

**Department of Mathematical Sciences  
COLLEGE OF Arts & Sciences**

**SUMMER RESEARCH OPPORTUNITIES  
FOR UNDERGRADUATE WOMEN**

**APPLICATION DEADLINE: March 1, 2014**

*The Department of Mathematical Sciences is pleased to offer the following research project for the summer of 2014. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.*

**Project title: Mathematics of Fractals**

**Professor Mihaela Poplicher  
Department of Mathematical Sciences  
5428C French Hall West  
Cincinnati, OH 45221-0025  
Tel: (513) 556-1223  
Fax: (513) 556-3417  
Email: [mihaela.poplicher@uc.edu](mailto:mihaela.poplicher@uc.edu)**

**Project Description**

Fractals have been known for more than a century and have been observed in different branches of sciences. It is only relatively recently though that they have become a subject of mathematical study; the pioneer of the mathematical theory of fractals was Benoit Mandelbrot whose book *Fractals: Form, Chance and Dimension* was first published in 1977.

The endeavor of independent study of the geometry, analysis, and arithmetic of fractals is one of the best ways for a young mathematician to acquire an active knowledge of the basic mathematical tools. Ideally, the student interested in this study of fractals would have passed the Calculus sequence, Differential Equations, Linear Algebra and will have basic knowledge of Euclidean Geometry. However, a student who is motivated can make-up the gaps in her/his background along the way.

We will start at the very elementary level and progress as much as possible. The student will work in the Department of Mathematical Sciences and will have the opportunity to meet the faculty members, graduate students and other undergraduate students. The student will learn and present his/her understanding of fractals in general, and the Sierpinski Gasket and the Apollonian Gasket in particular. The study will also include applications of fractals in sciences and everyday life (snowflakes, for instance).

