North British Semigroups and Applications Network, Wednesday 11th April 2012

All talks will talk place in Frank Adams room 1 on the first floor of the Alan Turing building in the School of Mathematics, University of Manchester. (See overpage for a map and directions.)

Programme

12:00-12:30 Early arrivers meet for lunch (in the ground floor cafe of the Alan Turing Building)

12:30-13:30 Peter Higgins (Essex)
Products in transformation semigroups: work with the late John M. Howie,

In 1966 John Howie showed that the semigroup of all non-permutations on a set of cardinal n is generated by E, its set of idempotents. This may not have been the deepest and most difficult of Howie's papers but it did set the stage for a wealth of similar results on generation by idempotents, nilpotents and other special elements. In 1978 Howie published his 'gravity formula' that gives the number of idempotents required, which is, for a mapping a, $n + c(a) - f(a)$, where $f(a)$ is the number of fixed points of a and $c(a)$ is the number of cyclic orbits. This was also proved independently by Iwahori in 1977 and indeed there were sporadic results of this kind in earlier literature.

However, this formula and Howie's techniques became a model whereby factorizations in semigroups of mappings came to be described in terms of various combinatorial aspects of the mappings. Howie also tackled the question of idempotent generation for arbitrary (in general infinite) base sets in a series of later papers.

About 15 years ago I began a collaboration with John Howie and Nik Ruskuc (and later James Mitchell and others) on the topics of rank and generating sets and this became the most fruitful joint work in which I have participated. In the first half of this talk I will summarise some of the most eye-catching and important results of this programme. In the second part I will show my latest set of results from a paper dedicated to John that has just been accepted by Semigroup Forum. In this paper I focus on, for reasons that will become clear, the subsemigroup (for it is a subsemigroup) EH formed by taking the product of the idempotents with an arbitrary $\mathcal{H}$-class in the finite full transformation semigroup. The outcome involves interesting applications of Hall's Marriage Lemma and the standard questions of identifying regular elements and characterizing Green's relations hold some real surprises.

13:30-14:30 Miklos Hartmann (York)
E-unitary almost factorizable orthodox semigroups

My talk is based on results obtained by Maria Szendrei and me. It is well known that an inverse semigroup is E-unitary and almost factorizable if and only if it is isomorphic to a semidirect product of a semilattice by a group.

In case of orthodox semigroups, the situation is more complicated. I will give a necessary and sufficient condition for an orthodox semigroup to be E-unitary and almost factorizable, and show that every such semigroup is isomorphic to a so-called Q-product of a band by a group. I also show that the class of E-unitary almost factorizable orthodox semigroups is bigger than the class of semidirect products of bands by groups.

14:30-15:00 Coffee and Proving of Theorems

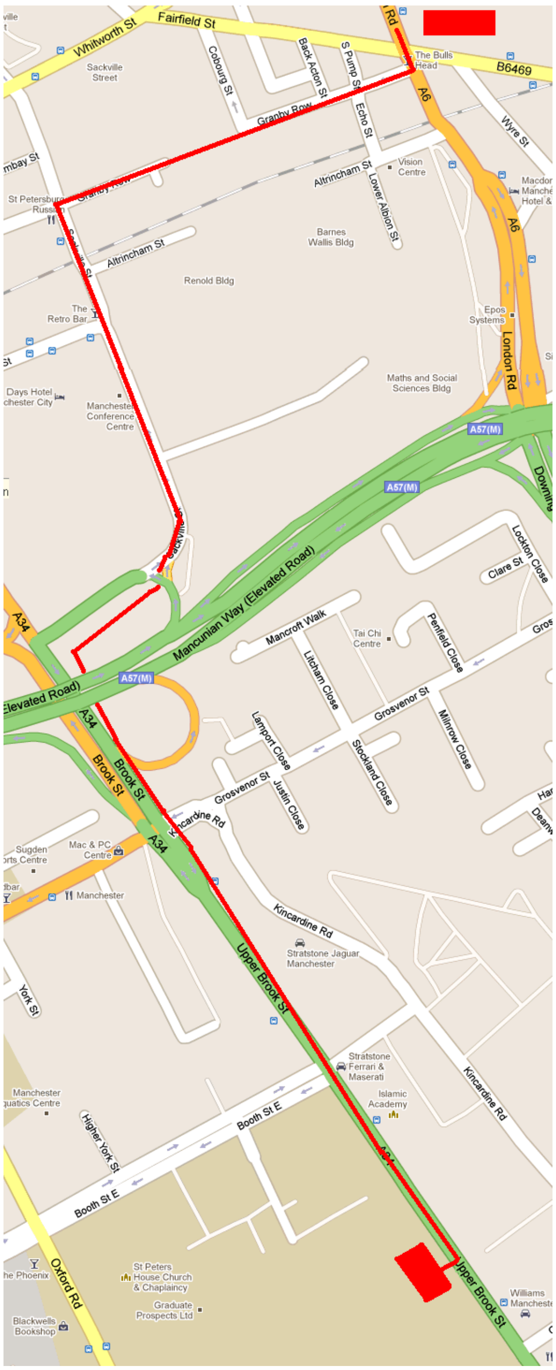
15:00-16:00 Sarah Rees (Newcastle)
Artin groups and monoids; normal forms and the group word problem

16:00-17:00 Des FitzGerald (Tasmania)
Categorification for binary relations

17:00 Close, followed by early dinner.
For those able to stay afterwards, we will be going out for an early dinner at a restaurant in the vicinity of Piccadilly railway station. It would be very helpful if you could let us know if you intend to join us for dinner.

Directions from Manchester Piccadilly station

Walking from Manchester Piccadilly to the Alan Turing Building should take around 20 mins.



Leave the station by the Fairfield Street exit (head down the escalators or lift from the main concourse) which brings you out at a big road junction.

Cross both main roads, and go along a smaller road (Granby Row) to the left of the Bull's Head pub.

Keep straight on, as the road becomes a pedestrian walk and then a road again, and at the phoneboxes turn left onto Sackville Street. (**Please note that part of Granby Row is currently closed for building works:** when you reach the closure, follow the sign-posted diversion to the left under the railway, bear right parallel to the railway, and then turn left onto Sackville Street to rejoin the route described.)

Continue under a bridge between buildings, and where the road bends off to the right, follow the left-hand pavement which becomes a footpath and goes through an underpass.

Afterwards, keep left under the motorway flyover (avoiding a deeper underpass ahead) before bearing right (avoiding yet another underpass to the left).

After very carefully crossing the motorway sliproad, you find yourself on Brook Street. Walk down this (away from the flyover).

At the intersection with Grosvenor Street, cross both roads and then continue along (now Upper) Brook Street on the opposite side.

Cross the next side-road (Booth Street East, carefully again!), continue past the Aquatics Centre car park and then the Alan Turing Building is on your right. To get into the building, go into the walkway after the second "finger" and then the doors are on your right.

Once inside the building, take the stairs (or lift) located on your right-hand side to the first floor. Go through the door to your left (the office should now be in front of you with the lift on the wall behind). Follow the walkway adjacent to the office all the way to the end. The Frank Adams rooms will be on your left.