Volume 165). Compared to the previous edition, the material has been significantly reorganized and many sections have been rewritten. The book presents many topics mentioned in the first part in greater depth and in more detail. The five chapters of the book are devoted to group theory, representation theory, homological algebra, categories, and commutative algebra, respectively. The book can be used as a text for a second abstract algebra graduate course, as a source of additional material to a first abstract algebra graduate course, or for self-study.
Rings, Modules, Algebras, and Abelian Groups summarizes the proceedings of a recent algebraic conference held at Venice International University in Italy. Surveying the most influential developments in the field, this reference reviews the latest research on Abelian groups, algebras and their representations, module and ring theory, and topological
This book is designed as a text for a first-year graduate algebra course. The choice of topics is guided by the underlying theme of modules as a basic unifying concept in mathematics. Beginning with standard topics in groups and ring theory, the authors then develop basic module theory, culminating in the fundamental structure theorem for finitely generated modules over a principal ideal domain. They then treat canonical form theory in linear algebra as an application of this fundamental theorem. Module theory is also used in investigating bilinear, sesquilinear, and quadratic forms. The authors develop some multilinear algebra (Hom and tensor product) and the theory of semisimple rings and modules and apply these results in the final chapter to study group represetations by viewing a representation of a group G over a field F as an F(G)-module. The book emphasizes proofs with a maximum of insight and a minimum of computation in order to promote understanding. However, extensive material on computation (for example, computation of canonical forms) is provided.
Introduction to Ring Theory
Introductory Lectures on Rings and Modules
Fundamental Concepts of Abstract Algebra
Rings, Modules and Linear Albegra
A First Course in Module Theory