MATH 480
Senior Seminar
Spring 2009

The Gentle Art of Abstract Writing

An *abstract* is essentially a written preview, or "teaser," for your talk. It lets a potential listener decide whether or not to come to your talk and answers the questions "who?," "what?," "when?," and "where?," and oftentimes it briefly addresses the question "how?."

Many of these questions are answered in a quick and straightforward fashion, before the abstract itself even begins! For instance, in answering "who?" one typically gives the name and affiliation of the speaker:

Dr. Josephine J. Johnson, Dunderry Polytechnic Institute.

The queries "when?" and "where?" are answered simply by giving the time and location of the scheduled talk, as soon as they are known:

Halsey Hall, Room 2033 B,
1:00 a.m., Monday, October 2nd.

Please note that it is generally *not* the speaker's job to provide time and location for the talk; this might be provided instead by a conference or seminar organizer.

The other questions will involve a little more information.

Answering "what?" typically involves both the title of the talk (generally the first piece of information given, preceding the abstract proper) and much of the content of the abstract itself. It is never a bad idea to include at least two or three sentences providing the potential auditor with a background for the topic to be addressed by the talk: in what field did the central problem arise? How does the problem addressed fit in with the general theory? What other scholars have considered the problem in the past? Usually this information is provided as clearly and concisely as possible, without great use of technical terminology.

Once the scene is set, the speaker must indicate the topic of the talk itself: what theorem will be proven? What particular aspect of the field will be covered? Will connections with other results be made, and in what way?

Depending on the nature of the intended audience, the speaker may wish to include a few more technical details concerning the course the talk will take. How, for instance, will the speaker attempt to demonstrate the stated results? Of what nature will the speaker's proof be?

Finally, an abstract may often close with a line indicating the background the listener should be expected to have: "This talk will be accessible to an undergraduate audience," or "some knowledge of basic group theory is assumed."

On the reverse are a few abstracts, for actual talks given earlier this semester. Further examples can be found on the course website, as well as on the website for the Mathematics Department's Research Seminar.

Title: *Graph dynamical systems and Coxeter groups*

Abstract: A graph dynamical system consists of

(i) a graph where each vertex has a state,
(ii) a sequence of vertex functions, and
(iii) an update scheme which specifies how to compose the functions to yield the dynamical system map that governs the discrete time evolution.

This is a natural framework for mathematically representing interaction-based or complex systems. In contrast, a Coxeter group is a group generated by involutions, or reflections. In this talk, I will show how both of these fields share similar underlying mathematical themes involving graph theory, algebra, and geometric combinatorics. By studying the mathematics involved, we are able to extend results in both fields, as well as further unify the two. Along the way, I will outline numerous open problems and ripe research projects. Additionally, I will illustrate a connection to yet others areas of mathematics, including the representation theory of quivers, and node firing games.

Title: *Discovering mathematics in computational biology*

Abstract: BIO2010, a report published in 2003 by the Committee on Biology Undergraduate Education, identified the need to foster quantitative, computational and mathematical skills in future biologists in order to prepare them for modern research. But just what are the connections between mathematics, computational science, and biology that BIO2010 points to? As mathematicians and computer scientists, we are not typically exposed to much biology, and thus may not know of the rich opportunities for applications in the biological sciences.

This talk will offer a glimpse at a selection of areas where mathematics, modeling, computational science and biology are nicely intertwined, as well as investigate specific examples that utilize some of the computational tools available to students and faculty interested in getting more acquainted with the field of computational biology.

Title: *Some practical applications of graph theory to interconnection networks*

Abstract: Interconnection networks of various types are modeled by graphs and desirable properties of the networks such as fault-tolerance or short transmission paths can be translated into corresponding graph properties. We will first discuss examples of important features of interconnection networks and the properties of graphs that affect these features. Then we will expand on an example to show how graph theory was applied to solve a concrete telecommunication network problem.