



## MATHEMATICS

# COMMUTATIVE ALGEBRA



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Department of Mathematics  
IIT Bombay

<b>TYPE OF COURSE</b>	: New   Elective   PG	<b>COURSE DURATION</b>	: 12 weeks (28 Jan'19 - 19 Apr'19)
<b>INTENDED AUDIENCE</b>	: ME / MSc / PhD	<b>EXAM DATE</b>	: 28 April 2019
<b>PRE-REQUISITES</b>	: Linear Algebra , Algebra – First Course , Commutative Algebra – Basic Course ; Homological Algebra – Elementary Level		

### COURSE OUTLINE :

The main purpose of this course is to provide important workhorses of commutative algebra assuming only basic course on commutative algebra. Special efforts are made to present the concepts at the center of the field in a coherent, tightly knit way, streamlined proofs and a focus on the coreresults. Virtually all concepts and results of commutative algebra have natural interpretations. It is the geometric view point that brings out the true meaning of the theory.

### ABOUT INSTRUCTOR :

Dilip P. Patil received B. Sc. and M. Sc. in Mathematics from the University of Pune in 1976 and 1978, respectively. From 1979 till 1992 he studied Mathematics at School of Mathematics, Tata Institute of Fundamental Research, Bombay and received Ph. D. through University of Bombay in 1989. Currently he is a Professor of Mathematics at the Departments of Mathematics, Indian Institute of Science, Bangalore and at present he is a Visiting Professor at the Department of Mathematics, IIT Bombay. He has been a Visiting Professor at Ruhr-Universität Bochum, Universität Leipzig, Germany and several universities in Europe and Canada. His research interests are mainly in Commutative Algebra and Algebraic Geometry.

### COURSE PLAN :

- Week 01** : Noether's Normalisation Lemma — Classical Version (Part -1)
- Week 02** : Noether's Normalisation Lemma — Classical Version (Part -2)
- Week 03** : Dimension of Graded Rings and Modules
- Week 04** : Digression on Basic Concepts
- Week 05** : Dimension Theorem
- Week 06** : Krull's Principal Ideal Theorem and its Generalisation
- Week 07** : Digression on the Language of Algebraic Geometry
- Week 08** : Regular Local Rings
- Week 09** : Homological Dimension of Modules and Global Dimension of Rings
- Week 10** : Homological Characterisation of Regular Local Rings
- Week 11** : Discrete Valuation Rings
- Week 12** : Dedekind Domains