Commutative Algebra

Description: In this course students will learn about Noetherian rings and modules, Hilbert basis theorem, Cayley-Hamilton theorem, integral dependence, Noether normalization, the Nullstellensatz, localization, primary decomposition, DVRs, filtrations, length, Artin rings, Hilbert polynomials, tensor products, and dimension theory.

Prerequisites: Advanced Algebra

Course Objectives:

(1) Commutative Rings
(2) Prime and Maximal Ideals
(3) Modules
(4) Integral Dependence and Integral Clousers
(5) Localization
(6) Primary decomposition
(7) Rings of Fractions
(8) Chain Conditions on Rings and Modules
(9) Dimension Theory
(10) Tensor Product
(11) Length of Modules

References

[1] Atiyah, Michael, and Ian Macdonald. Introduction to Commutative Algebra. Reading, MA: Addison-Wesley, 1994. ISBN: 9780201407518.

[2] Sharp, R.y, Steps in Commutative Algebra, Second Edition, London Mathematical Society Student Texts (51), Cambridge University Press, Cambridge 2000.

[3] Eisenbud, David. Commutative Algebra: With a View Toward Algebraic Geometry. New York, NY: Springer-Verlag, 1999. ISBN: 9780387942698.