INTRODUCTION TO COMMUTATIVE ALGEBRA

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TYPE OF COURSE : Rerun | Elective | PG
COURSE DURATION : 12 Weeks (18 Jan' 21 - 09 Apr' 21)
EXAM DATE : 24 Apr 2021

PRE-REQUISITES : Linear Algebra, Basic group theory and Basic ring theory including ED, PID & UFD.

INTENDED AUDIENCE : M.Sc. & Ph.D. Mathematics Students.

INDUSTRIES APPLICABLE TO :

COURSE OUTLINE :
This is an introductory course in Commutative Algebra where most basic tools on commutative rings and modules over commutative rings are developed. This course is essential for anyone who wants to do research in areas such as commutative algebra, algebraic geometry, algebraic number theory etc

ABOUT INSTRUCTOR :
I am Associate Professor at the Department of Mathematics, IIT Madras. My area of research is Commutative Algebra.

COURSE PLAN :

Week 1**:** Rings, ring homomorphism, ideals, quotients, zero divisors, nilpotents and units.

Week 2**:** Prime and maximal ideals, nilradical and Jacobsons radical

Week 3**:** Operations on ideals, extension and contraction.

Week 4**:** Modules and module homomorphisms, Submodules and quotient modules, Operations on submodules, Direct sum and product

Week 5**:** Finitely generated modules, Exact sequences, Tensor product of modules.

Week 6**:** Restriction and extension of scalars, Exactness properties of the tensor product.

Week 7**:** Localization

Week 8**:** Integral dependence, Going-up and Going-down theorems.

Week 9**:** Chain conditions, Noetherian rings

Week 10**:** Primary decomposition in Notherian rings.

Week 11**:** Artinian rings