

# Final report to PIMS for the Mostly Manitoba, Michigan, and Minnesota Combinatorics Graduate Student Workshop

## 1 Event Name

Mostly Manitoba, Michigan, and Minnesota 2016 Combinatorics Graduate Student Workshop (MMMM 2016).

## 2 Location

University of Manitoba, Winnipeg, Manitoba, Canada

## 3 Dates

- 29 April 2016: Participants visiting from out of town arrived on the evening of 29 April 2016 and an informal welcome reception was held at the hotel restaurant.
- 30 April 2016: Lectures and presentations were held all day with a conference dinner in the evening.
- 1 May 2016: Lectures and presentations in the morning with lunch after the final talk.

## 4 Topic

This meeting was a two day graduate student workshop with talks given by graduate students and invited experts. Topics for this workshop included graph theory, finite geometries, designs, and extremal combinatorics.

## 5 Methodology

The methodology of the conference was lectures and research presentations. Four participants who were not able to travel to attend the workshop gave their presentations remotely using the video conferencing site `appear.in` connected to the projector and speakers in the lecture room.

## 6 Objectives achieved

Graduate students were able to share their excitement about their research. Students received feedback on their results, but also feedback on their presentations and future research plans. Students also received exposure to types of combinatorics done at other universities.

Survey talks were given in fields that most students (and some faculty) had not been exposed to. For example, educational lectures were given on configurations, orthogonal matrices, graph limits and flag algebras (recent powerful techniques in graph theory). Some classical combinatorics included old Erdős-type distance problems, applications of number theory to geometric graph theory, and some old unsolved problems in graph colourings. In all, there were five survey/educational talks, expanding the perspectives of nearly all researchers in attendance.

## 7 Scientific highlights

The organizers were delighted to see that at least two researchers chose this conference to be the first at which their results were announced. For example, a student from Computer Science announced his result regarding intersecting families, settling a very stubborn open problem with a fairly straightforward proof. Another result about sequenceable groups was given, with the work being finished only very recently. The conference was only one and a half days, not leaving too much time for collaboration; however, younger attendees got to know colleagues that they can communicate mathematics with in the future.

## 8 Organizers

Local organizers:

- Gunderson, David, Department of Mathematics, University of Manitoba.
- Gunderson, Karen, Department of Mathematics, University of Manitoba.

Other organizers:

- Froncek, Dalibor, Department of Mathematics and Statistics, University of Minnesota Duluth.
- Kreher, Donald, Department of Mathematical Sciences, Michigan Technological University.

## 9 Speakers/Presenters

See list of titles and abstracts attached. A copy of the schedule is also attached.

## 10 Links

- Workshop website:  
<http://server.math.umanitoba.ca/~kgunderson/workshops/MMMM/MMMM2016.html>

## 11 Comments/Miscellaneous

Plans are already underway for this conference to be held at University of Minnesota at Duluth. We anticipate many more attendees for at least two reasons. First, those attending this conference in Winnipeg were very pleased with the event and have expressed desire to participate at next year's event. Also, while planning this conference, many colleagues from Minnesota and Michigan expressed interest in sending their students, but were challenged with the distances involved.

Shortly after the conference, we received many wonderful letters of thanks. Two local undergraduate summer students also attended most of the talks, and were delighted to be able to participate. Some participants expressed their gratitude for PIMS and U. of Manitoba's organization and assistance. For example, the poster produced by Claire Kiernan was a big hit. The local organizers, in particular, were grateful to PIMS for the resources to put on such a professional meeting.