PURE MATH 945: ALGEBRAIC CONSTRUCTIONS

- Professor: Jason Bell
- Office: MC 5008
- Office hours: Fri 11:00-12:30
- Email: jpbell@uwaterloo.ca
- Text: Course notes to be distributed
- Course website: http://www.math.uwaterloo.ca/∼jpbell/945W19.html

Material

Generators and relations: free semigroups, free algebras, rewriting systems, Gröbner-Shirshov bases, Dehn functions, Free groups, normal forms, subgroups of free groups, the ping-pong lemma, Burnside's problem, Burnside-Schur theorem for linear groups, Hilbert series, Golod-Shafarevich condition and Golod-Shafarevich groups, Growth functions, polynomially bounded groups and Gromov's theorem, Grigorchuk groups, Gelfand-Kirillov dimension, Division algebras, Quaternions, Hilbert's examples, Enveloping algebras of Lie algebras, universal property and the Poincaré-Birkhoff-Witt theorem, Growth of enveloping algebras, Ore condition, Tensor products, bimodules, balanced maps, universal property, tensor products of algebras, tensor categories, Ultraproducts, Malcev's theorem, injective versus surjective polynomials maps, Gromov's theorem revisited.

Outline

This course is intended to provide background on much of the basic constructions used in noncommutative algebra.

Determination of grades

Grades will be determined from the following data:

- assignments (50%);
- final project, due last day of class (30%);
- 20-minute lecture (20%).

There will be a total of four assignments that will be graded. Assignments will be posted on the course website. In addition to assignments, there will be a final project and a final talk.