MATH 596 - 101

2. TEXTBOOK

Irena Swanson and Craig Huneke, INTEGRAL CLOSURE OF IDEALS, RINGS, AND MODULES, LMS Lecture Series, Vol. 336, Cambridge University Press, New York, 2006.

3. SYLLABUS

WEEK	MATERIAL
1	**1**. **What is integral closure of ideals**: Basic properties; Integral closure via reductions; Integral closure of an ideal
2	Monomial ideals; Dedekind-Mertens formula
3	**2**. **Integral closure of rings**: Lying-over, incomparability, going-up, and going-down; Integral closure and grading
4	**3**. **Separability**: Algebraic separability; General separability; Relative algebraic closure
5	**4**. **Noetherian rings**: Principal ideals; Normalization theorems; Complete rings; Jacobian ideals
6	Serre's conditions; Affine and Z-algebras; Absolute integral closure; Absolute integral closure
7	Finite lying-over and height; Dimension one; Krull domains
8	**5**. **Rees algebras:** Rees algebras constructions; Integral closure of Rees algebras; Integral closure of powers of an ideal
9	Powers and formal equidimensionality; Defining equations of Rees algebras; Blowing up
10	**6**. **Valuations:** Valuations and the integral closure of ideals **7**. **Derivations:** Analytic approach
11	**8**. **Reductions:** Basic properties and examples; Connections with Rees algebras; Minimal reductions; Reducing to infinite residue fields
12	Superficial elements; Superficial sequences and reductions; Non-local rings
13-14	**12**. **The conductor:** The Lipman-Sathaye theorem **13**. **The Briancon-Skoda Theorem:** Tight closure; Briancon-Skoda via tight closure
14-15	The Lipman-Sathaye; General version

4. GRADING POLICY

Presentations	100
Take-home Exam (15 Problems)	100