Recap & exam

- Comm alg

- R a comm ring
- R-mods & R-algs
- Fin. gen mods & algebras
- Noetherian mods & rings
- Hilbert basis theorem
- Invariant theory :- graded algebras
  - symm. Functions
  - fund. Theorem
- Grobner bases for ideals in poly rings
- Duality between alg & geo :
  - varieties $\xleftrightarrow{(V,I)}$ ideals
  Apps of alg to geometry (Fin gen of varieties)
  Irreducibility
- Flavours of ideal (prime, radical etc)
- Nullstellensatz
- Coordinate rings
- Localization of rings & modules

Homological alg

- Exactness
- Chain complexes & homology.
- Homology as Functor.
- Homotopy
- Homology of spaces / simp. complexes
- Cohomology
- Pre additive & abelian cats - biproducts, kernels, cokernels
- Add & exact Functors - Freyd-Mitch. emls.
- Snake lemma, LES of homology
- Proj & inj resolutions
- Derived Functors; SES $\to$ LES
- Tensor prod of bimods
- Tor & ExT
- ExT & extensions
- Groups cohomology via ExT: Bar resolution cochain complex - H^1-crossed homs
- Simplicial resolutions briefly
- Hoschild cohomology

Rep. Theory

- G-modules
- Maschke's theorem
- Decomp into irreducibles
- complete set of irreducibles $U_1, \dots, U_n$
- Schur's lemma
- Decomp $U \cong \bigoplus U_i^{d_i}$
- $|G| = \sum \dim(V_i)^2$
- Calc of irreds For D_8, S_3.
- Tp of G-mods
- Characters
- Inner product & orthogonality
- Symmetric group S_n —
  - λ-tableaux
  - Specht mods.

Exam plan

- 20-25 mins
- Ask about concepts, theorems, constructions & some examples in The course.
- I won't ask For long proofs.
- If you read The notes, understand the concepts, you will be well prepared.
- 30% assignment.