

Inverse Semigroups for the Working Algebraist

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While every algebraist has come across groups, rings, associative and Lie algebras and even semigroups and monoids, inverse semigroups remain the poor cousin as an algebraic structure. This despite their playing a natural role in mathematics, appearing wherever partial automorphisms of structures are of interest.

The purpose of this lecture is to give a rapid introduction to the main results and techniques of inverse semigroup theory with an eye towards building enough tools to attack the word problem for special inverse monoids with one relator. Topics are listed below.

- 1) Definition of inverse semigroup. Wagner-Preston Theorem. Free inverse semigroups. Munn trees.
- 2) Schutzenberger graphs, with some examples.
- 3) E-unitary inverse semigroups and embedding of Schutzenberger graphs into Cayley graphs of the maximal group image.
- 4) Van Kampen diagrams and their use for $\text{Inv } w = 1$.
- 5) $\text{Inv } w = 1$ is E-unitary for w cyclically reduced.
- 6) $\text{Inv } w = 1$ is not in general E-unitary for reduced w .
- 7) Reduction of $\text{Mon } u = v$ to $\text{Inv } uv^{-1} = 1$.