



LEHIGH
UNIVERSITY.

Department of Mathematics A. Everett Pitcher Lecture Series

presents

Maria Chudnovsky

Associate Professor

*Industrial Engineering and Operations Research
Columbia University*

“Perfect Graphs— structure and recognition”

Monday, March 16, 2009

7:30pm, Sinclair Auditorium, Lehigh University
Lobby Reception at 7:00pm

Second Lecture

Excluding Induced Subgraphs

Tuesday, March 17, 2009

4:10pm, Sinclair Auditorium

Third Lecture

Packing Seagulls in Graphs with

No Stable Set of Size Three

Wednesday, March 18, 2009

4:10pm, Sinclair Auditorium

The lectures are held in honor of A. Everett Pitcher, who was secretary of the AMS from 1967 until 1988. Pitcher served in the mathematics department at Lehigh from 1938 until 1978, when he retired as Distinguished Professor of Mathematics. He died on December 4, 2006, at the age of 94.

Open to the public, free of charge. For more information, call 610-758-3731 or visit <http://www.lehigh.edu/math/web/pitcher.html>



LECTURE 1:

Title: Perfect Graphs |
structure and recognition

Abstract:

A graph is called perfect if for every induced subgraph, the size of its largest clique equals the minimum number of colors needed to color its vertices. As it turns out, the notion of perfect graphs generalizes a large number of phenomena, both in graph theory and in combinatorial optimization. Therefore, the problems of characterizing perfect (or minimal imperfect) graphs and finding an efficient recognition algorithm have become well known in both communities. In 1960's Claude Berge made a conjecture that any graph with no induced odd cycles of length greater than three or their complements is perfect (thus, odd cycles of length greater than three and their complements are the only minimal imperfect graphs). This conjecture is known as the Strong Perfect Graph Conjecture, and for over forty years it was one of the central problems in Graph Theory. In this talk we will outline the main ideas of the recent proof of the Strong Perfect Graph Conjecture (this is joint work with Robertson, Seymour and Thomas), and of the polynomial time recognition algorithm for perfect graphs (this part is joint with Cornuejols, Liu, Seymour and Vuskovic).

LECTURE 2:

Title: Excluding induced subgraphs

Abstract:

In this talk we will survey some results concerning the structure and properties of families of graphs defined by excluding certain induced subgraphs. In addition to perfect graphs, that were the subject of the first lecture, we will discuss claw-free graphs, even-hole-free graphs and others.

LECTURE 3:

Title: Packing seagulls in graphs with no stable set of size three

Abstract:

Hadwiger's conjecture is a well known open problem in graph theory. It states that every graph with chromatic number k , contains a certain structure, called a "clique minor" of size k . An interesting special case of the conjecture, that is still wide open, is when the graph G does not contain three pairwise non-adjacent vertices. In this case, it should be true that G contains a clique minor of size t where $t = \lceil |V(G)|/2 \rceil$. This remains open, but Blasiak proved it in the subcase when $|V(G)|$ is even and the vertex set of G is the union of three cliques. Here we prove a strengthening of Blasiak's result: that the conjecture holds if some clique in G contains at least $|V(G)|/4$ vertices. This is a consequence of a result about packing seagulls" (a "seagull" is an induced 2-edge path), that gives a necessary and sufficient condition for when graph with no stable set of size three contains k pair-wise disjoint seagulls. This is joint work with Paul Seymour.

BIO:

Maria Chudnovsky received her B.A. and M.Sc. from the Technion, and a Ph.D. from Princeton University in 2003. Currently she is an associate professor at Columbia University. Before that she was a Veblen Research Instructor at Princeton University and the IAS, and then an assistant professor at Princeton. Until April 2008 she was a Clay Mathematics Institute research fellow. Her research interests are in graph theory and combinatorial optimization.

Recently, she was a part of a team of four researcher that proved the Strong Perfect Graph Theorem, a forty year old conjecture, that had been a well known open problem in both graph theory and combinatorial optimization.