

ALGEBRA QUAL PREP: PROBLEMS ON MODULES AND HOMOLOGICAL ALGEBRA

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1. STRUCTURE THEORY OF MODULES

You should know: Nakayama's lemma, the notion of finiteness and noetherianity for modules over a ring.

- (1) 2010 Fall A4
- (2) 2012 Fall M1

2. FLATNESS, PROJECTIVITY, INJECTIVITY

You should know: the definitions of free, flat, projective, and injective modules, and Baer's criterion for injectivity.

- (1) 2013 Fall A3
- (2) 2015 Spring Q2

3. HOMOLOGICAL ALGEBRA

You should know: the definition of a chain complex, how to compute free/projective resolutions, how to compute homology of a chain complex, how to compute Ext and Tor.

- (1) 2010 Spring M5
- (2) 2011 Fall M5
- (3) 2012 Spring M5
- (4) 2013 Spring M2
- (5) 2015 Fall Q2